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Improved drinking water planning challenges in Urban Households' in Bamenda city, Cameroon

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Abstract

Access to improved drinking water remains a fundamental need and a basic human right vital for the dignity and health of all people. There is an urgent need to increase access to improved drinking water in urban households in Bamenda city where a low proportion currently appears to be having access. There also exist marked disparity in access amongst the different Sub-divisions which is still to be scientifically investigated. This study sets out to investigate the improved drinking water planning challenges in urban households in Bamenda, Cameroon. The study used systematic field observation, household surveys and administration of 520 copies of questionnaire to urban household heads as primary sources of data collection. The administration of the 520 copies of questionnaire was carried out using purposive and simple random sampling techniques within Bamenda I, II and III Sub-Divisions. Primary data were matched with secondary source information obtained from WHO, UNICEF, UN, CDC, UNDP, PAHO and The University of Bamenda Central Library. Findings revealed that standpipes (41.3%), protected dug well (51.9%), piped water connected to households (54.8%), boreholes (61.9%), rain water collection (63.3%) and spring water harnessed to households (38.6%) constitutes the main urban households improved drinking water sources. Also, natural factors (33.67%) and planning-related challenges (63.33%) work together to limit access to improved drinking water to households. Field observation and measurements revealed that less than 5 urban households share a common water source, while other 42.88% cover <50m to get to the nearest improved drinking water source point. The study highlights that improved drinking water in Bamenda city is currently a limited and non-basic service. The study recommends the expansion of improved drinking water infrastructure by the relevant stakeholders, systematic data collection on factors affecting access to improved drinking water by urban households for better decision making, seek ways to increase accessibility of improved drinking water by the government via MINEE and MINDUH and finally, households should build water towers to store water for continuous use.

Keywords: Access; Households; Improved; Planning; Water

1. Introduction

Through their Joint Monitoring Programme (JMP) for Water Supply and Sanitation, WHO/UNICEF considered improved drinking water sources as those that are likely to be protected from outside contamination and from faecal matter in particular, including piped water into dwellings, plot or yard, public tap/stand pipe, tube well/borehole, protected dug well, protected spring and rainwater collection (WHO, 2024; Decio, 2015). Access to improved drinking water is a fundamental need and a basic human right vital for the dignity and health of all people. The health and economic benefits of improved water supply to households and individuals are well documented. The use of an improved drinking water source is a proxy for the use of 'safe' drinking water (WHO, 2024). However, it does not necessarily mean access to "clean water" (UNICEF and WHO, 2011).

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According to a report by the JMP, global coverage rate for improved drinking water source increased from 76% in 1990 to 89% in 2012. This illustrates that almost 1.6 billion people now get water through a piped connection and 700 million access water through other improved sources such as public taps, protected wells and boreholes (WHO/UNICEF, 2014). Over half of the world's population has access to improved water through household connections or yard tap (WHO, 2004). It was estimated that between 1990 and 2008, an estimated 1.77 billion people gained access to improved sources of drinking water. During this period (1990-2008), the proportion of the world's population with access to improved drinking water sources increased from 77% to 87%. This constituted an increase of almost 1.8 billion people worldwide and did put the world well on track for meeting the MDGs drinking water target of 89% (UNICEF and WHO, 2011). As part of the Millennium Development Goals, the international community did set a goal of reducing the proportion of people without sustainable access to safe drinking water by 50 percent by 2015 compared to its level in 1990 (UN, 2010). To this effect, more than 2 billion people globally gained access to improved water sources from 1990 to 2010 (Salaam-Blyther, 2012). In the developing countries, some 2 billion people gained access to improved water sources from between this period (1990 to 2010). In Southeastern Asia for instance, the coverage rate for access to improved drinking water gained from piped on to premises (dwellings, plots or yards) increased from 17% in 1990 to 30 % in 2012 (Decio, 2015). Of this number, almost half lived in China or India (Salaam-Blyther, 2012). In Sub-Saharan Africa (SSA), an estimated 53.6% of the population had access to improved drinking water in 2017 (Gaffan *et al*., 2022). In Kenya for example, the State Department noted the Coca-Cola partnership "leveraged $15 million in private funds to provide improved access to clean water for 500,00 people (Salaam-Blyther, 2012).

A household is considered to have access to an improved water source if it gets drinking water primarily from a private standpipe, a public standpipe, a protected spring, a dug well with a pump, rain water, a water vendor, or a tank truck. Sources such as rivers, lakes, ponds and unprotected wells are regarded are unimproved water sources to households (Abebaw, 2011). To meet the criteria for a safely managed drinking water service, households must use an improved source that is "accessible on premises, available when needed and free from contamination", corresponding to requirements articulated in the United Nations recognition of the human right to water (WHO/UNICEF, 2022). In 2010, some 63% of households in Timor-Leste had access to improved source of drinking water, while 36% used unimproved sources of drinking water (Timor-Leste National Statistic Directorate, 2010 cited in Decio, 2015). In the developing countries, a percentage ranging from 68.5% to 97.6% of households using water from an improved source was recorded in Ethiopia, Ghana, Malaysia, Eswatini and Vietnam. Bangladesh in 2021 for instance, reported a proportion of 99.5%. In Benin, some 71.75% of households use improved drinking water facilities (Gaffan *et al*., 2022).

Diverse forms of disparities exist vis-à-vis access to improved drinking water around the globe as the proportion of the population that uses it varies significantly by country and region. For instance, Less Developed Countries (LDCs) have seen an increase of only 7 percentage points (from 54% to 61%) in the use of improved drinking water sources and Other Lower-Income Countries (OLICs) have seen an increase of 11 percentage points (from 68% to 79%). Meanwhile, Lower Middle-Income Countries (LMICs) saw an increase of 16 percentage points (from 72% to 88%) and Upper Middle-Income Countries (UMICs) saw an increase of 8 percentage points (from 88% to 96%) (UNICEF and WHO, 2011).

Worldwide, 1.1 billion people who gained access to improved water from piped water on premises reside in urban areas, compared to 438 million residing in rural areas (WHO/UNICEF, 2014). As such, over 86% of the urban population have access to improved drinking water sources (Pan American Health Organisation [PAHO], 2011). Over the first five years of the United Nations' Sustainable Development Goals (SDGs), urban drinking water coverage stayed at 96%. By 2020, it was established that 84 countries accomplished universal access to at least basic drinking water services (UN, 2010). The number of urban dwellers who gained access to improved drinking water between 1990 and 2008 was 1.052 billion, while the total urban population increased by 1.089 billion (UNICEF and WHO, 2011). In the Southeast Asia region, the urban drinking water coverage for improved water supplies is 92%, while the coverage of improved drinking water supplies in rural areas is 81% (WHO/UNICEF, 2014). Across 35 countries in SSA, over 90% of the richest quintile in urban areas use improved water sources and over 60% have piped water on their premises. In the poorest rural quintile, however, piped water is non-existent (Salaam-Blyther, 2012).

Despite calls for universal access to improved drinking water by households, many millions of people remain without access to basic drinking water services (CDC, 2024). An estimated 748 million people worldwide are without an improved source of improved drinking water (Decio, 2015). The number of people without access to an improved drinking water source increased by 38 million in urban areas and decreased by 346 million in rural areas. In 2002, 1.1 billion people lacked access to improved water sources, which represented 17% of the global population (WHO, 2004). Though 1.77 billion people gained access to improved drinking water between 1990 and 2008, by the end of 2008, some 884 million people still lacked access to improved water sources. At that rate of progress, some 672 million people were estimated not to use improved drinking water sources in 2015 and many hundreds of millions more still lacked sustainable access to safe drinking water (UNICEF and WHO, 2011). In 2020, 489 million people worldwide still lacked

access to improved drinking water facilities-water points that can deliver safe water because of their design and construction, including 122 million people using surface water (river, dam, lake, pond, stream, canal or irrigation canal) for drinking water (Gaffan *et al*., 2022). For instance, the Timor-Leste Population and Housing Census of 2010 reported that only 66% of people in Timor-Leste had access to drinking water from improved sources (Decio, 2015).

Of the estimated 884 million people without access to improved sources of drinking water in 2008, the majority were in the developing countries. In Latin America and the Caribbean, despite progress in expanding coverage of improved drinking water sources, 7% of the population remain without access to improved water sources (PAHO, 2011). Some 37% lived in SSA, 25% in Southern Asia, 17% in Eastern Asia and 9% in South-Eastern Asia. Worse still, the use of piped water on premises is lowest in SSA, Southern Asia and South-Eastern Asia (UNICEF and WHO, 2011). Also, of the 1.1 billion without improved water sources in 2002, nearly two thirds lived in Asia (WHO, 2004). Africa is home to 40% of all people without access to an improved drinking-water source (WHO, 2011). In SSA for instance, some 42% of the population is still without improved water (WHO, 2004). Here, progress in expanding clean water coverage is modest where the proportion of the population that depends on unimproved sources has declined only slightly, from 52 percent in 1990 to 44 percent in 2004 (UNDP, 2006). As such, it is clear that SSA was not on track to meet the sustainable access to safe drinking water target because in 2008, some 40% of the total population still lacked access to improved drinking water sources, as compared to 51% in 1990 (UNICEF and WHO, 2011). In Ethiopia for instance, access to improved drinking water is relatively poor throughout, with some regions experiencing more limited access than others (Belay and Andualem, 2022). In Benin, the results of the Fourth Demographic and Health Survey (DHS-IV) showed that despite progress in terms of household access to improved drinking water sources, the use of water from unprotected wells is still widespread (15%), with 3.6% of households using surface water for drinking water (Gaffan et al., 2022).

The factors accounting for failures to increase access to improved drinking water across regions and countries varies considerably. Some countries and regions are failing to increase access because of rapid population growth. In addition to population growth, the process of rapid urbanization presents another challenge. The proportion of the world's population that lived in urban areas increased from 43% in 1990 to 50% in 2008 (WHO/UNICEF, 2011). In Africa, population growth is the highest of all regions of the world, which has outstripped the number of people gaining access to improved drinking water (UNICEF and WHO, 2011). In SSA, population growth outstripped the number of people gaining access to improved drinking water sources between 1990 and 2008. According to the estimates of the UN Population Division, the population of SSA grew by 304 million people over the period 1990-2008, while only 237 million gained access to improved drinking water. Here, 12 countries have each seen an increase of more than 1 million people in the absolute number of people without access since 1990, despite making significant progress in providing drinking water to millions more people and seeing increases in proportional coverage between 1990 and 2008 because of unprecedented population increase (UNICEF and WHO, 2011). Besides population growth, improved drinking water supply schemes in many developing countries are not functioning properly, limiting access to improved drinking water to the population (Vasquez *et al*., 2009; Kleemeier, 2000). More so, the growth of informal settlements and poor environmental sanitation hinder efforts to increase access to safe drinking water in urban areas (UNICEF and WHO, 2011).

The lack of or inadequate access to improved drinking water is not without consequences to the population. Due to lack of its access, nearly one-sixth of the world's population obtains drinking water from unimproved sources (UNDP, 2006). Also, many people in developing countries continue to rely on unimproved water sources with their attendant negative health effects. More so, the increase in the total number of urban dwellers without access to improved drinking water, which includes those who rely on water from carts and tankers, means that more people may be forced to pay extortionate prices for drinking water (UNICEF and WHO, 2011).

Though marked variations exist, household access to drinking water in Cameroon improved from 70% in 2006 (Ako *et al*., 2020) to 79.4% in 2020 (Voluntary National Review of Cameroon [VNR], 2022). The variation was 88% for urban areas and 47% in rural areas. Cameroon falls within the countries of SSA that faces 50-75% challenges in increasing the use of improved drinking water sources (UNICEF and WHO, 2011). This is the same scenario in Bamenda city, headquarters of the Northwest Region of Cameroon where improved drinking water is considered a limited and non-basic service (Khan, 2024). The choice and justification to carry out this study in Bamenda city is the fact that as result of rapid population increase in Bamenda due to high natural growth rate and the influx of IDPs into urban neighbourhoods since the advent of the socio-political crisis in the Northwest and Southwest (NOSO) regions which turned violent in 2017, poor and inadequate improved drinking water facilities, proliferation of informal settlements, rapid urbanisation, pollution resulting from poor waste disposal/use of agro-chemicals and poor environmental hygiene and sanitation, access to improved drinking water sources by urban households seems to remain limited. More so, the factors affecting access to improved drinking water sources in the city are not yet identified and understood. Till date, the proportion of urban households having access to improved drinking water sources in the city and the disparity

in access amongst the sub-divisions is not known. This study seeks to investigate improved drinking water planning challenges in urban households in Bamenda city of Cameroon and make salient recommendation. It adds case evidence of Bamenda city in Cameroon to existing literature, a country where evident and spatial data on improved drinking water in urban households is missing, compared to other countries in the sub-region like Benin, Ethiopia and Kenya.

2. Study area and research methods

2.1. Study Area

Bamenda is the largest town in Mezam Division and serves as the regional headquarters of the North West Region. It is located between Latitudes 5°51'0'' and 6°3'0'' North of the Equator and Longitudes 10°3'0'' and 10°15'0'' East of the Greenwich Meridian. It is bounded to the North by Tubah Sub-division, to the South by Santa Sub-division, to the West by Mbengwi Sub-division, to the South West by Bali Sub-division and to the North East by Bafut Sub-division (Figure 1). The city as of 2016 was termed a near millionaire city (Fogwe, 2016).

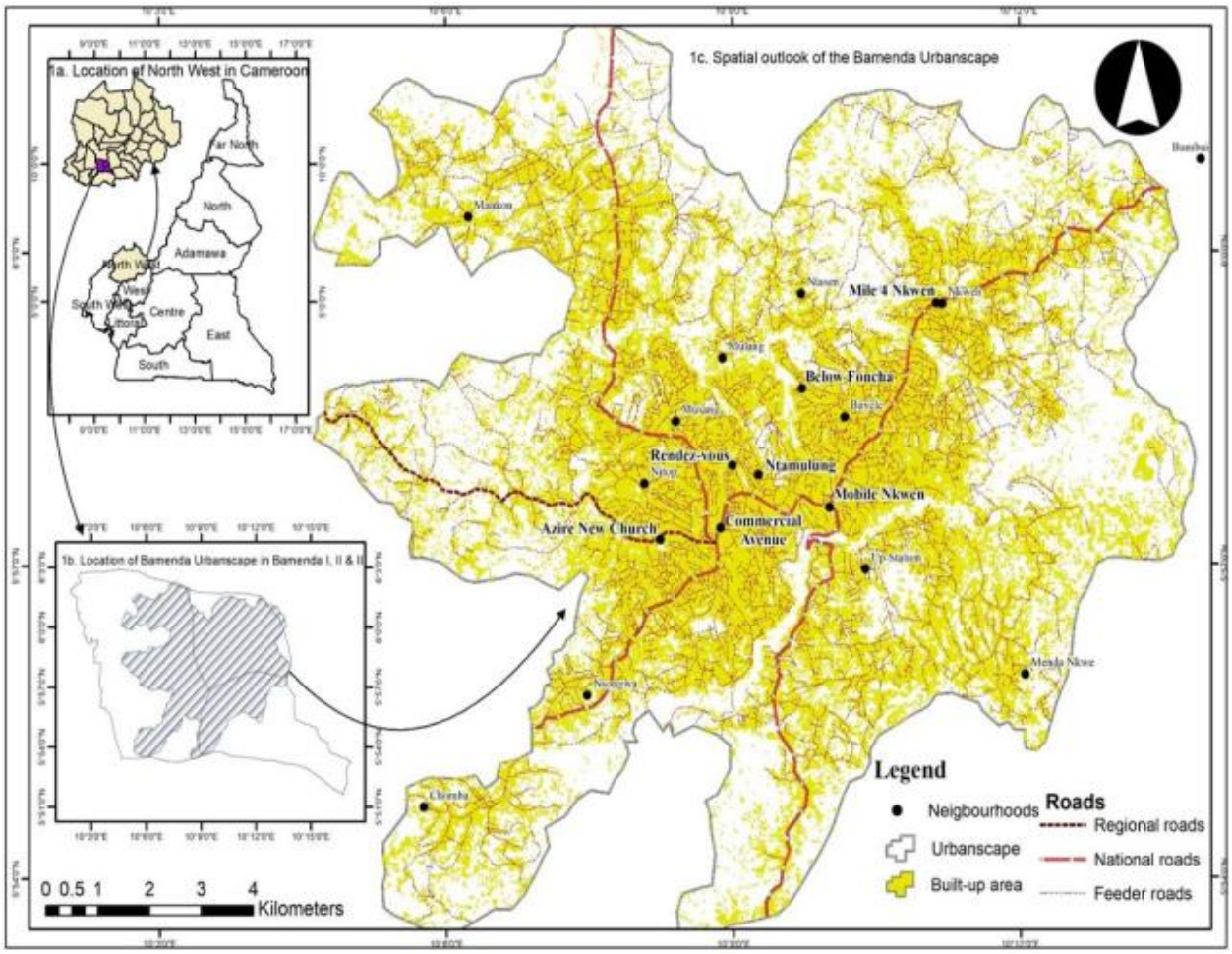


Figure 1 Location of Bamenda urbanscape in Bamenda I, II and III Sub-Divisions

Source: Wanie *et al*., (2020)

2.2. Data Collection Sources

Data for this study was gotten from a combination of both primary and secondary sources. Primary sources of data included field observations, household surveys and questionnaire administration.

Systematic field observations were undertaken within the urban neighbourhoods in Bamenda I, II and III Sub-Divisions in order to provide firsthand information on the improved drinking water sources utilised by urban households, their ranking and also measure, by help of a meter tape (tool used to measure distance), the distance covered by households

to the nearest improved drinking water source point. This was done repeatedly between April 2022 to November 2023 corresponding to both the rainy and dry season months. Household surveys were equally carried out in order to collect primary data targeting urban households using the *de jure* method (interrogating people according to their legal or regular residence). This was accompanied by the administration of 520 copies of questionnaire to urban households in all three Sub-divisions in varying proportion (Table 1) following their population size using a purposive sampling method. This sampling technique involved the intentional selection of urban households involved with the use of improved drinking water sources only as opposed to those who depend on unimproved sources like surface water (river, dam, lake, pond, stream, canal, irrigation channel), bottled water, tanker truck, cart with small tank or drum, unprotected spring and unprotected dug well. On the other hand, since the researchers could not get to all the urban households utilizing improved drinking water sources given the limited copies of questionnaire, the simple random sampling method was used. This method was best suited such that each urban household utilizing improved drinking water source had equal right or chance to respond to the questionnaire. This was equally to minimize bias in the distribution of copies of questionnaire to the urban households. Household surveys provided considerable discretion concerning disparity in household accessibility to improved drinking water sources, influencing factors of limited household accessibility to improved drinking water, number of households per improved drinking water source point, distance covered to the nearest source as well as suggestions towards improving the current limited improved drinking water services in the city. The questionnaire was administered to household heads who were of different gender, age group, level of educational attainment, family sizes, marital status, occupation, etc.

Table 1 Administration of 520 copies of questionnaire to urban households in Bamenda city

S/N	Sub-Division	No. of Questionnaire Administered	Percentage of total
1	Bamenda I	73	14
2	Bamenda II	301	58
3	Bamenda III	146	28
Total		520	100

The secondary sources of information used for this study emanated from libraries, institutional and internet sources where published and unpublished documents were obtained. The library of The University of Bamenda was visited were WHO/UNICEF periodicals, text books, defended dissertations and journal articles were all reviewed in order to situate the study. Archives of international institutions such as WHO, UNICEF, UN, CDC, UNDP, VNR and PAHO were also consulted from where end of year reports on improved drinking water sources were read and analysed. Finally, e-books and journals on the subject were accessed online via the internet with the help of Google search engine including pdfdrive.com, academia and ResearchGate, all consulted which provided relevant secondary information on the introduction and discussion of the study.

2.3. Data Processing, Analysis and Presentation

Through strict follow-up of the administered questionnaires for over 19 months, all 520 copies of the filled-in questionnaires were retrieved from the urban households which, together with the secondary sources, formed the basis of qualitative data analysis employed for the study. The data obtained from the primary and secondary sources were classified, coded and entered into Statistical Package for Social Sciences (SPSS) version 20. This software was used to generate qualitative techniques of data analysis, presented using figures, percentages and tables for easy understanding.

3. Results and discussion

The results of this study are presented in four perspectives, including improved drinking water sources in urban households, access to improved drinking water sources by urban and limiting factors, urban households per improved drinking water source point and distance covered to the nearest improved drinking water source point by urban households in Bamenda.

3.1. Improved drinking water sources in urban households in Bamenda city

The identified improved drinking water sources in the area were standpipes, protected dug well, piped water connected to households, boreholes, rain water collection and spring water, corresponding to the JMP considerations on improved drinking water sources (WHO/UNICEF, 2014). The ranking of these sources based on households' dependence of them in the Bamenda urbanscape is presented in Table 2.

Table 2 Ranking of household source of improved drinking water in Bamenda urbanscape

S/N	Water Source	Percentage	Rank
1	Rain water collection	63.3	1
2	Boreholes	61.9	2
3	Piped water	54.8	3
4	Protected dug well	51.9	4
5	Standpipes	41.3	5
6	Spring water	38.6	6

Source: Fieldwork, June 2023

Table 2 highlight that rain water collation (63.3%) is the main improved drinking water source for urban households in Bamenda city, closely followed by boreholes (61.9%), piped water connection in homes (54.8%), protected dug well (51.9%), standpipes (41.3%) and lastly spring water harnessed to households like in the Sissia neighbourhood (38.6%). The high dependence on rain water collection by urban households constitutes a housing planning challenge in Bamenda city as this source is not always reliable since it is highly seasonal being available only during the short spell of the rainy season (Mid-March to Mid-October). More so, rainfall is not consistent throughout the rainy season resulting to limited household water supply. This causes such household to get water from doubtful sources during days of no rains (Figure 2). Again, the collected rain water is oftently not of good quality after running off roofs and driveways into street and could have picked up dirt, bacteria or other pollutants during the process as it makes way through the storm drain and ditches resulting to waterborne diseases outbreak amongst the population. It was also observed that no or very limited treatment through filtration or disinfection using chlorine is done with collected rain water by the urban households. Again, infrequent maintenance and replacement is done to most of the rainwater tanks and pumps for households possessing them which increases the chances of drinking water contamination.

Figure 2 Urban households getting water from doubtful sources in Bamenda III Sub-Division with its nefarious health effects on the population

Source: Fieldwork, October 2023

3.2. Access to improved drinking water sources by urban household and limiting factors in Bamenda city

This refers to the percentage of urban households having access to and utilizing the different improved drinking water sources in Bamenda city. Findings showed that 63.3% of urban households have accessibility to rainwater collection as

their water source. Spatial disparity equally shows that Bamenda II households have more accessed to all the improved drinking water sources than her counterparts of Bamenda I and Bamenda III Sub-Divisions (Table 3).

Table 3 Access to improved drinking water sources by urban household in Bamenda city

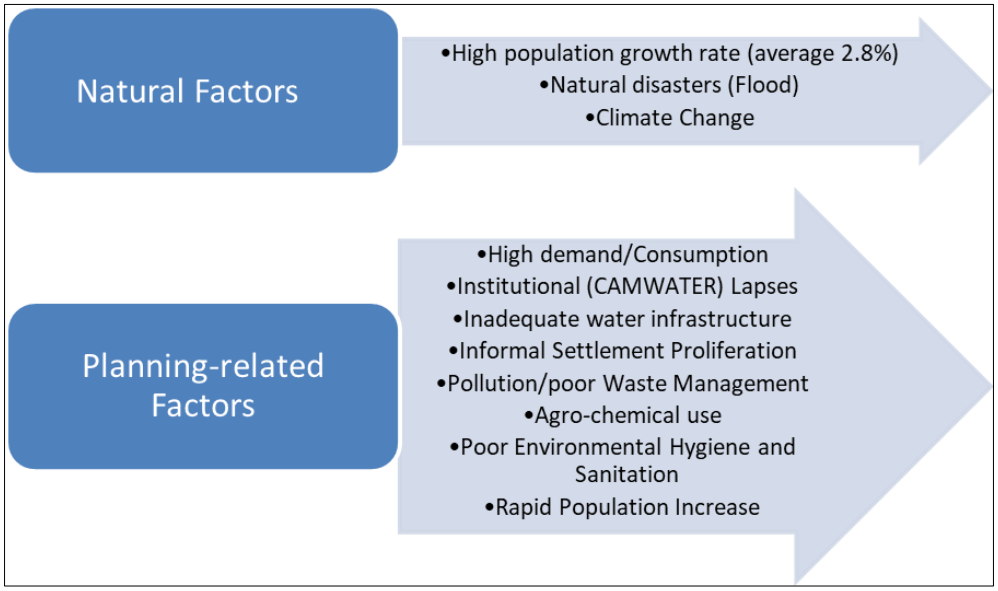
Sub-Division	Yes		No		Not applicable	
	F	%	F	%	F	%
Piped water connection to house, yard or plot						
Bamenda I	45	15.79	24	11.76	4	12.90
Bamenda II	156	54.74	122	59.80	23	74.19
Bamenda III	84	29.47	58	28.43	4	12.90
Total	285	100	204	100	31	100
Public standpipe						
Bamenda I	36	16.74	31	10.73	6	37.50
Bamenda II	121	56.28	170	58.82	10	62.50
Bamenda III	58	26.98	88	30.45	0	0
Total	215	100	289	100	16	100
Bore hole						
Bamenda I	38	11.80	23	13.94	12	36.36
Bamenda II	188	58.39	96	58.18	17	51.52
Bamenda III	96	29.81	46	27.88	4	12.12
Total	322	100	165	100	33	100
Protected dug well						
Bamenda I	35	12.96	34	14.98	4	17.39
Bamenda II	161	59.63	124	54.63	16	69.57
Bamenda III	74	27.41	69	30.40	3	13.04
Total	270	100	227	100	23	100
Protected spring water						
Bamenda I	26	12.94	34	13.55	13	19.12
Bamenda II	116	57.71	145	57.77	40	58.82
Bamenda III	59	29.35	72	28.69	15	22.06
Total	201	100	251	100	68	100
Rain water collection						
Bamenda I	45	13.68	26	15.20	2	10
Bamenda II	181	55.02	102	59.65	18	90
Bamenda III	103	31.31	43	25.15	0	0
Total	329	100	171	100	20	100

Source: Source: Fieldwork, June 2023

Table 3 shows that Bamenda II households have more access to piped water connection (54.74%), standpipes (56.28%), boreholes (58.39%), protected well (59.63), protected springs (57.71%) and rainwater collection (55.02%). From the

table, some 29.47% of urban households in Bamenda III Sub-Division have access to piped water connection, 26.98% do so for stand pipes, 29.8% for boreholes, 27.41% for protected wells, 29.35% for protected springs and 31.31% for rainwater collection. Bamenda I Sub-Division has the least access to all sources of improved drinking water including piped water connection (15.79%), stand pipes (16.74%), boreholes (11.80%), protected wells (12.96%), protected springs (12.94%) and rainwater collection (13.68%). The urban housing planning challenge presented in Table 3 lies in the fact that though access to improved drinking water is a fundamental need and a basic human right vital for the dignity and health of all people, urban households in Bamenda city registered limited access (less than 60%) to any of the improved drinking water sources in all the sub-divisions. This implies that sewage systems in urban households could fail and threats of contracting diseases like cholera is high. The low proportion of urban households having access to standpipes in their houses (41.3%) contradicts studies by Salaam-Blyther (2012) that over 90% of the richest quintile in urban areas across SSA countries use improved drinking water sources at home.

Fieldwork also revealed that both natural and planning-related factors work together to limit urban household improved drinking water accessibility in Bamenda city as highlighted in Figure 3. Population responses revealed that planning-related lapses account for up to 63.33% of all limiting factors.



Source: Conception by Authors, 2023

Figure 3 Framework of factors limiting accessibility to improved drinking by urban households in Bamenda

Figure 3 shows the interrelatedness of natural factors and planning-related lapses combining to limit urban households' accessibility to improved drinking water sources in Bamenda city. The identified natural factors are high population growth rate, natural disasters particularly floods and climate change and her negative effect on water resources. On the other hand, the planning-related factors are high water demand/population consumption resulting to over use, institutional lapses especially by the national water management authority (CAMWATER), inadequate water infrastructures such as storage tanks, the rapid proliferation of informal settlements all over the city, pollution (land, air and water), poor waste disposal practices, use of agro-chemicals in urban agriculture which is common nowadays, poor environmental hygiene and sanitation practices and rapid urban population increase notably with the huge influx of IDPs fleeing nefarious activities of separatist fighters in the surrounding peri-urban and rural areas of the Northwest Region into Bamenda city for refuge. All the above factors tie with those earlier reported by UNDP (2006), WHO/UNICEF (2011), Kleemeier (2000) and Vasquez *et al*., (2009).

3.3. Urban households per improved drinking water source point in Bamenda city

Most urban households in Bamenda city commonly share an improved drinking water source point. The household per water source point in the Bamenda urbanscape were measured ranging from <5 households to 21+ households per water source, be it piped connections, boreholes, protected wells, amongst others. Overall, findings showed that <5 of households share some 18.8% of water source point, closely followed by 21+ households with 17.5%, 5-10 households with 15%, 16-20 households with 9.4% and lastly 11-15 households with 6.5%. Spatial variation shows that more urban households in Bamenda II share the same water source, followed by Bamenda III and lastly Bamenda I respectively for all categories as seen in Table 4.

Table 4 Urban households per water source in Bamenda city

Sub-Division	Households per water point											
	<5		5-10		11-15		16-20		21+		Don't know	
	F	%	F	%	F	%	F	%	F	%	F	%
Bamenda I	21	21.65	11	14.10	3	8.82	7	14.29	12	13.19	19	11.11
Bamenda II	49	50.52	44	56.41	24	70.59	30	61.22	48	52.75	106	61.99
Bamenda III	27	27.84	23	29.49	7	20.59	12	24.49	31	34.07	46	26.90
Total	97	100	78	100	34	100	49	100	91	100	171	100

Source: Fieldwork, June 2023

From Table 4, over 11-15 urban households (70.59%), 16-20 households (61.22%), 5-10 households (56.41%), 21+ households (52.75%) and lastly <5 households (50.52%) all in Bamenda II Sub-division share a water source together. In Bamenda III Sub-division, 21+ households (34.07%), 5-10 households (29.49%), <5 households (27.84%), 16-20 households (24.49%) and lastly 11-15 households (20.59%) share a common water source. The least ratio was observed in Bamenda I whereby <5 households (21.65%), 16-20 households (14.29%), 5-10 households (14.10%), 21+ households (13.19%) and finally 11-15 households (8.82%) respectively share a common water source. The next section determines the distance covered to the nearest water point by the urban households. Overall, an overwhelming majority (32.8%) were not aware of the number of urban households they share a water source point with, corresponding to those who heavily rely on rainwater collection for their homes.

3.4. Distance covered to the nearest improved drinking water source point by urban households in Bamenda city

The urban household distance to the nearest water source point in the Bamenda urbanscape were measured ranging from <50m, 51-100m, 101-150m, 151-200m and 200m+ per water source point, be it public standpipes, boreholes, protected wells or protected springs. Overall, findings showed that the majority of urban households (42.88%) cover <50m to get to the nearest water source point, followed by 51-100m (23.26%), 101-150 m (4.42%), 151-200m (11.73%) and 200m+ (17.69%). Spatial variation equally revealed that the distance covered by urban households is furthest for Bamenda II (200m+ with 65.22%), followed by Bamenda III (151-200m with 34.43%) and lastly Bamenda I Sub-divisions (<50m with 18.83%) as shown in Table 5.

Table 5 Distance covered to the nearest improved drinking water source point by urban households in Bamenda city

Sub-Division	Distance to the nearest water point									
	<50 m		51-100 m		101-150 m		151-200 m		200 m+	
	F	%	F	%	F	%	F	%	F	%
Bamenda I	42	18.83	15	12.40	3	13.04	5	8.20	8	8.70
Bamenda II	118	52.91	72	59.50	16	69.57	35	57.38	60	65.22
Bamenda III	63	28.25	34	28.10	4	17.39	21	34.43	24	26.09
Total	223	100	121	100	23	100	61	100	92	100

Source: Fieldwork, June 2023

Sub-divisional variation in Table 5 further showed that 69.57%, 65.22%, 59.50%, 57.38% and lastly 52.91% of households in Bamenda II cover 200m+, 101-150m, 51-100m, 151-200 and <50m respectively to the nearest water source point. In Bamenda III Sub-division, 34.43%, 28.15%, 28.10%, 26.09% and 17.39% of households cover 151-200m, <50m, 51-100m, 200m+ and 17.39m respectively to the nearest water source point. In Bamenda I, 18.83%, 13.04%, 12.40%, 8.70% and 8.20% respectively of urban households cover <50m, 101-150m, 51-100m, 200m+ and 151-200m to the nearest water source point to get improved drinkable water. The planning challenge here is that some 57.12% of the urban households cover 51-200m+ to the nearest water source point in the Bamenda urbanscape. This implies that more time is taken each day by households to collect water in order to survive. Also, the desired daily quantity of water needed could not be attained worsening the already bad sanitation situation prevailing. Again, water

might become scarce in the urban households increasing threats of contracting diseases like cholera. As such, improved drinking water in the city is classified as non-basic or limited service since its round-trip collection from an improved source point for a greater proportion urban households exceeds 30 minutes according to WHO/UNICEF (2022). WHO/UNICEF (2011) equally opined that in SSA (where Bamenda city is found), water collection times of more than 30 minutes are mostly common and drinking water coverage drops by eight percentage points when taking time-to-source into account as a measure of access.

4. Conclusion and Recommendations

Access to improved drinking water remains a fundamental need and a basic human right vital for the dignity and health of all people. The health and economic benefits of improved drinking for urban households is vital. There is need therefore to increase access to improved, clean and safe drinking water in urban households in Bamenda city with currently a low proportion having access to it. Findings of the study showed that standpipes, protected dug well, piped water connected to households, boreholes, rain water collection and spring water harnessed to households are the available improved drinking water sources in urban households in Bamenda. In line with the findings, some 63.3% of urban households have accessibility to rainwater collection as their water source. Natural (33.67%) and planning-related (63.33%) factors work together to limit urban household improved drinking water accessibility. Less than 5 households share a common water source, while other 42.88% cover <50m to get to the nearest improved drinking water source point. As such, improved drinking water is considered a limited and non-basic service in the city. While efforts have been put in place by the relevant stakeholders over the years to improve the situation, the inclination has been to attain 'safe' and 'clean' household drinking water for all as stipulated by the UN. This can only be possible if the proposed recommendations are put in practice by the concerned authorities including the Ministry of Water and Energy (MINEE) and her Regional Delegation for the Northwest Region, the Ministry of Housing and Urban Development (MINDUH), the Bamenda City Council and Sub-Divisional Councils (Bamenda I, II and III councils), CAMWATER authorities, international partners like the UN, UNICR, WHO and friendly nations like the US, Canada, Germany, Great Britain, etc. This study therefore proposes the following recommendations;

Stakeholders should ensure the expansion of improved drinking water infrastructure in the city which will guarantee safety and adequacy of improved drinking water to its users (urban households).

The factors, especially the planning-related ones, limiting access to improved drinking water sources should further be researched on, identified and understood. This could help avert housing drinking water scarcity and reduce or even prevent illnesses contracted from obtaining water rom doubtful sources due to limited access by urban households.

In the line the above, there should equally be systematic data collection for better improved drinking water decision making in the city. This should be accompanied by improved data collection technologies on improved drinking water source points, disparity in access between Sub-divisions and distance covered to the nearest improved drinking water source point by urban households.

The government via MIINEE (Ministry of Water and Energy) and MINDUH (Ministry of Housing and Urban Development) and her partners should work to increase the accessibility of improved drinking water in all three sub-divisions so as to narrow the gap in its accessibility between urban households in Bamenda II and those of Bamenda I and Bamenda III.

Finally, urban households should build water towers or tanks to store water for continuous use.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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