International Journal of Sustainable Development and Planning
Vol. 21, No. 3, March, 2026, pp. 1269-1277
Journal homepage: http://iieta.org/journals/ijsdp

Drinking Water in the Avé 2 Municipality in Togo: Local Realities and Levers for Improvement

Kodzo Guillaume Etululuia Dedeho[1*], Koko Zébéto Houedakor[2], Djiwonou Koffi Adjalo[2], Abizou Kapitan-Gnimdu[3]

[1] Regional Centre of Excellence on Sustainable Cities in Africa (CERViDA-DOUNEDON), University of Lomé, Lomé 01 BP 1515, Togo
[2] Department of Geography, Regional Centre of Excellence on Sustainable Cities in Africa (CERViDA-DOUNEDON), University of Lomé, Lomé 01 BP 1515, Togo
[3] Laboratory for Research on the Dynamics of Environments and Societies (LARDYMES), University of Lomé, Lomé 01 BP 1515, Togo

Corresponding Author Email: kodzo.dedeho@cervida-togo.org

https://doi.org/10.18280/ijsdp.210325

Received: 21 July 2025
Revised: 16 September 2025
Accepted: 22 December 2025
Available online: 31 March 2026

Keywords:
access to drinking water, infrastructure, supply sources, Avé 2 municipality, Togo

ABSTRACT

Basic services, such as drinking water and electricity, are essential for daily life and the development of the inhabitants within a community. However, these services remain difficult to access for a portion of the population in developing countries. This article focuses on the analysis and prospects of access to drinking water in the municipality of Avé 2 in Togo. The article was based on surveys; A total of 87 households in the 3 cantons of the municipality were surveyed. Interviews were conducted with the authorities of the town hall, the water services and four (4) members of the village development committee invited to an informal discussion. The results reveal a significant issue with access to clean water in the community. Only 22% of the population has access to water via a private connection, mini water supply and standpipes. An overwhelming majority of 78% of the population get their water from open wells, drilling and rivers. Among the many likely causes of the difficult access to water sources in the community, the spatial extension of the Avé 2 municipality is one of the main causes of the difficult access to drinking water services. In response to these situations, several measures have been proposed to improve access to drinking water in the municipality of Avé 2, including infrastructure rehabilitation, extension of water supply networks, and participatory budgeting.

1. INTRODUCTION

The whole world is experiencing rapid urbanization. According to the United Nations, by 2030, the world will move to an urbanization rate of more than 60% [1], and this dynamic is particularly noticeable in Africa. An Organization for Economic Co-operation and Development (OECD) report in 2025 shows that the urbanization rate in Africa in 2020 was 54% and will reach 65% by 2050 [2]. This situation is putting a lot of pressure on urban infrastructure, exacerbating inequalities in access to essential resources.

In Togo, the Autonomous District of Greater Lomé has the largest number of inhabitants. With a population of 2.18 million according to the Fifth General Census of Population and Housing (RGPH-5-2022) [3], it accounts for about 27% of the country's total population. This increase in the urban population, in search of well-being (housing, location favourable to activities, etc.), led to an extension of the city towards its outskirts [4]. The municipality of Avé 2, located on the outskirts of this district (Grand Lomé), is a perfect example. This municipality is suffering from the effects of the spatial expansion (commonly referred to as "periurbanization") of the latter, leading to growing challenges in terms of access to basic services, including drinking water, electricity, housing, health, etc.

In this context of spatial expansion, the municipality of Avé 2, with a population of 36,170 according to the same census (RGPH-5) of 2022, faces major challenges in meeting the growing needs of its population. In this municipality, the area occupied by human settlements increased from 383.27 hectares to 727 hectares over 20 years, from 1990 to 2010. This average annual increase of 17.19 ha has led to significant imbalances in access to essential services. Furthermore, according to studies conducted as part of the Municipal Development Plan (MDP), the municipality's urban area now covers 2,710 hectares, with an annual increase of 198.30 hectares.

Decentralization, adopted in the 1990s and concretely implemented in 2019, aims to transfer competences and resources to local authorities in order to improve governance and better meet the needs of citizens. The existing literature, in particular the work of Satterthwaite [5] and Chattopadhyay and Chattopadhyay [6], emphasizes that the effectiveness of local governments must be measured by their ability to improve the quality of life of citizens. However, despite the efforts made, the results in terms of access to basic services, in this case drinking water, remain mixed.

Given the condition of rapid population growth, leading to water needs (i.e., the challenge of future water balance), the availability of infrastructure and services related to water resources is likely to be very unbalanced and sensitive [7]. Ensuring a high-quality drinking water supply for the entire population is a major challenge, among other things, due to the effects of climate change, pollution of groundwater and surface water resources, as well as the constant and costly increase in the need for drinking water [8].

The need for drinking water is expected to increase annually, under the combined effect of population growth and the increase in the number of people visiting inhabited areas. In the case of the municipality of Avé 2, it is generally observed that the difficulty of access to drinking water services is intensified by socio-economic, geographical and infrastructural factors. The lack of adequate infrastructure and rapid population growth contribute to the deterioration of living conditions in this municipality. All the difficulties related to access to drinking water services underscore the urgency of adopting sustainable and inclusive orientations to guarantee access to drinking water in this community.

This article aims, on the one hand, to analyze the levels of accessibility to drinking water in the municipality of Avé 2, and on the other hand, to identify the factors that hinder easy access to this service while proposing sustainable orientations. The methodology used for this study combines observation, questionnaire surveys, and interviews.

2. METHODOLOGY

2.1 Presentation of the research site

The municipality of Avé 2 is located in Togo, in the maritime region about 35km from Grand Lomé and more precisely in the prefecture of Avé. It extends between latitudes 6°10' and 6°26'N, and longitudes 0°57' and 1°6'E. It is bounded to the north by the municipality of Avé 1, to the south-west by Ghana, to the south-east by the municipality of Golfe 7, to the east by the municipalities of Zio 2 and Agoè-Nyivé 5 and to the west by the municipality of Avé 1 and Ghana.

According to Decree No. 2017-144 / PR fixing the territorial jurisdiction and the capitals of the municipalities of the Maritime and Savanes regions, the municipality of Avé 2 is composed of three (03) cantons listed as follows:

- Canton of Badja, capital Badja, comprising twenty-two (22) villages;
- Canton of Noépé, capital Noépé with five (05) villages;
- Canton of Aképé, capital Aképé with five (05) villages.

The following map (Figure 1) shows the geographical location of the Avé 2 municipality.

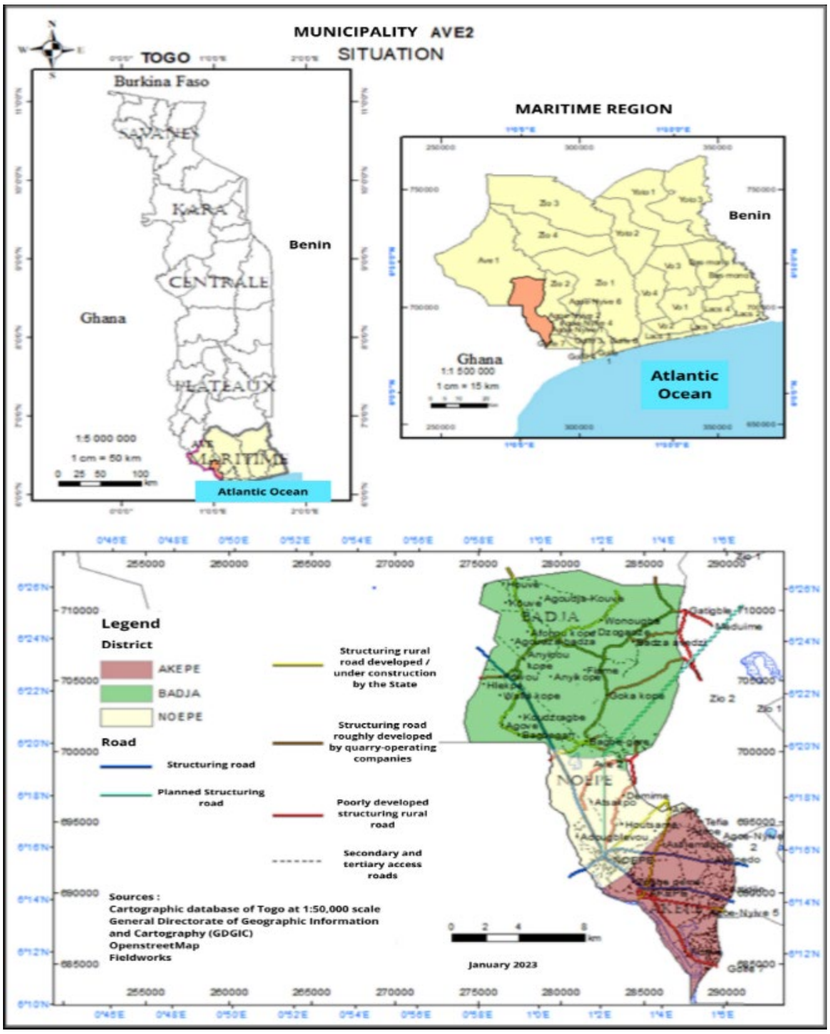

Figure 1. Geographical location of the Avé 2 municipality (Municipal Development Plan, January 2023)

2.2 Data collection and analysis

The data necessary for this research were collected during a 3-month internship in the Avé 2 municipality. To obtain the data, we used 3 techniques: observation, questionnaire survey and interview/interview survey.

During the observation, we identified the main elements of the study environment, including functional and non-functional water points, the affluence around these points, the latency time for the water supply, etc. At the end of this observation, we were able to analyze the availability and accessibility of water sources in the Avé 2 municipality. On the other hand, the qualitative dimension was only partially assessed through the self-declaration of households using qualitative indirect indicators of colour, taste, and smell.

For the questionnaire survey, we structured our form in 2 sections. The first section concerns the identity of the interviewee, the second focuses on access to drinking water. The survey was conducted in the three cantons of the municipality in order to illustrate the specific realities of all the cantons. As part of our research, we conducted a household survey. The survey was therefore conducted among 87 households, including 41 in the canton of Aképé, 23 in Noèpé and 24 in Badja. For plots housing several households, the survey was carried out on only one of them, considering that the living conditions were similar for all the occupants.

The first phase of sampling involved the identification of the general population as well as the target population.

The population of the Avé 2 municipality, 36,170 inhabitants according to the 2022 General Population and Housing Census of Togo (RGPH-5), is divided into 3 cantons (Aképé, Noèpé and Badja). The problem of access to water particularly affects all 3 cantons. Since it was impossible to conduct our surveys on the entire population, a sampling method was put in place. The sampling model is based on a single-stage non-probability sampling technique designed to select the households to be surveyed. Of the 32 districts, 15 were selected in proportion to the number of inhabitants and districts per canton.

Table 1 shows the number of inhabitants by canton:

Table 1. Illustration of the number of inhabitant by canton

Canton/Period	2022	Percentage
Aképé	16,961	47%
Noèpé	9,796	27%
Badja	9,413	26%
Total	36,170	100%

The surveys were carried out in 3 districts of the canton of Aképé, 2 districts of the canton of Noèpé and 10 districts of the canton of Badja. These districts include:

Canton of Aképé: Yidavé, Aképé and Assiamagble

Canton of Noèpé: Noèpé and Démimé

Canton of Badja: Bagbe Kpendji, Bagbe village, Bagbe station, Bagbe road, Goka Kopé, Kouve, Agoudoukpé, Dodji, Agové and Agama kopé

Yamane's formula (1967):

$$n = \frac{N}{(1+N) \times e^2}$$

n = the sample size to be determined.
N = the total population size.
e = the level of precision chosen.

The level of precision used is +/- 5%, and the size of the total population = 36170 inhabitants. Thus:

$$n = \frac{36170}{(1+36170) \times (0.05)^2}$$

n = 395.7

With 10% related to losses related to field surveys, the sample size amounts to:

Sample size: n = 395.7 + ($\frac{395.7 \times 10}{100}$)

N = 435 inhabitants

As the average size of person in households is 5 (MDP, Avé 2, 2024–2028), the number of households is: Number of households surveyed: 435/5 = 87 households.

Photographs and maps were used to support the results of this research. The maps in this article were produced using data from the General Directorate of Geographic Information and Cartography, the MDP (2024–2028) of the Avé 2 municipality, Google Maps, Open Street Map.

In order to have more qualitative data, we had semi-structured interviews with 4 members of the Village Development Committee, in this case, the vice-president, the secretary and two councillors. The topics mainly dealt with water management, breakdowns, maintenance, etc.

Improved drinking water sources are those that, by design and construction, have the potential to provide safe water. Under World Health Organization (WHO)/United Nations Children's Fund (UNICEF), improved water sources include drilling (private and public), standpipes, mini-water systems, private connections and protected wells. However, in the specific context of this study, the analysis of effective access to drinking water focuses on standpipes, mini-water supply networks and private connections. This methodological choice is based on the fact that these springs are managed institutionally, with the direct involvement of public authorities in their regulation, operation and maintenance. As such, they provide an appropriate basis for assessing functionality, continuity of service and users' perception of water quality, which are essential dimensions of effective access.

3. RESULTS

3.1 Drinking water infrastructure typologies

In Togo, there are two sources of water production: underground abstraction and river abstraction [9]. In the municipality of Avé 2, the water collection and distribution process is based on the underground collection technique. This method consists of drawing water from groundwater below the surface of the ground using an appropriate installation. Once captured, the water is treated and then conveyed to a water tower or a mini-supply system. Thanks to the gravitational force of attraction of the earth on the water, the water is then distributed via large pipes to the different districts or areas of the municipality. From these distribution points, small pipes bring water directly to households, thus ensuring an efficient supply of drinking water [10].

At the level of the municipality, several sources of water supply are used by the population, namely:

3.1.1 Individual or private connections (Togolaise des Eaux)

These are connections that are made in the canton of Badja by the Togolese Water Company (Togolaise des Eaux (TdE)) to supply drinking water to households. It should be noted that only a minority of households (18) benefit from this type of connection, given the cost of a simple connection estimated at 75,000 CFA francs (USD 134,29) compared to 52,500 CFA francs (USD 94) as the monthly minimum wage (Guaranteed Interprofessional Minimum Wage).

3.1.2 Mini supply

They are similar to the connections made by the TdE in the canton of Badja. Indeed, mini-water supplies are present in the cantons of Aképé and Noèpé to supply the population with drinking water. They are set up thanks to projects financed by technical and financial partners and the Republic of Togo. These mini drinking water supplies are managed by a delegate in collaboration with the town hall.

3.1.3 Standpipes

In the absence of a private connection to the house, households get their drinking water from standpipes. Standpipes are drinking water supply points of public initiative, implemented after the socio-economic crisis of 1990. According to our observations, most of the standpipes are out of order and those that are still in operation are not very frequented because of the obsolescence of the equipment (regularly leading to breakdowns and low water flow).

3.1.4 Drilling

Water drilling is a work carried out by professionals from the surface of the ground to an aquifer for the dewatering of deep water. Drilling that was once limited to rural areas are increasingly being implemented in the Avé 2 municipality.

3.1.5 Well water

According to the Water Code [11], wells are excavations dug from the surface of the ground to an aquifer layer to extract water. In the municipality, according to our surveys carried out in the field, well water represents 13% of household water use, making it the second most appreciated water by the population. Indeed, it is more used than other water sources thanks to its geographical accessibility (generally between 200 and 500 meters). It should also be noted that all the wells identified are unprotected open wells.

The main problems faced by several open wells in the area are the lack of potability of the water, mainly due to unsanitary conditions, lack of maintenance and lack of pre-treatment. Indeed, our field observations have shown that open wells are often covered with mold, attracting insects. Usually, the ropes used to draw water, made of plastic or palm leaves, rub against the walls of open wells and degrade, releasing particles into the collected water.

This is also the case for rivers, which are most of the time very unhealthy and are exposed to all kinds of contamination.

3.1.6 Rivers and ponds

In the municipality, rivers and ponds are also used, but by a small portion of the households (about 5%) for various needs, including water supply, laundry and even for agricultural irrigation. However, they are water sources that are generally exposed to contamination.

3.1.7 Rainwater

This source of water is only available during the rainy season, which explains its low use by the population of the municipality. This is because this water is relatively pure and can be consumed without treatment if it is obtained with care in clean utensils.

3.2 Current assessment of drinking water accessibility in the Avé 2 municipality

The Avé 2 municipality encompasses three primary cantons (Aképé, Noépé, and Badja), each characterized by distinct institutional arrangements for drinking water service delivery. In Aképé and Noépé, management is predominantly delegated to local committees operating in partnership with the municipal authority, whereas in Badja, provision is handled directly by the TdE. Notwithstanding these formalized governance structures, marked disparities persist in access to potable water across the cantons. The following Table 2 presents key indicators that illustrate these variations in coverage, reliability, and equity.

Table 2. Comparison of indicators of access to drinking water in the cantons of Badja, Aképé and Noèpé

Indicators	Badja	Aképé	Noèpé
Population	9,413	16,961	9,796
Water requirement(m^3/day)	188.3	339.2	195.9
Production capacity (m^3/day)	60 to 130	239	440
Deficit or surplus	-58.3 (even at 130 m^3)	-100.2	+244.1
Total number of standpipes	13	31	12
Number of functional Bornes Fontaines (BFs)	1	14	5
Number of private connections	68	248 (20non-functional)	376 (159 inactive)
Length of the distribution network	6.64 km	~13 km	~12 km

The specific case of the canton of Badja illustrates that 159 of the 376 private connections (i.e., a rate of 42%) are inactive. This inactivity is mainly due to several factors, namely: the accumulation of unpaid bills, persistent infrastructure breakdowns, the abandonment of connections by some households due to the cost of the service, and the intermittent supply of water.

3.2.1 Population accessibility

Accessibility to drinking water in the context of this article takes into account 5 main criteria: the presence of an improved water source, protected against the risks of contamination (standpipes, private connections (TdE and mains supply) for example) (i), located less than 200 metres from the place of residence (ii), requiring a collection time of less than 30 minutes (iii), offered at an affordable cost (iv) and guaranteeing a minimum volume of 20 litres per day per capita (v).

3.2.2 Use of water sources in the municipality of Avé 2

At the municipal level, the water sources used by households are varied. The general statistics reflect those of the cantons.

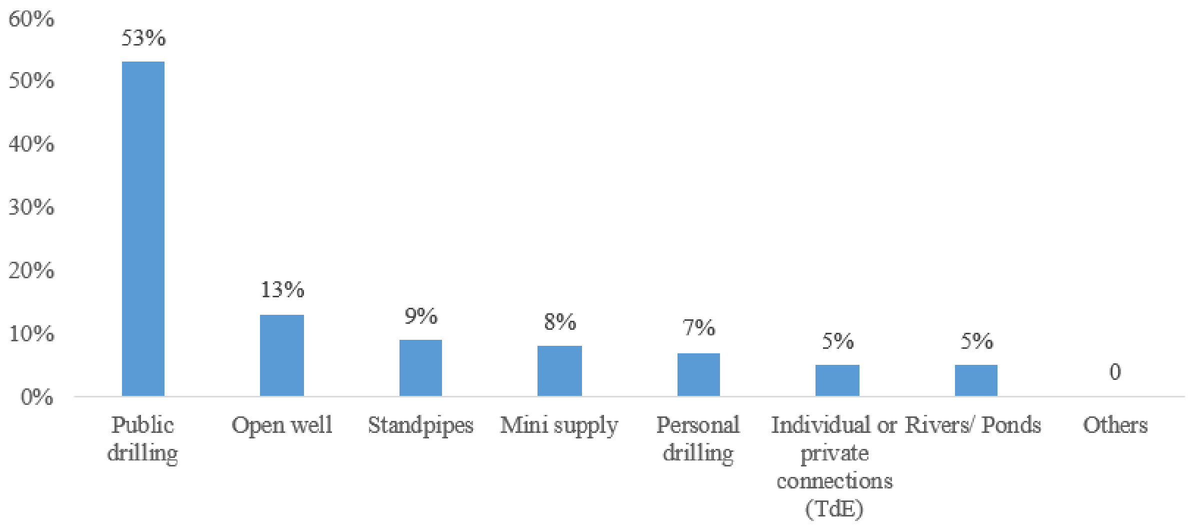

Figure 2. Different water sources in the municipality and their use (Field survey, November 2024)

Figure 2 illustrates the different water sources in the municipality and their use.

Referring to the WHO/UNICEF definition of improved water sources, access to improved water sources in the Avé 2 municipality is 82% (Drilling, standpipes, mini-water supplies, private connections). On the other hand, if only institutionally managed water supply systems are taken into account, access to efficient water services is limited to 22 per cent, which corresponds to standpipes, mini-water supply and private connections.

3.2.3 Accessibility in relation to distance

According to the WHO, reasonable accessibility in terms of distance to access a drinking water service must be less than 200 metres. However, several respondents say they travel beyond the recommended distance to access water.

Table 3 illustrates the distances travelled to access water services from water supplies.

Table 3. Cross-tabulation of distance travelled from water sources

Distance	Main Water Sources	Total
Less than 200 m	Public Borehole (2.3%), Open Wells (3.45%), Mini-Supply (8.05%), Personal Borehole (6.9%), ToE (4.6%), Other (1.15%)	26%
200 to 500 m	Public borehole (16.1%), Open wells (9.2%), Standpipe (1.15%), River/pond (1.15%)	28%
500 m to 1 km	Public borehole (24.14%), Standpipe (3.45%), River/pond (1.15%)	29%
More than 1 km	Public borehole (10.34%), Standpipe (4.6%), River/pond (2.3%)	17%
Total		100%

26% of households get their supplies from less than 200 m, mainly via mini-conveyances, personal Drilling or TdE connections.

3.2.4 Accessibility in relation to time

The time taken for water supply is also a very important variable in access to water services. In our surveys, we note that about 41% of households take more than 30 minutes to get their water. Figure 3 illustrates the time taken by respondents to access water.

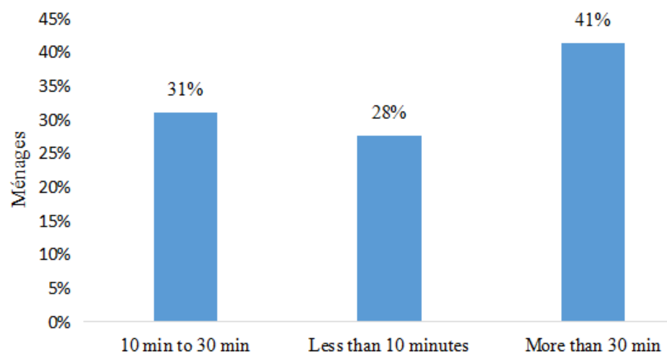

Figure 3. Time taken for water collection by household (Field survey, November 2024)

3.2.5 Accessibility vs. cost

The budget allocated to the supply of drinking water is an important indicator of access to drinking water services. The following Figure 4 shows the distribution of the population according to the monthly budget allocated to water.

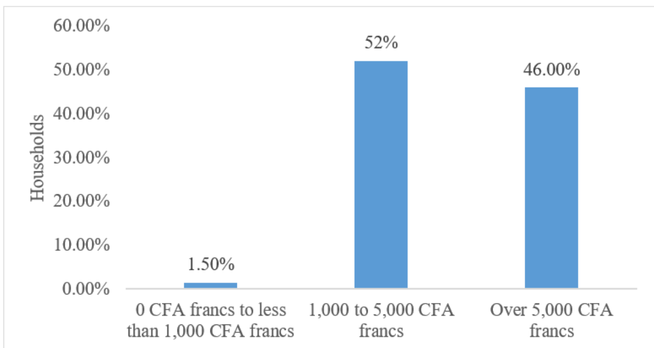

Figure 4. Distribution of the population according to the monthly budget allocated to the purchase of water (Field survey, November 2024)

The figure shows that of the total number of 65 households that purchase water, more than half (52%) spend between 1,000 CFA francs (USD 1.80) and 5,000 CFA francs (USD 9) per month on the purchase of this essential resource, while 46% spend more than 5,000 CFA francs. On the other hand, households whose monthly budget for this need is 0 to 1,000 CFA francs (USD 1.80) represent only a small proportion of 1.5%.

In terms of the budget allocated to water consumption, we note that more than 68% of the population spends more than 3% of their monthly income, while about 23% spends a percentage ≤ 3% of their monthly income on it (see Table 4).

Table 4. The monthly budget allocated to water consumption

Monthly Percentage of Income Allocated to Water Consumption	Number of Households (%)
≤ 3%	22.99
> 3%	68.97
0%	8.04
Total	100

3.2.6 Accessibility in relation to the amount of water consumed per person per day

In Noèpé, water production is generally satisfactory. With a population of around 9,796 inhabitants, the daily requirement is around 196 m³, but the production capacity is 440 m³, which is a little more than double the requirement.

However, in Badja, which has a population of 9,413 inhabitants, the situation is more critical. With a production that varies between 50 and 130 m³ per day, the daily needs are estimated at 188 m³. Even in the best case, there is a shortfall of about 58 m³ per day to meet demand.

In Aképé, the needs are even higher due to a larger population (16,961 inhabitants). It would take about 339 m³ per day, but the current production is 239 m³, leaving a daily deficit of 100 m³.

3.3 Problems encountered in the supply of drinking water

The data collected show that the populations of the municipality face several difficulties in the supply of drinking water. These challenges include: The problem of power cuts, low water flow at points of purchase, and distance from water sources.

4. DISCUSSION

Having easy access to drinking water remains a crucial element nowadays in our territories. This research has shown that the situation of this basic service in the municipality of Avé 2 remains worrying. Water sources recognized as drinking (private connection, mini water supply and standpipe) are used by only 22% of households. These figures show that access to reliable drinking water remains a challenge for the majority of the population. The low rate of drinking water use (22%) is linked on the one hand to the limited coverage of the network and on the other hand to the costs considered too high for low-income households. There are 56 standpipes throughout the municipality, 64% of which are currently out of service. In addition, it is estimated that there are nearly 600 private connections and mini-supply systems, although the majority of them are also non-functional. Indeed, although standpipes, private connections, and mini-pipelines are considered an improved source of drinking water according to a WHO study [12], their functionality or reliability in the field remains limited, which reveals a significant gap between the technical classification of hydraulic infrastructures and their actual capacity to provide a continuous service (hence the 64% non-functional of standpipes).

There are also other sources such as open wells and rivers, the quality of which remains uncertain based on the qualitative indirect indicators of perceived colour, taste and smell. This is also the case for several drilling in this municipality. This situation is exacerbated by the unplanned urbanization of these areas [13]. This fact is corroborated by an article which states that the level of water consumption is influenced by demographic, physiological, social and economic factors [14]. Unplanned urbanization leads to an increase in demand for water-related services without corresponding infrastructure development, leading to water scarcity and inadequate service delivery.

In addition, surveys have revealed that approximately 74% of the municipality's population does not have easy access to water in terms of distance (200 meters or less, see Table 3) and in terms of collection time, 41% of households take more than 30 minutes to get water (Figure 2). If we take into account the WHO standard which recommends that drinking water sources be located less than one kilometer away (200 meters recommended) and that the round trip collection time should not exceed 30 minutes [15-17], we note that the population of the Avé 2 municipality is facing significant challenges in accessing drinking water. The major challenges for the population of the Avé 2 municipality in terms of drinking water supply are: power cuts supplying drilling, low borehole flow and distance from water sources. Referring to Figure 5, the main difficulties encountered by households are power cuts (39%), low flow of water points (31%) and distance from supply sources (30%). These results are confirmed by several studies such as those of Lewis et al. [18], which reveal that the distance of households from water points is a major constraint, especially in peripheral neighbourhoods. This is also the case with this research [19] on water accessibility in the informal settlements of Goreangab in Namibia, in which the results show that only 11% of the inhabitants live within one kilometre of a drinking water source.

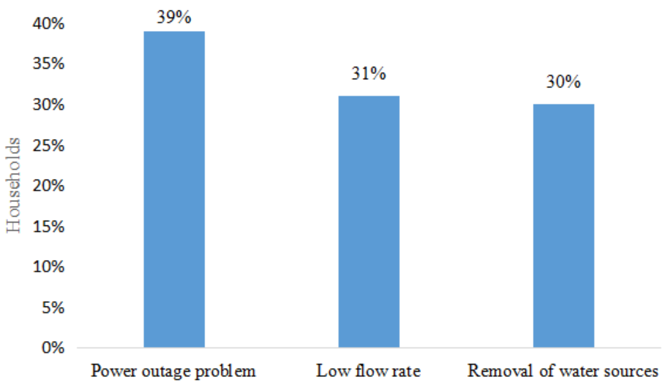

Figure 5. Supply difficulties at water points (Field survey, November 2024)

3% is the generally accepted and set financial affordability threshold by the OECD and the World Bank; Monthly spending on drinking water should not exceed 3% of a household's monthly income [20]. In terms of cost, approximately 69% of the population surveyed spends more than 3% of their monthly income on water consumption, which indicates a critical situation. Generally, households spending this minimum percentage (more than 3%) of their income on water are poor households that cannot afford a drinking water service directly in their yard and seek alternatives that ultimately cost them more. Some studies confirmed the fact that many households spending more than 3% of their income on water services can be considered to be in a situation of water poverty [21, 22].

The minimum threshold of 20 litres per person per day was originally set as part of Agenda 21, the United Nations plan of action for sustainable development. A comparison of the survey results shows that two cantons are unable to produce their daily drinking water requirements. The canton of Badja, with a population of 9,413 inhabitants and an estimated daily demand for water of about 188 m³, produces only between 60 and 130 m³ per day. Also in the canton of Aképé, which has a larger population (16,961 inhabitants), about 339 m³ per day is needed, but the current production is 239 m³, leaving a daily deficit of 100 m³. This critical situation can be explained, among other things, by the high spatial dispersion of dwellings, low population density, ageing infrastructure and the high costs associated with the construction and maintenance of long-distance water supply networks [23].

Several factors are at the heart of this complex situation regarding access to drinking water in the municipality of Avé 2. These factors include geographical, socio-economic and infrastructural factors. In terms of geographical factors, southern Togo (including the municipality of Avé 2), which is often affected by climatic anomalies, has an average rainfall of around 870 mm per year towards the coast, making it the region with the lowest rainfall in the country. The water table, which is replenished by rainwater, is indirectly affected by this anomaly. In this sense, research demonstrates that climate change is putting additional pressure on available surface water resources [24-27], leading to water shortages and recurrent droughts that threaten the progress made so far. In addition, the population growth and rapid urbanization of this municipality amplify the need for an expansion of water services [28].

Regarding socio-economic factors, the economic crisis experienced by Togo in the 1990s, characterized by the breakdown of cooperation, propelled the collapse of investments negatively impacting the water sector in Togo. This situation has influenced the extension of water distribution pipes in several peripheral areas. The impoverishment of the population of the municipality of Avé 2 is also part of the socio-economic factors. Our surveys have revealed that the sources of access to basic services vary according to people's monthly income. For example, only people with an income of more than 120,000 CFA francs have direct access to drinking water (TdE connection, mini water supply, personal drilling, etc.) within their household. Some research [27-31] argues that economic disparities limit the ability of communities to invest in water infrastructure or pay for clean water, thus perpetuating cycles of deprivation.

For factors related to infrastructure, the analysis of access to drinking water in the municipality of Avé 2 reveals a crisis in terms of infrastructure. Of the 56 standpipes (Bornes Fontaines (BF)) surveyed, only 18 are currently functional, i.e., an availability rate of 32.1%. This situation is mainly the result of two interrelated dynamics. The majority of the hydraulic infrastructure dates back years, with installations that have not been renovated since they were commissioned. This is accompanied by a lack of preventive maintenance due to a lack of budgets allocated by delegated managers. To add to this observation, some researchers point to the inadequacy of infrastructure [32]; They point to the fact that many regions lack the necessary water supply systems, forcing them to rely on remote or dangerous sources. These authors also point out in the same research that maintenance problems such as dysfunctional water points (broken drilling, clogged pipes, etc.) further limit access and require expensive alternatives.

Difficult access to drinking water can have harmful consequences on the well-being and health of a population. Although this study did not take into account physical, chemical, or microbiological analyses of water quality, the conditions of access to water for the population of the municipality of Avé2 may pose potential risks to the health of the population. In peripheral areas, such as Avé 2 on the edge of Greater Lomé, dependence on unimproved water sources, combined with intermittent formal services and long distances travelled for water supply, promotes practices such as prolonged water storage at the household level. The literature shows that these conditions increase the risk of secondary water contamination and exposure to waterborne diseases, including diarrhoeal diseases, which are one of the leading causes of death among children under five years of age in low-income countries [33, 34]. In terms of people's well-being, improving physical access to water has positive effects on household well-being. Studies in sub-Saharan Africa indicate that reducing water collection time, especially when the distance is less than 15 minutes, is associated with significant improvements in child health indicators [35].

5. LEVERS FOR IMPROVEMENT

5.1 Rehabilitation of standpipes and extensions of the water supply network

An analysis of the situation reveals that the infrastructure is dilapidated, with only 18 functional standpipes out of 56. It was proposed to rehabilitate this equipment by replacing it with modern models with two taps, equipped with solar panels to ensure pumping even in the event of a power cut.

Below is an illustration of the 2-tap standpipe, equipped with a solar panel (Figure 6):

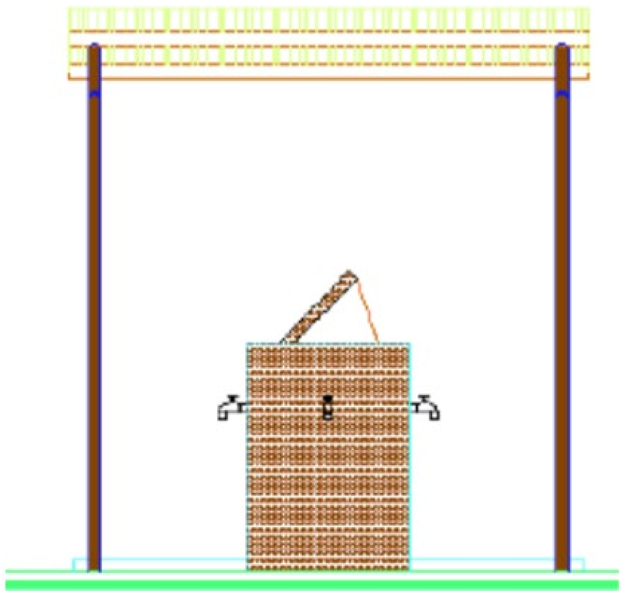

Figure 6. Proposed two-tap standpipe with solar panel

The extension of water supply networks remains hampered by financial constraints. It has been proposed to widen the primary and secondary networks in order to reduce connection costs, as is the case in Lomé. This solution approach would facilitate access to water for low-income households and reduce the distances travelled to obtain supplies.

5.2 Reduction of the cost of the subscription

The cost of the subscription, which is 75,000 FCFA (USD 134.29), is an obstacle for many households. Reducing it would allow more families to have a direct connection to their homes, thus limiting travel, improving hygiene and reducing inequalities in access to water.

6. CONCLUSION AND LIMITATIONS

The present study revealed crucial issues concerning access to drinking water services in the municipality of Avé 2. The analysis of the data showed that access to drinking water is particularly problematic. In fact, only a minority of the households surveyed use private connections (TdE, mini water supply and standpipes). The main obstacle identified by the populations to this constraint is the distance from water sources, which forces them to travel long distances to obtain supplies. Difficult access to water can be explained by several factors: population growth that is not supported by infrastructure, economic inequalities limiting access to quality services, and poor maintenance of existing facilities. To meet these challenges, infrastructure must be improved, networks must be extended and the cost of subscriptions must be lowered. Involving communities in water management would ensure sustainable and appropriate solutions.

6.1 Research limitations

Although this study provides valuable information on the realities of access to drinking water in the Avé 2 municipality in Togo, certain limitations must be recognized, namely: the partial consideration of the qualitative dimension of water sources. Indeed, water quality has only been assessed through the self-declaration of households using qualitative indirect indicators of colour, taste and smell.

FUNDING

This research was funded by the Regional Centre of Excellence on Sustainable Cities in Africa (CERVIDA-DOUNEDON), the Association of African Universities (AAU) and the World Bank (Grant No.: IDA 5360 TG).

REFERENCES

[1] United Nations. (2002). Future world population growth to be concentrated in urban areas of world. https://press.un.org/en/2002/pop815.doc.htmpress.un.

[2] OCDE. (2025). Dynamics of African urbanization 2025: Planning urban expansion. https://www.oecd.org/fr/publications/dynamiques-de-l-urbanisation-africaine-2025_cb26f4e2-fr.html.

[3] INSEED. (2023). Presentation of the main final results of the RGPH-5. https://inseed.tg/presentation-des-principaux-resultats-definitifs-du-rgph-5/.

[4] Almosawi, F., Ebraheem, A.K., Alkinani, A.S. (2025). Simulating natural systems for urban intelligence: A case study of Dora Municipality, Baghdad, for sustainable urban development. International Journal of Sustainable Development and Planning, 20(1): 305-315. https://doi.org/10.18280/ijsdp.200128

[5] Satterthwaite, D. (2016). The Current and Potential Development Impact of Sub-Saharan Africa's Cities. IIED, London; KCL, London.

[6] Chattopadhyay, S., Chattopadhyay, S. (2012). Contours of governance reforms in India: Constraints and possibilities. South Asian Survey, 19(1): 113-132. https://doi.org/10.1177/0971523114539592

[7] Lubis, R.P., Subhilhar, Harahap, R.H., Zuska, F. (2022). Model of sustainable drinking water governance at Tirta Kualo regional drinking water corporate in Tanjungbalai city, Indonesia. International Journal of Sustainable Development and Planning, 17(8): 2421-2426. https://doi.org/10.18280/ijsdp.170809

[8] Liu, L., Zhou, J., An, X., Zhang, Y., Yang, L. (2010). Using fuzzy theory and information entropy for water quality assessment in three gorges region, China. Expert Systems with Applications, 37(3): 2517-2521. https://doi.org/10.1016/j.eswa.2009.08.004

[9] SPEAU. (2023). Water resources. https://sp-eau.tg/index.php/2023/05/23/ressources-en-eau/.

[10] Li, Y., Li, X. (2021). Research on water distribution systems from the past to the future: A bibliometric review. Environmental Technology Reviews, 10(1): 161-176.

[11] Ministry of Water and Sanitation. (2023). Documentation. https://eau.gouv.tg/documentation/.

[12] WHO &UNICEF. (2017). Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines. https://washdata.org/sites/default/files/documents/reports/2019-05/JMP-2017-report-final.pdf.

[13] Lapworth, D.J., Nkhuwa, D.C.W., Okotto-Okotto, J., Pedley, S., Stuart, M.E., Tijani, M.N., Wright, J. (2017). Urban groundwater quality in sub-Saharan Africa: Current status and implications for water security and public health. Hydrogeology Journal, 25: 1093-1116. https://doi.org/10.1007/S10040-016-1516-6

[14] Zheng, C., Yang, Y. (2018). Influencing factors of the amount of drinking water by Changsha college students: A multilevel model analysis. Journal of Hygiene Research, 47(4): 593-598.

[15] Cassivi, A., Johnston, R., Waygood, E.O.D., Dorea, C.C. (2018). Access to drinking water: Time matters. Journal of Water and Health, 16(4): 661-666. https://doi.org/10.2166/wh.2018.009

[16] Graham, J.P., Hirai, M., Kim, S.S. (2016). An analysis of water collection labor among women and children in 24 sub-Saharan African countries. PLoS ONE, 11(6): e0155981. https://doi.org/10.1371/journal.pone.0155981

[17] Ndongo, B., Ngnikam, E., Mbouendeu, S.L. (2012). Analysis of non-conventional water services in spontaneous habitat districts: Case study of the EBA'A District in the periphery of the Younde City (Center region in Cameroon). Revue des Sciences de L'eau, 25(2): 153-163. https://doi.org/10.7202/1011605ar

[18] Lewis, E.W., Staddon, C., Sirunda, J. (2019). Urban

water management challenges and achievements in Windhoek, Namibia. Water Practice & Technology, 14(3): 703-713. https://doi.org/10.2166/wpt.2019.055
[19] Goni, I.B., Taylor, R.G., Favreau, G., Shamsudduha, M., Nazoumou, Y., Ngounou Ngatcha, B. (2021). Groundwater recharge from heavy rainfall in the southwestern Lake Chad Basin: Evidence from isotopic observations. Hydrological Sciences Journal, 66(8): 1359-1371. https://doi.org/10.1080/02626667.2021.1937630
[20] Fan, L., Liu, G., Wang, F., Geissen, V., Ritsema, C.J., Tong, Y. (2013). Water use patterns and conservation in households of Wei River Basin, China. Resources, Conservation and Recycling, 74: 45-53. https://doi.org/10.1016/j.resconrec.2013.02.017
[21] Bradshaw, J., Huby, M. (2013). Water poverty in England and Wales. Journal of Poverty and Social Justice, 21(2): 137-148. https://doi.org/10.1332/175982713x669835
[22] Mahmood, B., Sharma, S. (2009). Affordability of household water and wastewater charges in Manukau City: A case study. WIT Transactions on Ecology and the Environment, 1: 313-324. https://doi.org/10.2495/wrm090291
[23] Omarova, A., Tussupova, K., Hjorth, P., Kalishev, M., Dosmagambetova, R. (2019). Water supply challenges in rural areas: A case study from central Kazakhstan. International Journal of Environmental Research and Public Health, 16(5): 688. https://doi.org/10.3390/ijerph16050688
[24] Bhaga, T.D., Dube, T., Shekede, M.D., Shoko, C. (2020). Impacts of climate variability and drought on surface water resources in Sub-Saharan Africa using remote sensing: A review. Remote Sensing, 12(24): 4184. https://doi.org/10.3390/RS12244184
[25] Yomo, M., Mourad, K.A., Gnazou, M.D.T. (2019). Examining water security in the challenging environment in Togo, West Africa. Water, 11(2): 231. https://doi.org/10.3390/W11020231
[26] Diouf, K., Hellier, E., Fall, A.N., Taibi, A., Kane, A., Ballouche, A. (2024). Environmental inequalities in access to water in rural areas: Shortcomings in resource governance or spatial justice issues? The case of the GoromLampsar axis (Senegal River Delta). VertigO, 24(2). https://doi.org/10.4000/11qkz
[27] Baron, C., Bonnassieu, A. (2012). The challenges of access to water in West Africa: Diversity of modes of governance and conflicts of use. Mondes en Développement, 156(4): 17-32. https://doi.org/10.3917/med.156.0017
[28] Ferguson, B.C., Brown, R.R., Deletic, A. (2013). Diagnosing transformative change in urban water systems: Theories and frameworks. Global Environmental Change, 23(1): 264-280. https://doi.org/10.1016/j.gloenvcha.2012.07.008
[29] Dhin Etia, F.C., Mvogo, G., Honoré, B. (2022). The determinants of access to drinking water in Cameroon. African Development Review, 34(1): 154-170. https://doi.org/10.1111/1467-8268.12624
[30] Oskam, M.J., Pavlova, M., Hongoro, C., Groot, W. (2021). Socio-economic inequalities in access to drinking water among inhabitants of informal settlements in South Africa. International Journal of Environmental Research and Public Health, 18(19): 10528. https://doi.org/10.3390/IJERPH181910528
[31] Debela, B.K., Bouckaert, G., Troupin, S. (2022). Access to drinking water in sub-Saharan Africa: Is the doctrine of the promoter state relevant? Revue Internationale Des Sciences Administratives 88(2): 411-430. https://doi.org/10.3917/risa.882.0411
[32] Baddianaah, I., Dongzagla, A., Salifu, S.N. (2024). Navigating access to safe water by rural households in sub-Saharan Africa: Insights from north-western Ghana. Sustainable Environment, 10(1). https://doi.org/10.1080/27658511.2024.2303803
[33] Sy, I., Keita, M., Traoré, D., Koné, B., Bâ, K., Wedadi, O.B., Fayomi, B., Bonfoh, B., Tanner, M., Cissé, G. (2014). Water, hygiene, sanitation and health in precarious neighbourhoods in Nouakchott (Mauritania): Contribution to the ecohealth approach in Hay Saken. VertigO. https://doi.org/10.4000/vertigo.14999
[34] Bhavnani, D., Goldstick, J.E., Cevallos, W., Trueba, G., Eisenberg, J.N.S. (2014). Impact of rainfall on diarrheal disease risk associated with unimproved water and sanitation. The American Society of Tropical Medicine and Hygiene, 90(4): 705-711. https://doi.org/10.4269/ajtmh.13-0371
[35] Pickering, A.J., Davis, J. (2012). Freshwater availability and water fetching distance affect child health in Sub-Saharan Africa. Environmental Science & Technology, 46(4): 2391-2397. https://doi.org/10.1021/es203177v