World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

# ASSESSMENT OF WATER QUALITY INDICATORS OF WELLS IN THE URBAN COMMUNE OF DALABA (GUINEA)

Samba Alarba Barry [1,*], Alhassane Diami Diallo [1], Mamadou Madaniou SOW [1], Adama Moussa Sakho [2] and Cellou Kanté [1]

[1] Laboratory Techniques Department, Higher Institute of Technology, Mamou, Guinea.
[2] Chemestry Department, Gamal Abdel Nasser University, Conakry, Guinea.
* Corresponding Author; Email: sab.istmamou86@gmail.com

World Journal of Advanced Research and Reviews, 2026, 32(01), 2004–2009

Publication history: Received on 19 September 2026; revised on 27 October 2026; accepted on 29 October 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.32.1.2756

Copyright © 2026 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution License 4.0

## ABSTRACT

The quality of water intended for consumption is a major issue for public health and sustainable development, especially in areas where access to drinking water is This resource still remains a fundamental challenge for Guinea as a whole, and more particularly for the urban commune of Dalaba. This study assesses the quality of well water in the urban commune of Dalaba (Guinea). Where wells are a vital household water source but face contamination risks natural and human sources. Researchers analyzing 36 samples collected at different times of day (morning, noon, evening) over 02 periods (May and October 2026) to evaluated physico-chemical and microbiological quality. The goal was to identify pollution sources, link environmental conditions to water contamination, and provide scientific recommendations for better water management and public health protection. Finding were compared against World Health Organization over time (WHO, 2014). Results indicate significant organic pollution of human origin, likely from sewage infiltration, posing health risks to the local population. This study also aims to raise awareness about water quality, pollution sources, and purification methods for vulnerable communities, ultimately helping develop strategies for sustainable access to safe well water in Dalaba.

**Keywords:** Evaluation, Indicators, Quality, Well Water, Dalaba

## 1 INTRODUCTION

Water is an essential element for the survival of humans, animals, and plants. Having enough water, both in quantity and quality, helps maintain good health. That's why it's not just a resource but also a source. It's the origin of all life, because anywhere it’s lacking on Earth marks the end of all forms of life. At the same time, it can carry harmful components like toxic minerals, bacteria, and viruses. Water deserves special attention, especially since human activities put it at great risk (Amadou and al., 2014; WHO, 2014).

The population growth in Guinea following its independence has led to an increase in the essential needs of its people, especially in urban areas (Diallo, 2015). The urban commune of Dalaba is also affected by these environmental issues. Dalaba gets its drinking water from three (3) different sources: tap water, borehole water, and well water. The branch of the Guinea Water Company (SEG) in this city struggles to meet the full demand for drinking water (only 3/4 of the neighborhoods are served). This situation has led residents to use well water to wash their fruits and vegetables, as well

as for drinking (Diallo, 2015; Heriarivony and al., 2015). Indeed, the use of these untreated well waters exposes communities to various health risks such as amoebic dysentery, typhoid fever, cholera, among others (Diallo, 2015; Diallo, 2012).

As part of this study, a field survey was carried out, revealing that diarrheal diseases caused by the lack of drinking water are the most common. This study aims to establish some quality criteria for well water in the urban commune of Dalaba, particularly the physicochemical parameters (pH, conductivity, iron content, and total hardness) and microbiological parameters (aerobic mesophilic flora, total coliforms, fecal coliforms, and yeasts and molds), while identifying potential sources of pollution in order to suggest solutions to minimize the risks associated with using this well water.

## 2 MATERIALS AND METHODS

The work involved evaluating the physicochemical and microbiological quality of well water in the urban commune of Dalaba using appropriate equipment and techniques to carry out these various analyses.

To carry out these different analyses, the following equipment was used:

- Field Equipment: cooler, markers, latex gloves, 50 cl bottles, HANA HI 1832 pH meter, and survey forms;
- Laboratory Equipment: 50 cl bottles, HANA LF 330 conductivity meter, Petri dishes, 10 ml sterile pipettes, incubators, Mettler Toledo analytical balance, Bunsen burner, magnetic stir plate with bar, desiccator, 20 ml graduated burettes, Erlenmeyer flasks, 250 ml graduated test tubes, stirring rod, toilet paper, beakers, marker, colony counter, flat-tip stainless steel tweezers, test tubes, and calculator.

The chemical analysis methods are described for each parameter in the indicated guides (Aquamerk ammonium, nitrite, nitrate tests; Merckoquant Chlorine test). The bacteriological analysis methods involve using a graduated pipette to take 1 ml of the sample, placing the collected solution in the center of the COMPACT DRY, incubating at 35 °C for 18, 24, or 48 hours depending on the case, and then reading and interpreting the results.

Samples were taken in 50 ml PVC containers following the sample collection practices in aquatic environments described by the Vendée Departmental Analysis Laboratory for physico-chemical and bacteriological analyses.

Well water samples were collected from two neighborhoods at three different times and during two periods, taking into account the water service rate of the Guinea Water Company, as well as the usage and population density around these wells. They were then transported in a cooler in May and October 2016 to the National Quality Control Office (ONCQ) in Matoto for analysis. The results of the analyzed well water samples were discussed using tables generated in Excel.

## 3 RESULTS AND DISCUSSION

### 3.1 Physico-chemical parameters of well water analyzed in May and October 2026

The histogram shows that the pH values of the sampled well water have an average of 7.3. Drinking this water probably wouldn't pose a risk to human health (Diallo, 2015).

The average conductivity values range between 53.12 µS/cm for the minimum (dry season) and 84.42 µS/cm for the maximum (rainy season), with an average of 68.77 µS/cm. The wells are more mineralized in October than in May (Figure 1). This conductivity can also come from human activities, caused by agricultural or domestic effluents that contain salts, which also contribute to increasing conductivity. The rise in well mineralization is due to heavy use by mechanics and the infiltration of wastewater, especially after the rainy season. The decrease in conductivity is explained by the construction of a well curb and a protective wall around some wells. The conductivity of all water samples from the wells analyzed during the two (2) periods complies with the WHO recommended standard (≤ 400 µS/cm) (Diallo, 2012; WHO, 2014).

The iron content is higher in May compared to October, which can be explained by the decrease in water levels in the wells. This is due to heavy use of the wells, which promotes the growth of certain bacteria in the water that precipitate iron and corrode the pipes (Diallo, 2015).

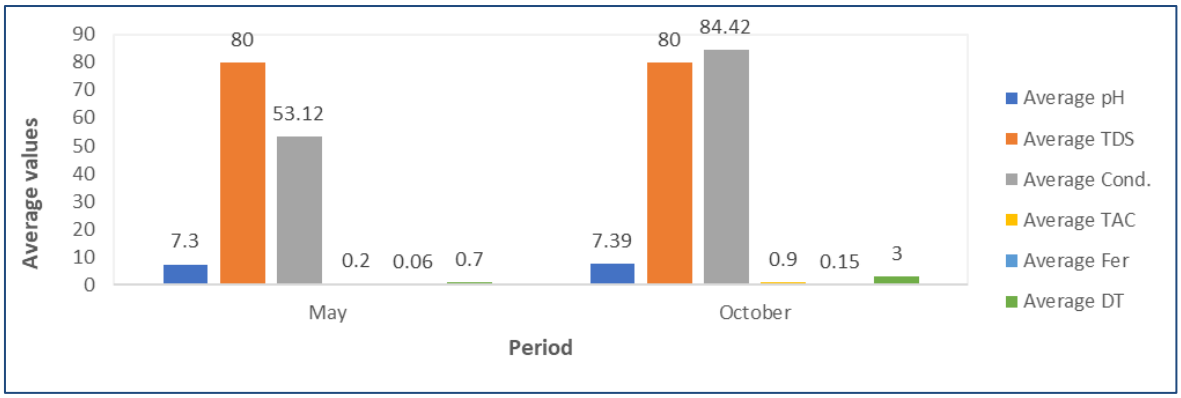


**Figure 1: Histogram of the average results of the physico-chemical parameters of well water analyzed in May and October 2026**

We will say that all the water samples from the wells analyzed in the Pellel Yero and Silly neighborhoods are soft (P1, P2, S2, and S3) or slightly soft (P3 and S1), especially in October. So, this water is recommended for laundry since it uses less soap, and all of it meets the standard recommended by the WHO (0 – 15 °F) (WHO, 2014). The difference in these results can be explained by the type of terrain crossed, soil structure, well depth, and environmental conditions (Amadou and al., 2014; Diallo, 2015; Moissou and al., 2014).

From a physico-chemical point of view, all the well water samples analyzed in May and October meet WHO standards (WHO, 2014).

### 3.2 Microbiological parameters of well water analyzed in May and October 2026

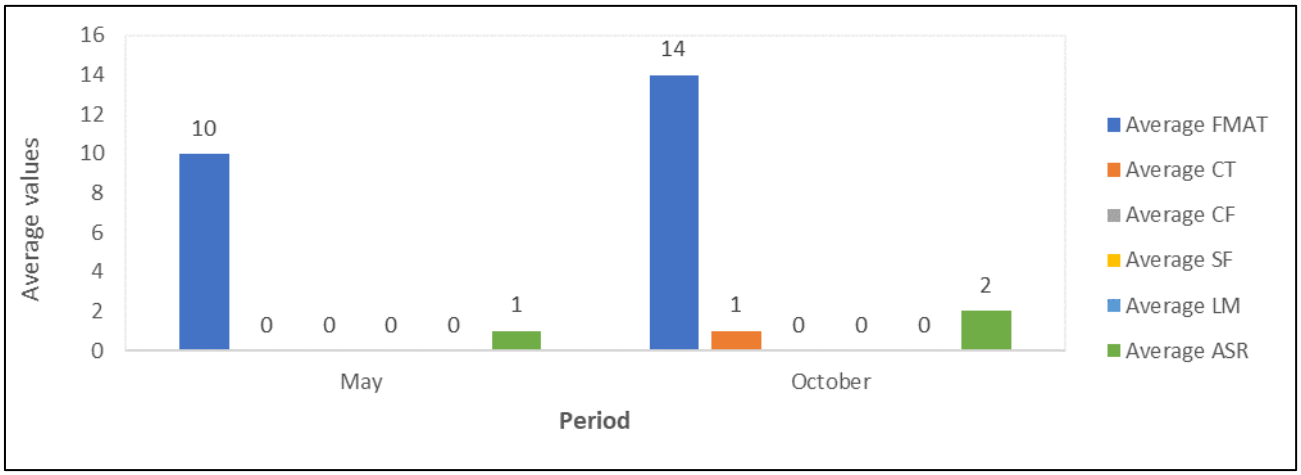


**Figure 2: Histogram of the average results of microbiological parameters of well water analyzed in May and October 2026**

We noticed a significant increase in FMAT in December, which is due to sewage infiltration following the rainy season. In general, this pollution is encouraged by not following hygiene rules and practices, especially during the rainy season. On average, well results meet the standard recommended by the WHO (100/1 ml maximum) (WHO, 2014).

On average, the wells in the Silly neighborhood contain CT, a situation explained by sewage infiltration. The wells analyzed in October were of unsatisfactory quality compared to World Health Organization (WHO) standards. Their presence in the water indicates fecal contamination, which poses a health risk, while also signaling a deterioration in the water's bacterial quality. This degradation can be attributed, among other things, to surface water seeping into the wells, a large influx of residents, or the gradual growth of the bacterial layer on the walls of these wells.

However, on average, we observe a minimal presence (0.1/100 ml) of CF, SF, and LM during the month of October. This is explained by a lack of hygiene due to excessive use by the residents. It's worth noting that some neighborhoods in the urban commune of Dalaba have neither boreholes nor tap water supplied by the SEG (Figure 2).

All analyzed well water samples are not suitable for human consumption because they do not meet the standard recommended by the WHO (0/100 ml) (Kahoul and al., 2014; WHO, 2014).

### 3.3 Statistics of well results and characteristics

All the well water samples (100%) analyzed between May and October showed satisfactory physico-chemical quality. In May, 16.67% of the well water samples analyzed were microbiologically satisfactory, unlike in October, when 100% were considered unsatisfactory. 33.33% of the wells are located at a distance of 15 to 20 meters, while 16.67% are 20 to 25 meters away from latrines. 33.33% of the sampled wells have a depth of 15 meters, compared to 16.67% with a depth between 17 and 25 meters.

### 3.4 Comparison of results

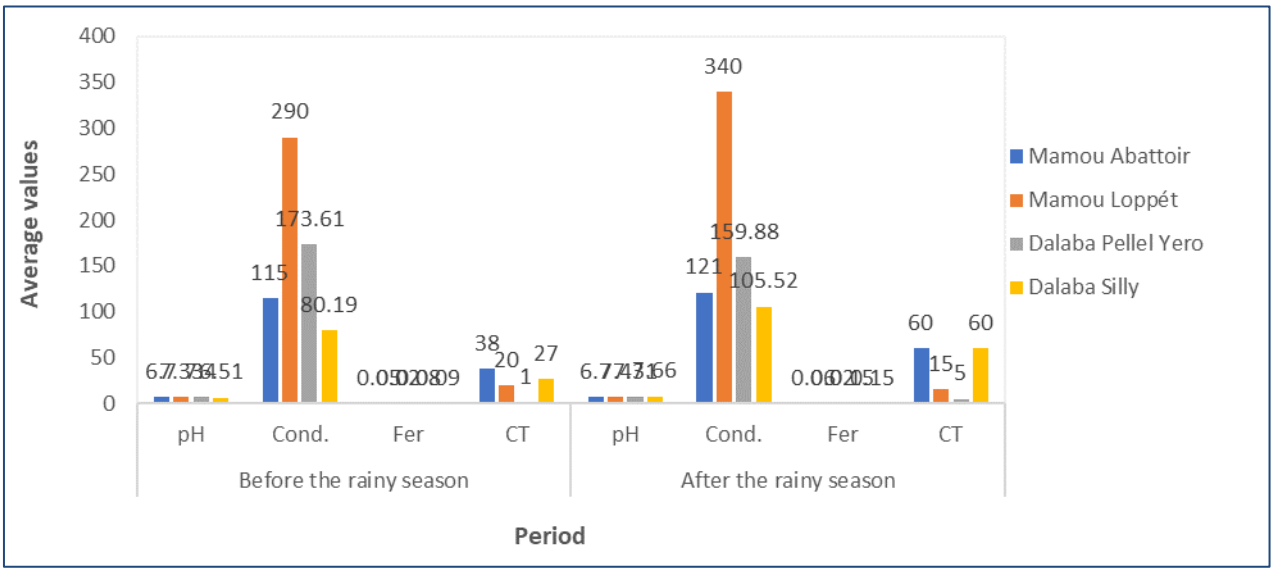


**Figure 3: Histogram comparing the results of the physico-chemical and microbiological parameters of well water between Mamou and Dalaba**

This comparison shows that the pH remains stable and slightly acidic (6.71 to 6.75) across all sites and periods. The Dalaba sites stand out for having water with fewer minerals (especially Dalaba Silly) and a zero CT level after the rain, indicating better bacteriological quality. In contrast, the Mamou Loppé site has very high conductivity (up to 340 mg/L) and an increase in iron after the rainy season, a sign of heavy runoff. Finally, the Mamou Abattoir site maintains a high CT level (60 col/mL) even after the rainy season, which is explained by ongoing pollution from human activities. We notice a difference in results, which can be explained by the type of terrain, the soil structure, the well depth, and the surrounding environment (Figure 3).

*Abbreviations*

| | | | |
|---|---|---|---|
| pH | Hydrogen ion concentration | FMAT | Total aerobic mesophilic flora |
| TDS | Salt levels below | CF | Fecal coliforms |
| Cond. | Conductivity | CT | Total coliforms |
| TAC | Tatal alkalinity level | SF | Fecal streptococci |
| Fer | Iron level | LM | Yeasts and molds |
| DT | Total hardness | ASR | Sulfite-reducing anaerobes |

## 4 CONCLUSION

This work focused on studying the quality of well water in the urban commune of Dalaba during the months of May and October 2026. The analysis of water samples taken from the wells in May and October shows that they are all (100%) of satisfactory quality from a physico-chemical perspective. However, only 16.67% of the water samples from the wells analyzed in May were of satisfactory quality, compared to 100% of unsatisfactory quality in October from a microbiological point of view (Bengoumi and al., 2015). 33.33% of the wells analyzed are located at a distance ranging from 15 to 50 m from latrines, while 16.67% are at a distance of 20 to 25 m. 33.33% of the wells sampled are 15 m deep,

and 16.67% have a depth ranging from 17 to 25 m (Amadou and al., 2014). The water samples from the wells that were analyzed are not of satisfactory quality for human consumption. That's why it's necessary to continue this research in order to monitor the progression of this pollution.

*We suggest*

- To the population: clean the wells, if possible, using a bucket to remove foreign objects, deposits, and animal or plant matter; put bleach in the wells according to the quantities mentioned in the table titled 'Required Amount of Bleach for Well Disinfection'; follow personal and collective hygiene rules and practices; regularly check the condition of wells and septic systems; and examine possible sources of contamination around the wells and take appropriate corrective measures.
- To the prefectural and municipal authorities: to strengthen the capacity of the network of the Guinea Water Company agency; to raise awareness among the population about the use of chlorine in households; to design a sanitation network for waste disposal; to protect water points; to inform the population about the harmful effects of consuming polluted water as well as the prescribed rules and practices of personal and collective hygiene; to remove anything that could promote the development of flies and other living beings capable of spreading microbes by destroying tin cans or other objects that could serve as breeding sites; and to put lids on different water reserves and build wells' edges and enclosures for large-diameter wells to prevent contamination by animals.

*To keep well water clean, you should*

- Improve the area around the well and follow these hygiene practices: build a well curb and a protective wall to keep animals away as well as runoff water, especially during the rainy season;
- Put a cover on the well to prevent dust and insects from contaminating it;
- Raise a block where you can place containers to avoid contamination from the ground;
- Use clean containers with a small opening to carry and store water;
- Avoid putting foreign materials like leaves and twigs into the water when transporting it to where it will be used;
- Wash your hands with soap and water before any contact with drinking water;
- Use clean utensils to drink water and educate people about hygiene (handwashing) after defecation, before eating, and when preparing food.

## STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

*Acknowledgments*

I would sincerely like to thank the authorities of the Higher Institute of Technology of Mamou for their support and the staff of the National Quality Control Office of Matoto for the warm welcome and hospitality during my stay.

*Funding Source*

The Higher Institute of Technology of Mamou is the source of funding.

*Disclosure of conflict of interest*

The authors declare no conflicts of interest.

*Statement of ethical approval*

We declare respect for ethics and the consent of all the authors.

*Statement of informed consent*

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

## REFERENCES

[1] Amadou H., Laouali M.S., Manzola A., 2014. Physico-chemical and bacteriological analyses of waters from three aquifers in the Tillabéry region: Application of multivariate statistical analysis methods; Larhyss Journal, vol 11, no.4, pp. 25-41; http://archives.univ-biskra.dz/handle/123456789/4186 ;

[2] Bengoumi D., Chahlaoui A., Belghiti L., Taha I.S., El Moustaine R., 2015. Study of the bacteriological quality of water from certain wells in poultry farms (Meknes and Gharb - Morocco); Larhyss Journal, no. 24, pp. 209-226 ; https://asjp.cerist.dz/en/article/55300 ;

[3] Diallo A. D., 2015. Determination of some physico-chemical and microbiological parameters of well waters in the urban commune of Mamou; Master's Thesis in Applied Chemistry and Biology at Gamal Abdel Nasser University of Conakry; Library of the Higher Institute of Technology of Mamou ;

[4] Diallo M., 2012. Determination of some physico-chemical parameters in well waters in the commune of Matoto (Conakry); Library of Gamal Abdel Nasser University of Conakry ;

[5] Heriarivony S. C., Razanamparany B., Rakotomalala J. E., 2015. Physico-chemical and bacteriological characteristics of drinking water (wells) in the rural municipality of Antanifotsy, Vakinankaratra region, Madagascar; Larhyss Journal, no. 24, pp. 7-17; http://www.larhyss.net/ojs/index.php/larhyss/article/view/306 ;

[6] Kahoul M., Derbal N., Alioua A., Ayad W., 2014. Assessment of the physico-chemical quality of well water in the Berrahal region (Algeria), Larhyss Journal p-ISSN 1112-3680 / e-ISSN 2521-9782, no. 18, pp. 169-178 ; https://asjp.cerist.dz/en/article/55107 ;

[7] Moissou L., Moudachirou I., Jean-Pierre C.M., Valentin D.W., Nester G.S., 2014. Physico-chemical characterization of well water in the municipality of Pobè (Benin, West Africa); Journal of Applied Biosciences 63: 4703-4719; https://doi.org/10.4314/jab.v79i1.13 ;

[8] WHO, 2014. Guidelines for drinking water quality, Guidelines for drinking-water quality: fourth edition incorporating the first, second and third addenda.