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***Research Article***

# Prevalence and Epidemiological Profile of Patients with Malaria at the Torrock District Health Center from December 2025 to January 2026

**Gondimo Gabdibé Elysée [1*], Abdelsalam Adoum Doutoum [2], Kouyahbé Fadeunbo [3], Kémoral Aristide [1] and Djimarabeye Pacifique [4]**

[1] *Faculty of Human Health Sciences, University of N'Djamena, N'Djamena, Chad.*
[2] *Faculty of Human Health Sciences, Adam Barka University of Abéché, Abéché, Chad.*
[3] *Faculty of Humanities and Social Sciences, University of N'Djamena, N'Djamena, Chad.*
[4] *Faculty of Life and Earth Sciences, University of Pala, Pala, Chad.*
[*] *Corresponding author: gonelysee@gmail.com*

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**Abstract**

In Chad, as in the rest of sub-Saharan Africa, malaria is endemic and epidemic, and epidemiological data continue to evolve at all levels. The objective of this study was to determine the prevalence of malaria and to establish the epidemiological profile of patients with malaria in order to gain insight into trends in its morbidity. To achieve this objective, a descriptive cross-sectional study was conducted at Torrock District Hospital from December 2025 to January 2026 among 241 patients who had been prescribed a thick blood smear or a rapid diagnostic test and who consented to participate in the study. A questionnaire designed in accordance with our objectives was then administered to this study population, and the resulting data were subsequently processed using simple tabulation. Our investigations revealed a malaria prevalence of 48.54%, with severe malaria (86.32%) predominating over the uncomplicated form. Consequently, the most commonly used antimalarial drug in treatment was artesunate. The study population showed a female-to-male ratio in favor of females; the dominant age group was 0 to 10 years; there was a preponderance of unmarried individuals; and the overall level of education was very low. Although 95% of the population owned an insecticide-treated bed net, this prevalence of malaria observed during a season of low transmission indicates that the disease remains a public health problem in our region.

## 1. Introduction

Malaria is a cosmopolitan protozoan disease caused by parasites belonging to the genus Plasmodium. Five species of this genus are responsible for the disease: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae, and Plasmodium knowlesi. The greatest public health impact is associated with Plasmodium falciparum, which is often responsible for severe or even neurological forms of the disease that can lead to death without adequate treatment [1–4]. It is transmitted through the bite of mosquitoes of the genus Anopheles, specifically by blood-feeding females [5, 6].

Given its significant impact on public health, particularly among populations living in poverty-stricken areas, preventive strategies have been adopted to curb the spread of malaria, reduce its endemicity, and thereby lessen its impact on public health. These control measures include the use of long-lasting insecticide-treated bed nets, indoor residual spraying, seasonal malaria chemoprevention, Moquirix trials, early

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diagnosis, and effective treatment with artemisinin-based combination therapies. Thanks to these diverse and intensive control measures, malaria has declined in all regions of the world since 2010 [7].

Despite these massive efforts in the fight against malaria, the disease shows a slight increase in both morbidity and mortality between 2023 and 2025, according to WHO reports [8, 9]. Worldwide, more than three billion people remain at risk of malaria infection. Malaria therefore remains a serious public health problem, with approximately 282 million cases and 610,000 deaths worldwide in 2024, representing a slight increase compared to 2023. The WHO African Region continues to account for the majority of cases and deaths, with 11 countries representing approximately two-thirds of the global malaria burden [9]. In Chad in particular, malaria remains a major public health problem, and its prevalence remains high according to health statistics [8, 9]. Since collecting data on the disease can help clearly identify trends in its progression, our study focused on examining the prevalence of malaria and constructing the epidemiological profile of patients with malaria who were seen in outpatient clinics at the Torrock District Health Center.

## 2. Methods

### 2.1. Study Setting

This study was conducted at the Torrock District Health Center, located in the Torrock subprefecture, which is also the subprefecture's administrative center. Torrock is a region in the West Mayo-Kebbi Province of Chad; it is a subprefecture situated 35 km east of Pala, the provincial capital.

### 2.2. Biological material

A drop of capillary blood was used to perform a diagnostic test for malaria in patients seen during outpatient visits. The diagnosis was made in the laboratory using either the thick smear technique to detect malaria parasites (GERH) or the rapid diagnostic test (RDT), which are the two methods routinely used in Chad.

### 2.3. Data collection equipment

Data were collected using a questionnaire designed for this purpose. Upon arrival at the laboratory for diagnostic testing, the questionnaire was administered to consenting patients. This survey allowed us to gather information on sociodemographic characteristics, diagnostic test results, ownership of an insecticide-treated bed net, and the medications used to treat malaria in the event of a positive result.

### 2.4. Statistical analyses

The data collected in this way was analyzed using a simple sort, and the graphs were created in the Excel spreadsheet program in Office 2019.

## 3. Results

A total of 241 patients were included in this study; all were suspected of having malaria. The data collected through the questionnaire were used to compile the results and their various categories.

### 3.1. Socio-demographic characteristics

#### Gender

In this study, the gender distribution of patients showed that women were more numerous, with 125 participants (51.86%), compared to men, who numbered 116 (48.13%). This gender distribution resulted in a female-to-male ratio of 1.07, favoring women, as illustrated in the following graph.

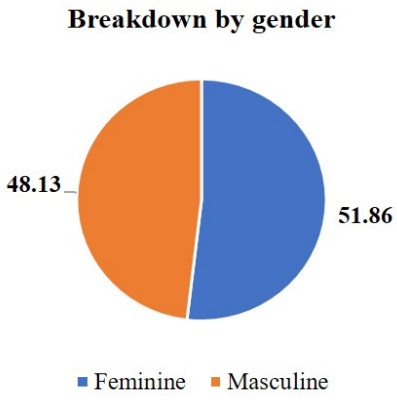


**Figure 1:** Breakdown of patients by gender

### Age

By age group, the most represented age group in our study was 0–10 years, accounting for 61.80% of the total sample of 149 patients; In contrast, the least represented age group was 31–40 years, with a sample size of 8 patients, representing a frequency of 3.31%, as shown in Table 1 below.

**Table 1:** Breakdown of patients by age group

| Age group by year | Number (n) | Frequency (%) |
|---|---|---|
| 0 – 10 | 149 | 61,80% |
| 11 – 20 | 45 | 18,65% |
| 21 – 30 | 25 | 10,35% |
| 31 – 40 | 8 | 3,31% |
| >40 | 15 | 6,20% |
| Total | 241 | 100% |

### Place of origin

An analysis of Table 2 below shows that the majority of patients or 58.90% included in our study resided directly in Torrock, the capital of the sub-prefecture and home to the hospital that served as the setting for our study. However, 17% or 41 patients lived outside the Torrock sub-prefecture. The other villages in the subprefecture account for varying proportions, as listed in the table.

**Table 2:** Place of origin

| Place of origin | Number (n) | Frequency (%) |
|---|---|---|
| Torrock | 142 | 58,90 |
| Makeuré | 9 | 3,7 |
| Gouin | 14 | 5,8 |
| Mateta | 3 | 1,2 |
| Massounebaré | 8 | 3,3 |
| Mabachakré | 8 | 3,3 |
| Malanegomé | 3 | 1,2 |
| Balani | 13 | 5,3 |
| Autres | 41 | 17 |
| Total | 241 | 100% |

### Level of education

Based on educational attainment, of the 241 patients included in this study, a majority of 163 had no formal education, representing 67.63%, compared with a small group of 8 patients—only 3.31%—who had attained a higher level of education. This distribution is illustrated in Figure 2 below.

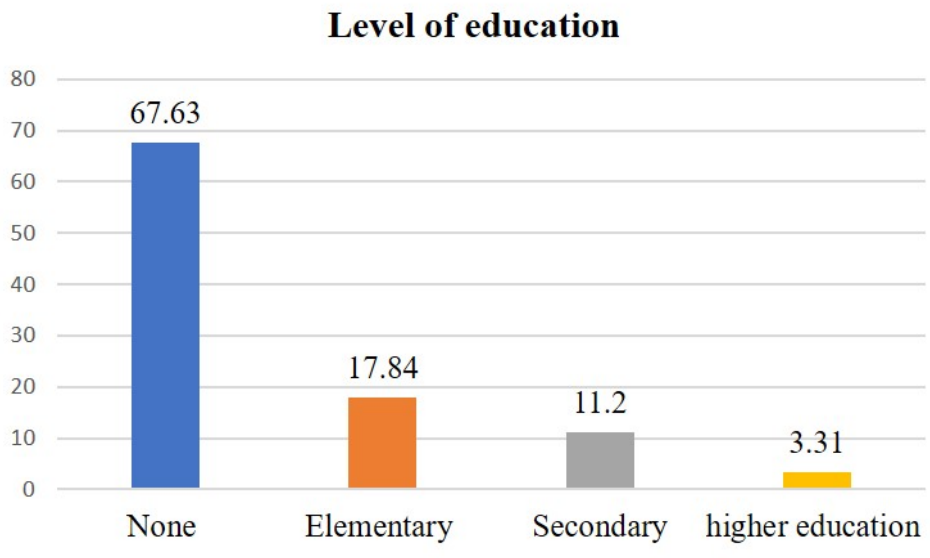


**Figure 2:** Distribution of patients by educational level

### Ethnic group

The patients included in this study belonged to different ethnic groups; according to the survey, the most represented ethnic group was the Moundang, accounting for 68.70% of the total sample of 158 patients. As shown in Table 3 below, the Toupouri/Kéra ethnic group accounted for the second-highest proportion, with a frequency of 20.43% (47/230).

**Table 3:** Breakdown of patients by ethnicity

| Ethnic group | Number (n) | Frequency (%) |
|---|---|---|
| Moundang | 158 | 68,70 |
| Toupouri/Kéra | 47 | 20,43 |
| Foulbé | 21 | 9,13 |
| Kado | 3 | 1,3 |
| Mousseye | 1 | 0,43 |
| Total | 230 | 100 |

### Marital status

Marital status showed a higher proportion of single individuals; there were 186 single patients, accounting for 77.18% of the total, compared to 53 married patients, representing 21.99%.

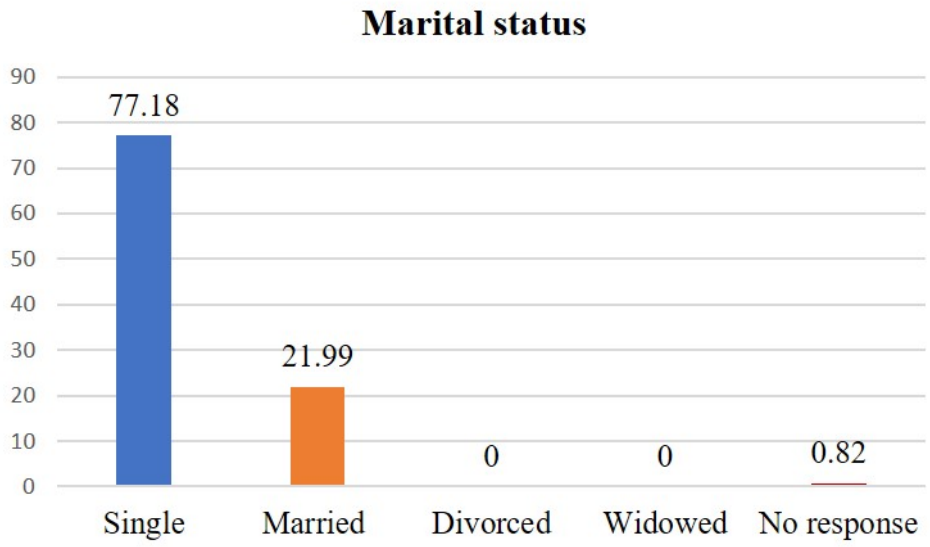


**Figure 3:** Distribution of patients by marital status

### Religion

Based on their religious affiliation, Figure 4 shows that 60.99% of patients were Christian, 31.95% identified as non-religious, and only 7.05% were Muslim.

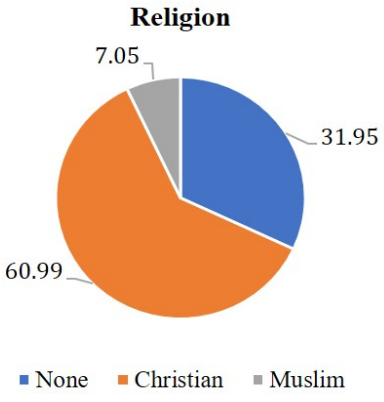


**Figure 4:** Breakdown of patients by religion

### 3.2. Preventive, diagnostic, and therapeutic parameters

#### Use of insecticide-treated mosquito nets

The survey also sought to determine the use of insecticide-treated bed nets among patients. As shown in Figure 5, 95.43% of patients used an insecticide-treated bed net, while only 4.56%—or 11 patients—did not use one.

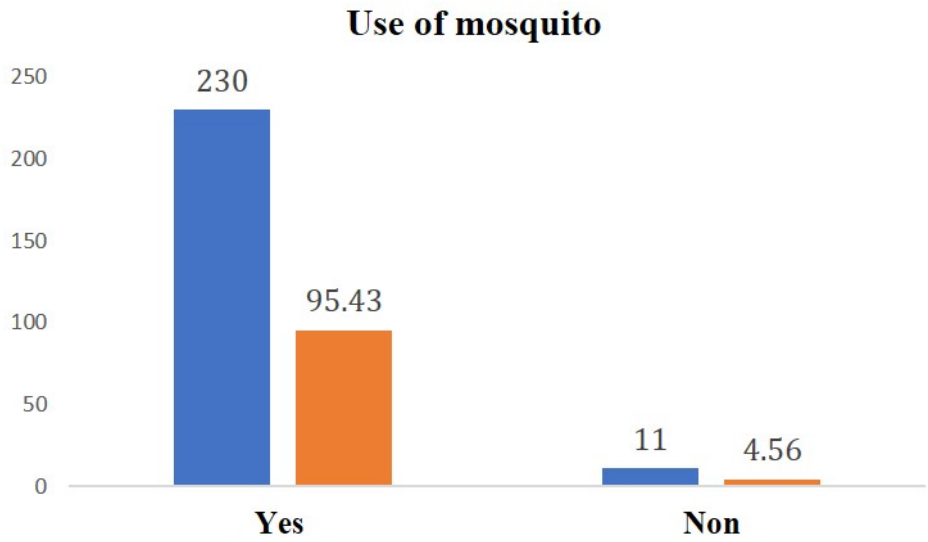


**Figure 5:** Breakdown of patients by use of a mosquito

#### Prevalence of malaria

Based on the results of the laboratory tests we collected, the prevalence of malaria at the Torrock District Health Center during our study period was 48.54%. This prevalence was determined by the 117 positive cases recorded compared to 124 negative cases, representing a proportion of 51.45%.

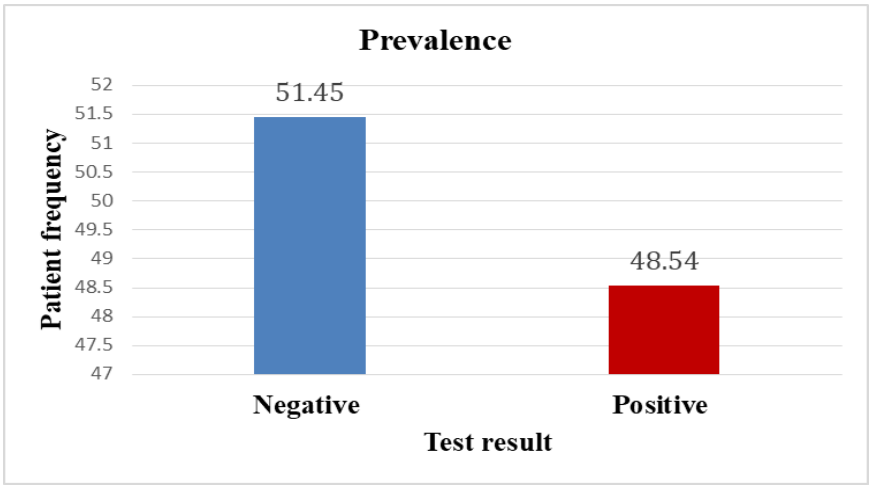


**Figure 6:** Prevalence of malaria at Torrock District Hospital

#### Form of malaria

According to the criteria defined by the WHO, malaria can be mild or severe. Based on these criteria, of the 117 positive cases recorded, 101 patients had developed severe malaria, representing 86.32% of the total, compared with 16 patients with mild malaria, representing 13.67%.

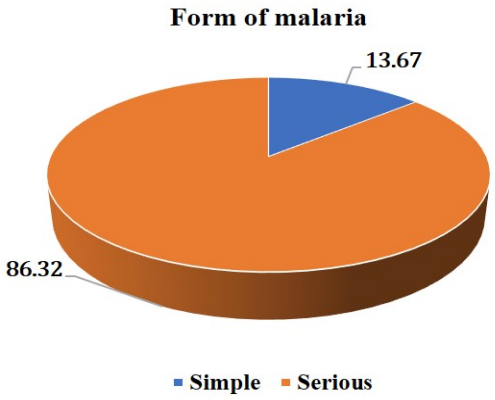


**Figure 7:** Distribution of malaria by severity

**Molecules used in treatment**

La prise en charge du paludisme se fait au moyen de molécules antipaludiques; ainsi le traitement antipaludique le plus utilisé était l'artésunate avec une proportion de 63,25% suivi de la transfusion sanguine dans une proportion de 17,09%. Tertio, l'artéméther était utilisé dans une proportion de 13,67% et l'antipaludique le moins utilisé était la quinine avec un taux de 5,98%.

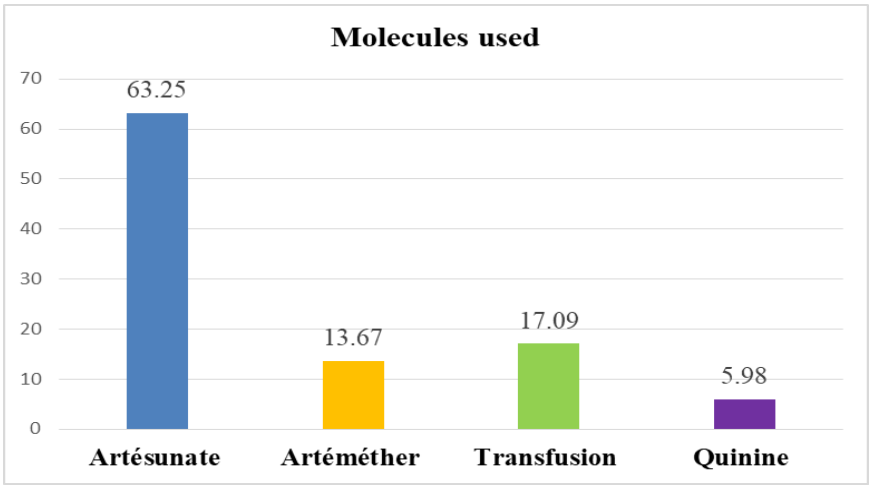


**Figure 8:** Breakdown of antimalarial drugs used

## 4. Discussion

This study aimed to determine the prevalence of malaria and to establish the epidemiological profile of patients with malaria seen in outpatient clinics at the Torrock District Health Center. It included a total of 241 patients, of whom 51.86% were female compared to male. This high proportion of females could be explained by the fact that, in the overall population of Chad, women are more numerous, and pregnant women—who represent a vulnerable group with regard to malaria—are also more prevalent. Nor can we rule out the possibility of a sampling bias. This result is consistent with that of Doutoum et al in Abéché, Chad, who in 2019 reported a female prevalence of 56.3% while studying the prevalence and risk factors associated with malaria. In Côte d'Ivoire in 2016, Aba et al., who assessed malaria prevalence in a health district, also found a female prevalence of 51.5% [10, 11].

With regard to age, the most represented age group was 0 to 10 years old, accounting for 61.8%; the least represented age group was 31 to 40 years old, which accounted for only 3.31%. This result could be explained by the fact that children aged 0 to 5, who represent one of the groups most vulnerable to malaria, belong to the most represented age group, and also because all children aged 0 to 10 are still unable to self-medicate, which could increase their likelihood of seeking medical care. The most represented age group observed in our study was the same as that reported by [12] in Burkina Faso, who studied the care pathway for suspected malaria cases admitted to a district hospital in Burkina Faso. However, [10] reported that the 20–29 age group was the most represented.

Since the Torrock Health District Hospital is located in Torrock, the administrative center of the sub-prefecture, the rate of hospital visits is likely linked to proximity, as patients living near the hospital were more represented than those living farther away. Thus, 58.9% of these patients came from Torrock, reflecting the hospital's proximity to the district. The study by Doutoum et al in Abéché, Chad, also reported a similar finding.

When examining their educational attainment, it became apparent that a majority of 67.6% were uneducated, and only 3.31% had attained a higher level of education. This result is consistent with Chad's literacy rate, as the country has one of the lowest literacy rates in the world due to extreme poverty, parental illiteracy, the priority given to religious instruction, fear of corporal punishment, and even ignorance regarding the importance of literacy. According to the latest data, Chad has the lowest literacy rate in Africa, a finding that corroborates the

results reported in this study. This education rate confirms the findings reported by [13], who found a non-schooling rate of 62.4% among fathers and 71.3% among mothers [13]. Similarly, the Ministry of Public Health in Chad reported a non-schooling rate of 70% (MSP, 2013). In Abéché in 2019, Doutoum et al reported a non-schooling rate of 70% in their epidemiological study on malaria [10].

Following the development of the epidemiological profile, the analysis of ethnic affiliation revealed that the most dominant ethnic group in this survey was the Moundang. This can be explained by the fact that the Moundang are an indigenous ethnic group of Torrock, naturally constituting the majority of the population in that subprefecture and living primarily in the central area. The Toupouri/Kera ethnic group rounds out the top three, as is the case in the overall population.

As for marital status, the distribution favored single individuals, accounting for 77.18% of the sample; this high proportion could be explained by the fact that the most represented age group was 0 to 10 years old, and this entire group consists solely of unmarried individuals. In contrast to our findings, Doutoum et al. reported that 61.1% of respondents were married, making this the largest group by marital status.

Based on their religious affiliation, 60.99% of patients were Christian, contrary to what the Ministry of Public Health reported in 2010 in its survey on malaria indicators, in which 53.6% of respondents were Muslim. Our findings may be explained by the fact that the Moundang and Toupouri, who accounted for a high proportion of our study (a combined frequency of 89.13%), are predominantly Christian, as are most other indigenous ethnic groups in southern Chad.

With regard to malaria prevention measures, the findings showed that 95.43% of the patients surveyed owned an insecticide-treated mosquito net. This ownership rate is higher than that reported by [13], who, in a study on the use of insecticide-treated nets and perceptions of malaria risk in Chad, found that 80.6% of participants owned an insecticide-treated net.

Based on the results of the diagnostic tests, our study found a malaria prevalence of 48.54%. This prevalence was higher than that reported by [10], who found a prevalence of 36.57%. The prevalence reported in our study may have been underestimated due to home-based care, self-medication, and a preference for traditional treatment over medical care. It may also have been overestimated because the sampling was based on a doctor's prescription of a GERH or TDR.

Among the recorded positive malaria cases, the majority or 86.32% were severe malaria, compared to only 13.67% that were mild cases. This is due to the fact that the majority of patients with malaria in this study were in the 0–10 age group; and the WHO defines severe malaria as malaria in a child aged 0 to 5 years or in a non-immune individual. These children are generally vulnerable to severe forms of malaria due to a lack of acquired immunity [3, 4].

The widespread use of artesunate in treatment is directly consistent with the prevalence of severe forms of malaria, as recommended by the guidelines of the WHO and the Ministry of Public Health and Prevention of Chad. Artesunate is the drug of choice for the treatment of severe forms of malaria, rather than quinine, due to the latter's tinnitus side effects and the prohibition on its intramuscular administration.

## 5. Conclusion

Although the study was conducted during a period of low transmission, the prevalence of malaria was close to the average, with a predominance of severe forms, indicating that this disease remains a public health problem in our region and one of the leading causes of patient visits to our health facilities. The use of artesunate as the antimalarial drug of choice is simply a result of the predominance of severe malaria among the recorded positive cases. These patients with malaria were generally female, in the 0–10 age group, mostly out of school, and unmarried relative to the most represented age group. High ownership of insecticide-treated nets had no effect on the incidence of malaria. Awareness-raising efforts regarding preventive measures and the rational use of insecticide-treated nets must be undertaken among the general population to reduce malaria incidence.

### Article Information

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**Author Contributions:** Gondimo Gabdibé Élysée - Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; Abdelsalam Adoum Doutoum - Conceptualization, Supervision; Kémoral Aristide - Methodology, Writing – original draft; Kouyahbé Fadeunbo - Data curation, Formal analysis; Djimaraneye Pacifique - Data curation.

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**Competing Interests:** Authors have declared that no competing interests exist.

**Ethical Approval:** In the absence of an ethics committee in the country's provinces, the hospital administration authorized the study to be conducted at the facility after a research protocol was submitted to it. Subsequently, the patients included in this study provided their prior verbal consent to participate.

**Informed Consent:** Verbal consent to participate in the study was obtained from all patients. The data collector clearly explained the reasons for the study and its scientific value to them.

**Data Availability Statement:** Data available on reasonable request.

**Clinical Trial Registration:** In Chad, hospital data is still stored in anonymous physical records kept by each hospital department. These records are filed within the department at the end of each year.

**Disclaimer (Artificial Intelligence):** The author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.), and text-to-image generators have been used during writing or editing of manuscripts.

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