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State of Urban Household Drinking Water Security Situation in Bamenda North West Region, Cameroon

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Abstract

Urban water governance is a rising challenge across the third world countries where the population is increasingly combating water crisis. The situation in the city of Bamenda has obliged the population to resort to doubtful sources and is exposed to water borne diseases despite the multiple water supply systems in the city. The study aimed to assess the state of urban household drinking water in the city of Bamenda. In order to meet the objective, a total of 420 questionnaires were administered to households in the three Sub-Divisions of the city accompanied by interviews. Data was analysed by use of the Statistical Package for Social Sciences (SPSS) version 25, Microsoft excel and Microsoft word 2016. Findings reveal that, multiple water supply sources prevail in the city (pipe borne water 65%, boreholes 18.6%, wells 8.3%, and spring/stream 8.1%) with three major pipe borne water suppliers. Approximately 25% of the study population obtained water from sources located off their premises and an average of 79.9% of the 25% spend over 30 minutes trekking for over a kilometre to fetch water. There is high financial cost in acquiring home water connection with an average rate of 200,000 FCFA (333.26 U.S Dollar). Since 2005 the city population has not met the minimum water of 50 l/p/d. In order to solve the water insecurity within the city, the

study proposed that all water providers should ensure transparency, accountability, participation, the development of new water infrastructures and improvement on existing ones and financial support from the state.

Keywords: Urban water, Urban household, Drinking water security, Water treatment, Stakeholders, Bamenda

1. Introduction

Urban water governance is a rising challenge across third world countries where the population is increasingly combating with water crisis (Seijger *et al*., 2018; Navaneeth, *et al.*, 2021). Rapid population growth has not only increased the demand for water and sanitation services for a large and diverse urban population but also revealed that a rapidly growing, vulnerable segment of the population is being underserved**.** The growing demographic trend can be an opportunity for cities to better articulate urban water policies with broader strategic pathways at local and national levels. While water challenges have long been seen through a rural lens given their implications on agriculture and food security, they have increasingly become a prominent urban issue (OECD, 2022). Africa's water situation is worsening and obtaining clean water is a daily challenge for an increasing number of African households (Daniel, 2022). In Sub-Saharan Africa, only 24% of the population has access to safe sources of drinking water and water quality deterioration is a major threat among communities. It is estimated that thousands of people in Africa die from diseases linked to improper hygiene, poor sanitation, and contaminated water yearly (Oluwasanya, *et al*., 2022).

Cameroon is blessed with abundant water resources that if well harnessed could provide potable water to the communities without difficulties (Kometa *et al*., 2020). With total renewable water resource supplies of about 285.5 Km^3 per year, Cameroon accounts for about 15 % of the total water resources in the Central Africa Sub-Region. Among African countries, Cameroon ranks second in water resource potentials after the Democratic Republic of Congo with an available quantity of water resource estimated to be 322 billion cubic meters. This gives annual available water per inhabitant of 21,000 m^3 (Ako *et al*., 2010). However, despite the abundance of water in the country, this resource is not being harnessed efficiently to satisfy the needs of her more than 18 million inhabitants (Oumar and Tewari, 2012). That is why the national policy of the government of Cameroon as enshrined in its vision 2035 prescribes the intention to increase access to water in Cameroon from 40% to 75% (MINEPAT, 2022). As such the state of Cameroon, the local government and the communities in the city have all been engaged in the provision of drinking water. The multiple water schemes in the city have not been able to meet the needs of its population. As a result, this has caused urban water insecurity in the city and pushed the population to doubtful sources of water leading to water borne diseases. It is against this background that the study seeks to assess the state of urban household drinking water security and governance within the City of Bamenda.

2. Study Area, Methods and Materials

2.1 Study Area

Bamenda is located in the North West Region of Cameroon between latitude 5^{o} 56' North of the equator and longitude 10.09^{o} and 10.11^{o}East of the Greenwich Meridian. The city is made up of three Sub-Divisions namely Bamenda I, Bamenda II and Bamenda III. The climate of Bamenda is principally the Guinea-Savannah type marked by two distinct seasons. These are the dry season (from October to February) and the rainy season (from mid-March to mid – October) with heavy rainfall ranging from 2000 to 3000mm per year. The annual average temperature exceeds 19^{o}C. The city shows a wide variety of rugged relief with altitudes ranging from 1300m to 2600m above sea level which falls within the Cameroon Volcanic Line (CVL).

2.2 Methods

The tools employed for data collection included both secondary and primary sources (field observation, interview, questionnaires and documentary analysis). Quantitative and qualitative data were obtained from 420 household heads from the projected population of 767,613. The questionnaires were framed to collect data on accessibility to drinking water (sources, location, and trips to water sources), availability (regularity in flow, storage methods) affordability (cost of water), and quality (based on organoleptic properties, treatment methods). Responsibilities for water fetching (gender and age), methods of water transportation and challenges faced were all inclusive in the questionnaires.

Interviews were conducted with the Regional Delegate of Camwater and the chief of quality control of Camwater supply scheme, the Mayor of Bamenda III Council water and the head of the purification centre. For the Nkwen water supply, the head of management of the water supply was interviewed and two sessions of focus group discussions were held in the Nkwen Palace to collect primary data from the households (consumers) and institutional heads. In this study, triangulation was established by comparing the interview results with the feedbacks obtained from the focus group discussions. The focus was on the "perceived quality" from the users' perspectives as opposed to "technical quality". Analyses were performed with the help of the Statistical Package for Social Sciences (SPSS) version 25, Microsoft excel and Microsoft word 2016.

3. Results

3.1 Water Sources and Authorities in Charge of Water Supply in Bamenda

Multiple water sources prevail in the city of Bamenda with different authorities in charge in its supply. The main water sources identified for household include pipe borne water 65% (273), boreholes 18.6% (78), wells 8.3% (35), and spring/stream 8.1% (34). Rainfall and water from vendors were also a means through which some inhabitants of the city obtained water. The three major pipe borne water supply authorities within the city of Bamenda were identified including Camwater (Camwater Down-Town and Camwater Up-Station). Camwater Down-Town supply pipe borne water to Bamenda II and Bamenda III

Sub-Divisions while Camwater Up-Station supplies water to Bamenda I Sub-Division only. Camwater is a State-owned water utility and is found in all the ten Regions of Cameroon. The second major pipe borne water supplier identified within the city of Bamenda is the Bamenda III Council Water Scheme realised by the Bamenda III Council in association with the German group of engineers who adopted the name *Trinkwasser fur Kamerun* (Association for the promotion of Drinking water supply in Cameroon). The water scheme supply water only within the Bamenda III Sub-Division or Municipality to a population of over 63,955. The water quality provided by the Bamenda III council is the German standard and Camwater is the World Health Organization (WHO) standard. The third major pipe borne water scheme within Bamenda III Sub-Division is the Nkwen Water Supply scheme realised by the community and serves over 2000 customers.

Apart from pipe borne water, boreholes, wells and springs were identified as major water sources. The boreholes were both private and public provided by individuals, NGOs and Councils to the communities within the city. The high rate of boreholes wells and springs (18.6%, 8.3% and 8.1% respectively) serving households are due to the irregularity in piped water and limited coverage of the city. A significant number of people using these sources are still served with pipe borne water and these sources serve as an alternative. Another source through which the population of the city obtains water is from water vendors, which is either pipe borne, well or borehole. This is a small but significant means through which some inhabitants of the city obtain their drinking water. Another source is through rainfall which serves the population on a seasonal basis.

3.2 Location of Water Points and Distance Factor

Pipe borne water is located within the building, in the vicinity or off household premises. In line with the location of water, 49% of the households indicated that their water is located within their building (piped within the house with multiple sources). This is followed by 26.2% of households whose water is within their premises and 24.8% out of their premises. This statistical indicator implies that one-quarter of the population of Bamenda cover a long distance in search of water and consequently spends productive time to fetch water. The location of water has a great impact on water usage and availability. Water fetching off household premises is generally accepted to be more common in rural areas but in the urbanizing Bamenda, significant proportion of the population still fetch water away from their homes (24.8%). This is a significant figure which shows the degree of low household connectivity of piped water to homes and water scarcity. The distance covered and time taken to fetch water are assessed and presented in Table 1. In terms of distance covered to and from a water source, 5.8% cover <100m and 11.5% between 100-1000m. However, 82.7% cover more than 1000m. This shows that three quarters of the 24.8% fetching water away from home cover more than a kilometer which is equivalent to 20.5% as illustrated in table 1.

Table 1. Distance Covered to Fetch Water

Distance (meters)			Time (minutes)		
	N	%		N	%
<100	6	5.8	<5	8	7.7
100-1000	12	11.5	5-30	15	14.4
1000^{+}	86	82.7	$31\text{-}60^{+}$	81	77.9
	104	**100**		**104**	**100**

Source**:** Field Work, 2023

The time taken for households to get water off household premises and return home was equally calculated and ranged from less than 5 minutes to more than an hour. In table 1, 7.7% of the respondents trekked for less than 5 minutes for a round-trip to fetch water while 14.4% spent between 5-30 minutes. Conversely, 77.9% of the respondents indicated that they spent between 31 to 60^{+} minutes for a round-trip. The water collection time is a good indicator of water availability as it takes into account distance, waiting time, and to a certain extent the effort needed to obtain it. Besides to time was the queue time observed to be very high in the morning and in the afternoons. Queue times were highest for public water sources and lesser for privately owned water sources provided to the public such as a protected borehole and well. The queue time ranged from 5 minutes to 2.42 hours. This gives an average queue time of 1.23hrs. In most public stand pipes, protected boreholes, wells and protected springs, it was observed that it took more than 3 munities to fill a 20liters container especially in the dry season.

3.3 Quantity of Water Demanded and Supplied

The frequency of water supply was structured into four rubrics. Regularity of water supply was harmonized with the frequency of water cuts, the communication of water rationing schedules and the perceived quality of water supplied. The frequency of water supplied is presented in Table 2 which reveals that there is no uniform supply of water to the population of Bamenda by Camwater, Nkwen Community Water and Bamenda III Council water. 7.9% of households revealed that the supply of water is constant.

Table 2. Frequency in the Supply of Water

Frequency	Major water suppliers					
	Camwater		Nkwen Water Supply		Bamenda III Council Water	
Regularity of water supply	Frequency	%	Frequency	%	Frequency	%
Constant	25	7.9	2	20	8	53.3
Not constant	246	78.1	6	60	6	40
Rarely	44	14	2	20	1	6.7
	315	**100**	**10**	**100**	**15**	**100**

Source: Field Work, 2023

This was followed by 34.3% who specified that their water supply was not constant, while 78.1% indicated that their supply was very rare. For Nkwen water supply, 20%, 60%, and 20% respectively were for constant, not constant and rarely. With regard to the Bamenda III council water supply, results 53.3% indicated that their water supply was constant while 40% indicated that it was not constant. Only 6.75% indicated that they rarely have water supply. Based on the regularity of water supply therefore, Bamenda III council water ranks first followed by Nkwen water supply and lastly by Camwater.

The study investigated the overall quantity of water supplied and demanded based on household needs. The quantity of water consumed by a household per day ranged from less than 50L to above 250L as shown in Table 3. Households with less than 50 litres of water consumption represent the highest with 49% while households with more than 250 litres represented the lowest with 1.4%. This figure shows that there is a critical household water insecurity situation in Bamenda. The UN suggests that each person needs 20-50 litres of water a day to ensure their basic needs for drinking, cooking and cleaning with a daily drinking water requirement per person per day of 2-4 litres. This is not the case in the Bamenda city where a greater part of the population (98.6%) does not have access of up to $250L^{+}$ of water daily. The quantity of water demanded is a direct contrast to the quantity supplied. Only 1.4% of the population need less than 50 litres of water a day while 33.8% need above 250L of water a day.

The relationship between the quantity of water supplied and quantity demanded was derived from Table 3. At less than 50L, the quantity demanded is in contrast what is supplied. That is 1.4% and 49% for the quantity demanded and supplied respectively. Between 100-150 L, the quantity of water demanded is almost equal to the quantity supplied with 13.3% and 17.2% respectively for the quantity demanded and the quantity supplied. From 151-200 L, the quantity demanded outpaces the quantity supplied by 10.5%. This difference runs from 24.5% at 201-250 L and 32.4% at 250^{+}L.

Table 3. Quantity of Water Demanded and Quantity Supplied

	Quantity Supply		Quantity Demanded	
Quantity (litres)	Frequency	Percentage	Frequency	Percentage
<50	206	49	6	1.4
51-100	93	21	21	5
101-150	72	17.2	56	13.3
151-200	31	7.6	76	18.1
201-250	11	3.8	119	28.3
250^{+}	7	1.4	142	33.8
	420	100	420	100

Source: Field work, 2023

3.4 Responsibility for Water Fetching and Mode of Transportation

Given that 25% (104) of the population of Bamenda city fetch water off premises, the study investigated those responsible for fetching water for the household. This responsibility is presented in Table 4. In line with the responsibilities for fetching water, for the household 87.5% was by adults (60.6% women) and 26.9 men). Also involved in the water collection process are children of below 18years with girls representing 7.7% and boys 4.8%. Consequently, the female gender bear more responsibility for water collection.

Table 4. Age Group Involved in Fetching Water

Age group	Frequency	Percentage	
Male > 18years	5	4.8	12.5
Female > 18 years	8	7.7	
Adult women (18+ years)	63	60.6	
Adult men (18+ years)	28	26.9	
	104	100	

Source: Field work, 2023

Although it is often said that females are more responsible for water fetching especially in the developing countries, the city of Bamenda shows that a significant proportion of males are involved in water fetching (31.7%). This high percentage of adult men involved in water fetching (26.9%) was attributed to the socio-political crisis in the region that has come with a lot of insecurity and also because most of these men use their vehicles and bikes to fetch water off household premises for their families.

The study investigated the means of water transportation from water sources off the household premises. In this regard the population indicated that they used one of the following four methods; by head, by vehicle, by motorbike and hand truck for transporting water as illustrated in Figure 1. As presented in Figure 1, more than half of the population (51.9%) transport water from source to the home by head load. This was followed by the use of vehicles representing 26.9%, motorbike; by 13.5% and hand truck; 7.7%.

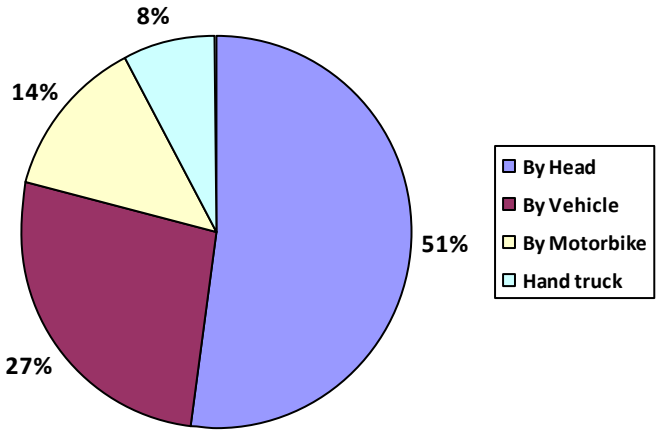

Figure 1. Mode of Water Transportation

Source: Field Work 2022

3.5 Organoleptic Properties of Drinking Water

The water quality was assessed using the perception of the households in terms of organoleptic properties (taste, odour, and colour). The degree of water quality varies with the different providers.

Table 6. Water Quality Assessment Based on Organoleptic Properties

Organoleptic properties	Camwater		Nkwen W S		Bamenda III C. W	
	Freq	%	Freq	%	Freq	%
Colour	205	65	7	16	8	13
Taste	41	13	4	10	4	6
Odour	22	7	2	5	3	5
All of the above	38	12	5	11	6	9
None of the above	9	3	24	58	42	67
Total	315	100	42	100	63	100

Source**:** Field Work 2023

From table 6, consumers of Camwater indicated that 65% of their water has colour, 13% indicated the element of taste and 7% reported that they smelled odour (an unpleasant smell). While 12% acknowledge the presence of colour, taste and smell, only 3% of respondents indicated that there did not experience any of the organoleptic properties in their drinking water.

For Nkwen water supply, the population reported low level of colour, taste and smell in their water by 16%, 10%, and 5%. While 11% of the population acknowledge the presence of taste, odour, and colour, 58% indicated that they did not experience organoleptic properties (taste,

odour, and colour) in their water. For Bamenda III Council water supply, only13%, 6%, and 5% acknowledged the presence of colour, taste and odour in their water respectively with 9% indicating the availability of all of the organoleptic properties. Of more importance, a significant number of respondents (67%) indicated the absent of none of the organoleptic properties in their water. The perception of water quality was supported by the households' regularity in treating water before consumption.

3.6 Household Water Treatment Methods

As regards possible methods of water treatment at the household, 93.3% of the population indicated that they treat their water while 6.7% do not. The treatment methods used are as follows: let the water stand and settle, use of water filter, boiling, and chlorination. According to the population treating water at home, 40.8% allow their water to stand and settle, followed by 30.6% who use water filter. Chlorination and boiling methods are used by 13% and 11% of the population respectively. Cloth straining is used by 4.3% of households. The high rate of water treatment at home illustrates the poor water quality supplied.

Protected water sources do not guarantee that water is safe. This is because from the source to the home especially for water sources located off household premises, a lot of contamination can take place before the water reaches the home. The frequency of water treatment was spatialized on the major water suppliers and this revealed the quality of water as perceived by their consumers based on three rubrics shown in Figure 2. Figure 2, illustrates that 75% of Camwater consumers constantly treat their water, 18% sometimes treat it and 7% rarely do. With regards to Nkwen water supply, 42% indicated that they constantly treat water and 28% of the population sometimes do. However, 30% indicated that they rarely treat the water at home. For Bamenda III Council water Scheme, only 15% of the inhabitants indicated that they treat the water constantly and 31% sometimes or irregularly. A significant number of the population (54%) rarely treat the water. The spatialisation of water treatment by various suppliers captured the degree of water quality by the various providers.

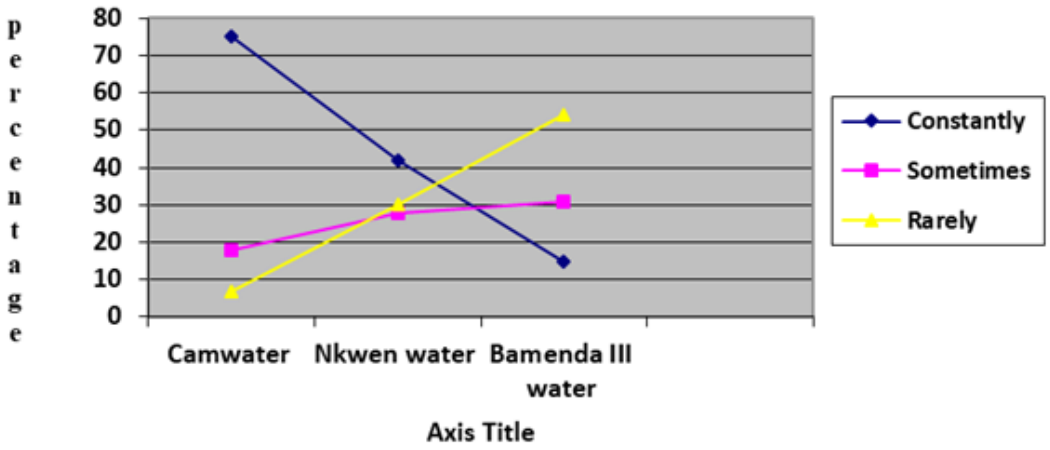

Figure 2. Frequency of Household Water Treatment from Different Suppliers

Source: Field work, 2023

3.6.1 Household Water Storage Facilities and Capacities

The irregular supply of water has caused the population to resort to water storage with 99.5% of them indicating that they own water storage facilities while 0.5% do not. The containers identified for water storage are jerry cans, drums (plastic/metallic), bucket (plastic/metallic), plastic bottles and tanks. Findings reveal that 54% use plastic jerry can container. The other container used are drums (plastic/metallic) (59, 14%), bucket (plastic/metallic) (76, 18%), plastic bottles (46, 11%) and tanks (13, 3%). The capacities of these containers owned by households vary and depend on the household size and water needs. The results obtained shows that 15% own storage containers with a capacity of <100L. For water storage facilities of 100-250L, 35% of the population own them, while 39% own storage containers of 251-500L. Only 11% indicated that they owned storage facility of above >500L.

3.7 Cost of Water, Population Growth and Per Capita Water in Bamenda

The actual amount the population pays for water was assessed and limited to household with piped water. Table 7 shows the cubic unit price of water charged by Camwater and Bamenda III and the annual cost for Nkwen water. From table, consumers of Camwater with < $10m^3$ pay 293FCFA per m^3 while those who consume above this limit pay 364 FCFA per m^3. This was accompanied by a monthly meter rent of 930 FCFA. For Bamenda III Council water, the price per cubic metre of water is 200FCFA and the payment is done after every three months. For the consumers of Nkwen water, the payment is done annually with a different rate for students, stand tap per household, household with water closets toilets and institutions. For those households with a single tap and no water closets in their homes, the amount paid is 7000 FCFA per year while households with water closets pay 10000FCFA per year and students 2000FCFA per year.

Table 7. Cost of Water supplied by the Providers

Service provider	Area coverage by Sub-Division	Payment frequency	Price per cm^3 (FCFA)
Camwater	Bamenda I, II & III	Monthly	293/364 FCFA
Bamenda III council water	Bamenda III	After every 3 months	200FCFA
Nkwen water supply	Bamenda III	Yearly	7000 per year (Single tap per household)
			10000 (Household with water closets toilets)
			2000 (Student)
			Institutions (Base on its water consumption)

Source: Field Survey, 2023

These monthly and annual amounts is affordable but consumers complain of an average

200,000 FCFA paid before installation and when combined with the cost of piping water which is also influenced by the size of the pipe, the total cost become very high for households. For water vendors, the price per 20liters is between 25-50 FCFA depending on the water source and quality. The cost for Bamenda III council public stand taps is 25 FCFA per20liters.

Water supply in the city of Bamenda is divided into two compartments; Up-Station Bamenda and Down-Town Bamenda. Up-Station Bamenda is supplied by Camwater and not connected with Down-Town Bamenda served by Camwater Downtown and Bamenda III council water schemes. This result in distinct calculations for the per-capita water for Bamenda I, Bamenda II and III municipalities from 2005 to 2022. Nkwen water supply was excluded due to lack of production figures. The minimum water requirements per person was calculated and presented in Table 8 illustrates that, for the year 2005, the per capita per day water for Bamenda I was 59.9 l/c/d which met the minimum requirement according to the WHO standards of 50 l/c/d. From 2010 to 2022, the per capita water started decreasing below the minimum requirement due to population growth in Bamenda II and III, the minimum standard was not met even in 2015 when the Bamenda III council water scheme added 6,500,000 litres of water per day; an increase from 35.8 l/c/d to 41.1 l/c/d between 2010 to 2015 respectively. The decreasing trend continues to fall and by 2022 only 29.4 l/c/d was recorded.

Table 8. Daily Water Output and Population Growth for Bamenda city

Year	Daily water output for Camwater Up-Station	Bamenda I Population	l/c/d	Daily water output for Camwater & Bamenda III Down-Town	Bamenda II Population	Bamenda III Population	l/c/d
2005	1700000L	28359	59.9 l/c/d	14200000 L	201,764	110,253	45.5 l/c/d
2010	1700000 L	36022	47.2 l/c/d	14200000 L	256,284	140,045	35.8 l/c/d
2015	1700000 L	45756	37.2 l/c/d	20700000 L *(14200000 + 6500000)	325,536	177,887	41.1 l/c/d
2020	1700000 L	58120	29.2 l/c/d	20700000 L	413,501	225,955	32.4 l/c/d
2022	1700000 L	63955	26.6 l/c/d	20700000 L	455,016	248,642	29.4 l/c/d

Source: Camwater, Bamenda III and Field Work 2023
*Camwater and Bamenda III combined for 2015

The overall trend of the per capita water for the entire city is illustrated in Figure 3. According to the Figure, only Bamenda I municipality in 2010 attained the minimum water requirement per person due to low population. Since then, the overall per capita water has been decreasing for the city. The situation became worst after 2015 due to the socio-political crisis in the region that triggered immigration into the city from neighbouring towns and villages without any increase in water production.

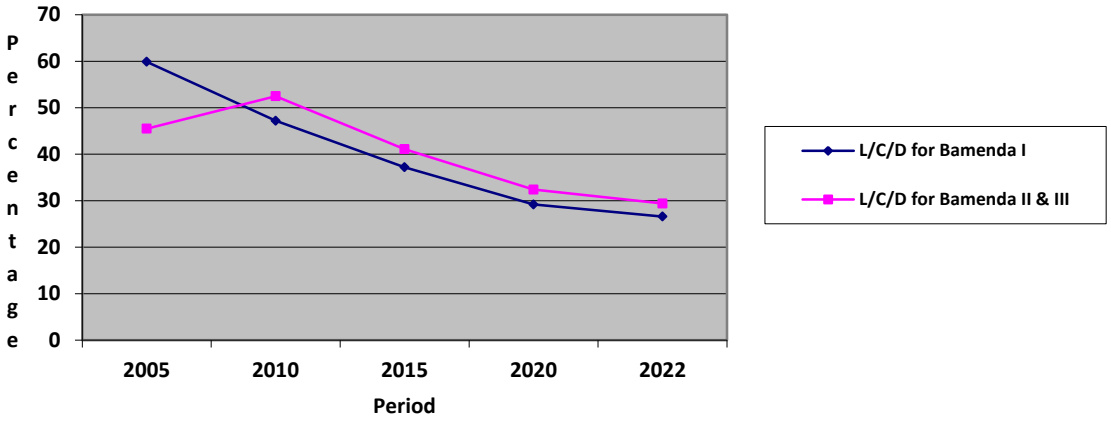

Figure 3. Quantity and Trend in Water Supply per Person per Day (2005-2022)

Source: Camwater, Bamenda III and Field Work, 2023

3.8 Problems of Water Supply

The study realised several water supply challenges in the city. These challenges hinder the smooth functioning of the water supply schemes and water supply to the households). The problems of water supply in the city identified are presented in Figure 4 and are natural and human. From Figure, financial and infrastructural challenges occupied the first position with 17.4% each. Much money is required to expand the water supply system to newly settled areas, payment of workers, daily repairs, treatment, energy provision and the expansion of the schemes given the rapid population growth and urbanization which are overwhelming. The outdated infrastructures need complete change which requires much money especially for Camwater whose infrastructure date back to 1962. This is followed by seasonal variation (climate change) (14.3%) and is the lone physical challenge causing the scarcity of raw for streams/rivers supplying the water treatment plants. Other challenges are population growth and urbanization (13.1%), corruption (12.4%), lack of transparency accountability and participation (TAP) (8.8%) socio-political crisis (7.6%), stakeholder engagement challenge (6%) and disability exclusiveness (3.6%). Disability exclusiveness is a challenge faced by those living with disabilities due to lack of inclusiveness in public water facilities like taps, boreholes, wells and springs.

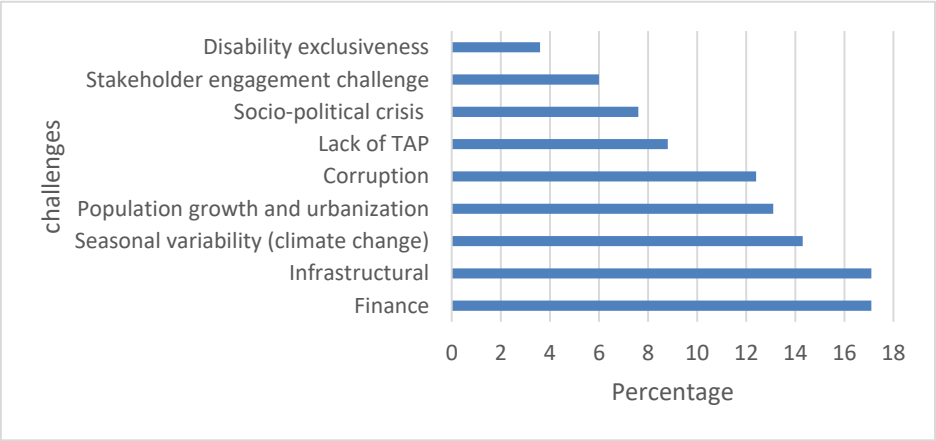

Figure 4. Problems of Water Supply

Source: Field Work, 2023

4. Discussion

The study revealed multiple sources of water for the population of the city with high coverage of pipe borne water (65%) and 35% from alternative water sources such as boreholes, wells and springs. This is in line with the findings of Banerjee *et al.*, (2008) who stated that piped water is readily available in urban areas in Africa than rural areas. City dwellers who do not obtain water from water utility sources get it from wells and boreholes. A significant number of urbanites in the city have gained access to pipe borne water (63%) but 24.8% of the population still fetch their water off the household premises.

Base on the distance and time spent to fetch water, the study revealed that 24.8% of the population still fetch water from off household premises. As such 82.7% of those fetching water off household premises trek over 1000m and spent over 30-60+ minutes daily. According to Howard and Bartram (2003); WHO and UNICEF (2017) these are people who are considered not to have access to water. However, 17.3% of the population that trek between <100-1000 metres and 22.1% who spend <5-30 minutes are considered as the population with basic water availability by Howard and Bartram (2003); WHO and UNICEF (2017).

There is high financial cost in obtaining or acquiring home water connection. This cost has been illustrated by the different billing methods and the average cost of 200,000 FCFA (333.26 U.S Dollar) in obtaining water at home which is for more than four months income for those earning 50,000 FCFA per month. This is contrary to the WHO (2003) provisions that the cost for water services should not exceed 5% of a household's income, meaning services must not affect people's' capacity to acquire other essential goods and services, including food, housing, health services and education. But acquiring water within the home in the city must affect meeting other needs according to Howard *et al.*, (2003).

Analysis indicated that there is less accessibility to water in the city and that between 2005

and 2022, the per capita water is declining despite increase in the number of water suppliers in the city. Currently, the city water supply is not able to meet the WHO (2017) minimum water standards for urban areas of 50 l/c/d. The decreasing supply has caused the population to resort to doubtful sources of water accompanied by frequent and doubtful household water treatment methods to which improves the microbiological quality of household water and reduce the burden of diarrhoeal disease.

The study revealed multiple challenges which account for insecurity in household drinking water supply in the city with human challenges accounting for 90% of the problems and only 1% for natural problem (seasonal variation). These problems lead to limited water supply (availability) and doubtful quality. These challenges are similar to those identified by the OECD (2016) in their study on water governance in cities and Khatri and Kalanithy (2007) in their study of challenges for urban water supply and sanitation in the developing countries.

5. Conclusion

The objective of the study was to assess the state of urban household drinking water in the City. Data revealed that between 2005 and 2022, the population has not been able to obtain minimum water standards as per the WHO and UNICEF specifications and 24.8% of the population trek up to 1000m and spend up to an hour to fetch water while significant financial cost is required to obtain home water connection. Population growth in the city of Bamenda has been accompanied by increase in water supply but decrease in water per capita. In order to solve the water insecurity in the city, the study proposed that all stakeholders should ensure transparency, accountability and participation especially by water supply companies. The development of new water infrastructures and improvement on existing ones will increase water supply for the city. Furthermore, improvement in rural urban linkages is vital since city water is harnessed from the rural milieu with increase in agricultural activities, encroachment into water catchments and the effective settlement of the socio-political crisis in the region. There is need for the state of Cameroon to invest more in the water sector to help realise minimum water requirements.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Macrothink Institute.

The journal’s policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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