

Research Article

# Profile of Anemia in the Internal Medicine Department of the Lomé University Hospital Campus: Typology and Etiologies

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## Abstract

We did this study to determine the profile of anemia in the internal medicine department of the Lomé University Hospital campus. Then, we have done a retrospective and descriptive study which took place over the period from January 1, 2021 to December 31, 2022, i.e. a duration of 2 years in the internal medicine department of the Lomé University Hospital campus. Data were collected from a questionnaire completed using the records of patients hospitalized during the study period. During the study period, 190 files of anemic patients were collected from 2,249 hospitalized patients. The hospital frequency of anemia was 8.45%. The average age of the patients was  $47 \pm 20$  years. The female gender was predominant with a sex ratio of 0.76. Most patients were admitted through the emergency department (56.8%). The main reasons for consultation were asthenia (41.6%) and severe pallor (17.9%). Hypertension, HIV infection and diabetes were the main medical antecedents in 22.6%, 22.6% and 15.3% respectively. The average hemoglobin level was 7 g/dl. Normocytic anemia and microcytic anemia were the most observed types of anemia (55.3% and 43.2% respectively). The main etiologies were severe malaria (26.3%), HIV infection (24.7%) and chronic renal failure (17.9%). The average length of hospitalization was  $6 \pm 3$  days. The mortality rate was 18.9%. The main causes of death were HIV infection, viral hepatitis B&C, chronic renal failure and hematologic malignancies. To conclude, anemia is a frequent symptom in our environment and constitutes a real challenge for the hospital practitioner. Its classification makes it possible to guide the etiologies in order to establish adequate care.

## Keywords

Anemia, Malaria, HIV, Lome

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## 1. Introduction

Anemia is defined as a decrease in hemoglobin levels below the normal range for age, sex, and physiological status. It occurs when the hemoglobin level is less than 12 g/dl in men, 11 g/dl in women and children, and 14 g/dl in newborns [1].

The World Health Organization (WHO) estimates that anemia is one of the ten most serious problems in the world and therefore constitutes a major public health issue due to its magnitude and severity [2]. According to McLean, 1.62 billion individuals are affected by anemia, representing a prevalence of 24.8% [3]. For Kassebaum *et al.* and Gardner *et al.*, the global prevalence of anemia in the general population was 32.9% and 22.8% respectively [2, 4]. In Africa, this prevalence is over 40% compared to 10% in developed countries. It is around 64.6% in children under 4 years old and 44.4% in women [3]. In Senegal, Ngondé-Essome *et al.* and Faye *et al.* reported a prevalence of 20.94% and 32.5% of anemia respectively [5, 6]. In Togo, according to Djagadou *et al.* and Balaka *et al.*, the hospital frequency of anemia was 6.7% and 3.23% respectively [7, 8].

The etiologies of anemia are multiple. To enable this etiological research, it is essential to classify each case of anemia according to whether it is microcytic or non-microcytic.

Iron deficiency is the first mechanism of occurrence of anemia for which the etiology must be sought. It also represents the first most widespread nutritional deficiency in the world and mainly affects children and pregnant women [3, 9]. According to Ngondé-Essome *et al.*, malaria, digestive parasitosis and the human immunodeficiency virus (HIV) are the main causes of anemia [5].

The consequences of anemia are multiple and varied. It affects physical growth, cognitive development, reproduction and physical work capacity, resulting in a decrease in human performance. In Africa and Asia, anemia is responsible for 3.7 to 12.8% of deaths [2, 10].

To our knowledge, we do not have enough data on anemia in our country in general and more specifically in the internal medicine department of the university hospital (CHU) campus of Lomé. It is in this perspective that we considered it useful to conduct this study whose general objective was to determine the profile of anemia in the internal medicine department of the university hospital campus of Lomé.

## 2. Materials and Methods

This is a retrospective and descriptive study which took place over the period from January 1, 2021 to December 31, 2022, i.e. a duration of 2 years in the internal medicine department of the University Hospital Center (CHU) Lomé Campus.

The study focused on the records of patients hospitalized in the internal medicine department of the CHU Campus during the study period. Included in our study were the records of patients admitted to hospital during the study

period who presented anemia, confirmed by blood count (Hb level < 12g/dl in men and 11g/dl in women). Not included were the records of patients admitted to hospital during the study period who presented anemia and who had only a white blood cell count and a hemoglobin level on admission or during hospitalization.

We also excluded from the study patients who did not present with anemia as well as patient records that did not correspond to the study dates.

The data collection lasted 03 months (from February to May 2023). The collection of information in the medical file of each patient was done using a survey form whose main items were as follows:

- 1) Epidemiological and sociodemographic data: year of hospitalization, age, sex, marital status, profession, method of admission, residence.
- 2) Medical history: personal history (medical, surgical, obstetrical/gynecological), family history, lifestyle.
- 3) Clinical data: reason for consultation, general and physical signs.
- 4) Paraclinical data: CBC, iron metabolism, blood smear, reticulocyte count, myelogram, hemoglobin electrophoresis, urea creatinine, thick gout, digestive fibroscopy...
- 5) Diagnosis retained: etiological diagnosis.
- 6) Therapeutic data.
- 7) Evolving data: length of hospitalization, method of discharge.

Data were initially collected on a pre-established survey form, standardized and then subsequently entered via smartphone using a questionnaire digitized using an online form editor (Google Forms). Daily monitoring was done to ensure the quality and completeness of the data collected. All statistical analyses were performed using R© statistical software (version 4.3.1.) and Excel 2019 spreadsheet. Results were presented in tables of numbers and proportions for qualitative variables. Quantitative variables were presented as mean ( $\pm$  standard deviation), median (interquartile range), minimum and maximum. Qualitative variables were compared using chi-square and Fisher's tests of independence.

Prior authorization was received from the administrative authorities of the CHU-Campus as well as the agreement of the head of the internal medicine department before the start of the study, to have access to the patients' files. The anonymity of the patients was preserved, the files were analyzed in strict compliance with their confidentiality by the coding of the survey forms.

We used the following definitions:

- 1) Mild anemia: Hemoglobin level between [10 and 12 g/dl [3].
- 2) Moderate anemia: Hemoglobin level between [08 and 10 g/dl [3].
- 3) Severe anemia: Hemoglobin level between [06 and 08 g/dl [3].

4) Profound anemia: Hemoglobin level below 0.6 g/dl [3].

### 3. Results

#### 3.1. Epidemiological Data

During the study period, 2,249 files were examined, of which 190 anemia files were retained, representing a hospital frequency of 8.45%. The average age of the patients was 47 ± 20 years with extremes of 16 years and 95 years. The age group of 16 to 40 years was 40%. Patients aged over 70 years represented 15.3%. There were 108 female patients (56.8%) and 82 male patients (43.2) with a sex ratio of 0.76. Patients were from urban areas in 98.4% compared to 1.6% from rural areas. Regarding the occupation of the respondents, out of a total of 190 patients, 23.7% worked in the informal sector, 16.8% were civil servants and 30.5% were housewives. Regarding marital status, one hundred and forty-seven patients were married, i.e. 77.4%, and 43 patients were single.

#### 3.2. Clinical Data

Patients were admitted via the emergency room in 56.8%.

Asthenia and severe pallor were the main reasons for consultation with a rate of 41.6% and 17.9% respectively. The others reasons are fever (13.7%), the alteration of general condition (12.1%) and dyspnea (11.1%).

Among personal medical history, hypertension, HIV infection and diabetes were 22.6%; 22.6% and 15.3% respectively.

Among the physical signs, Pallor was found in 183 patients (98.4%), asthenia in 79 patients (41.6%), fever in 26 patients (13.7%).

#### 3.3. Biological Data

The mean hemoglobin level was 7g/dL (minimum

hemoglobin rate = 2 g/dL and maximum hemoglobin rate = 12 g/dL). Of the 190 files analyzed, severe anemia was observed in 59 patients, moderate anemia in 58 patients, profound anemia in 49 patients and mild anemia in 24 patients.

#### 3.4. Etiological Data

Severe malaria, HIV infection and chronic renal failure were noted in 26.3%; 24.7% and 17.9% respectively as reported in Table 1.

Table 1. Distribution of patients according to etiological diagnosis.

	Effective	Percentage
Severe malaria	50	26.3
HIV infection	47	24.7
Chronic renal failure	34	17.9
Chronic viral hepatitis B&C	12	6.3
Acute hemorrhage	12	6.3
Sickle cell disease	11	5.8
Neoplasia	10	5.3
Others**	14	7.4
Total	190	100.0

Others\*\* bone marrow suppression, inflammatory anemia linked to tuberculosis.

HIV: Human immunodeficiency virus.

Severe malaria (43.1%) and chronic renal failure (32.4%) were found in patients with normocytic anemia; HIV infection (64.3%) and chronic viral hepatitis B&C were those found in patients with microcytic anemia (Table 2).

Table 2. Main etiologies depending on the type of anemia.

	Anemia				P
	Microcytic n (%)	Normocytic n (%)	Macrocytic n (%)	Total N (%)	
Severe malaria	8 (9.8)	42 (40.0)	0 (0.0)	50 (26.3)	0.49
HIV infection	46 (56.1)	1 (1.0)	0 (0.0)	47 (24.7)	
IRC	1 (1.2)	32 (30.5)	1 (33.3)	34 (17.9)	
Viral hepatitis B/C	12 (14.6)	0 (0.0)	0 (0.0)	12 (6.3)	
Acute hemorrhage	0 (0.0)	12 (11.4)	0 (0.0)	12 (6.3)	
Sickle cell disease	0 (0.0)	11 (10.5)	0 (0.0)	11 (5.8)	
Neoplasia	5 (6.1)	4 (3.8)	1 (33.3)	10 (5.3)	

	Anemia				P
	Microcytic n (%)	Normocytic n (%)	Macrocytic n (%)	Total N (%)	
Others	10 (12.2)	3 (2.9)	1 (33.3)	14 (7.4)	
Total	82	105	03	190	

HIV: Human immunodeficiency virus.

Others: bone marrow suppression, inflammatory anemia linked to tuberculosis.

### 3.5. Scalable Data

The average length of stay was  $6 \pm 3$  days with extremes of 1 day and 21 days. The duration of hospitalization was 3 to 21 days in patients with viral hepatitis B&C, 1 to 18 days in patients living with HIV and 1 to 15 days in patients with renal failure (Table 3).

**Table 3.** Length of stay according to etiologies (N = 190).

	Effective	Average stay	Minimum-Maximum
Severe malaria	50	4	1-11
HIV	47	6	1-18
Chronic renal failure	34	6	1-15
Chronic viral hepatitis	12	7	3-21

	Effective	Average stay	Minimum-Maximum
B&C			
Acute hemorrhage	12	5	1-15
Sickle cell disease	11	5	2-11
Neoplasia	10	6	1-11
Others**	14	7	2-11

HIV: Human Immunodeficiency Virus

Others: bone marrow suppression, inflammatory anemia linked to tuberculosis.

The outcome was favorable in 150 patients (79%). It resulted in death in 36 patients (18.9%). The causes of death were related to HIV infection (33.3%) and chronic renal failure (25%) as shown in Table 4.

**Table 4.** Evolution according to etiologies.

	Evolution			
	Death n (%)	Escaped n (%)	Favorable n (%)	Total N (%)
Severe malaria	4 (11.1)	0 (0.0)	46 (30.6)	50 (26.3)
HIV	12 (33.3)	2 (50.0)	33 (22.0)	47 (24.7)
Chronic renal failure	9 (25.0)	0 (0.0)	25 (16.7)	34 (17.9)
Chronic viral hepatitis B&C	4 (11.1)	0 (0.0)	8 (5.3)	12 (6.3)
Acute hemorrhage	1 (2.8)	0 (0.0)	11 (7.3)	12 (6.3)
Sickle cell disease	0 (0.0)	1 (25.0)	10 (6.7)	11 (5.8)
Neoplasia	5 (13.9)	0 (0.0)	5 (3.4)	10 (5.3)
Others*	1 (2.8)	1 (25.0)	12 (8.0)	14 (7.4)
Total	36	4	150	190

HIV: Human immunodeficiency virus, Others: Bone marrow suppression, inflammatory anemia linked to tuberculosis.

## 4. Discussion

### 4.1. Main Results

We studied 190 records of hospitalized patients out of a total of 2,249 records in the internal medicine department of the Lomé University Hospital campus from January 2021 to December 2022. This study allowed us to determine the profile of anemia in the said department.

The mean age of the patients was  $47 \pm 20$  years, with a female predominance, a sex ratio of 0.76. Most patients were admitted via the emergency room (56.8%). The main reason for consultation was asthenia (41.6%) followed by severe pallor (17.9%). Hypertension, HIV infection and diabetes were the main antecedents found respectively in 22.6%, 22.6% and 15.3%. Pallor was almost constant (98.4%). The average hemoglobin level was 7 g/dl. Normocytic anemia and microcytic anemia were predominant (respectively 55.3% and 43.2%). The main etiologies were severe malaria (26.3%), HIV infection (24.7%) and chronic renal failure (17.9%). The average length of hospitalization was  $6 \pm 3$  days. The outcome was favorable in most cases (79%). The causes of death were related to HIV infection (33.3%) and chronic renal failure (25%).

These results obtained allowed us to achieve the objectives assigned to this study.

### 4.2. Strengths and Limitations of the Study

This study has limitations due to its retrospective nature, the setting, the non-systematic performance of certain paraclinical examinations and the spontaneous transfusion of patients without prior blood sampling for the measurement of certain preliminary biological parameters. However, our study remains of interest because it allowed us to have an idea of the frequency, type and etiologies of anemia in the internal medicine department of the Lomé University Hospital Campus.

### 4.3. Epidemiological Data

The hospital frequency of anemia during the study period was 8.45%. Balaka *et al.* in Togo reported in a study a hospital frequency of 6.70% of anemia [8]. In Senegal, Faye *et al.* reported a prevalence of 32.5% (150/461) of anemia [6]. Similarly, Nanko *et al.* in Mali noted 91 cases of anemia in 200 hospitalized patients, i.e. a hospital prevalence of 45.5% [11].

We noted a female predominance with a sex ratio of 0.76. Our results are shared by Balaka *et al.* in Togo who reported a female predominance with a sex ratio of 0.71 [8]; by Faye *et al.* in Senegal who noted a female predominance with a sex ratio of 0.72 [6]; Nanko *et al.* in Mali [11] who found a female predominance with a sex ratio of 0.78 and by Zinebi

*et al.* in Morocco with a sex ratio of 0.56 [12]. The conformity of our study with the data in the literature is explained by the fact that women are more at risk of presenting anemia than men, for various reasons such as menstruation, pregnancy, various gynecological pathologies which could lead to phenomena hemorrhagic. In addition, women are more likely to seek medical help when they have a health problem than men. The mean age of the patients was  $47 \pm 20$  years with extremes of 16 years and 95 years. This result is similar to that of authors such as Djagadou *et al.* in Togo [7], El Hioui *et al.* in Morocco [13], Faye *et al.* in Senegal [6] who reported respectively a mean age of 45.6 years, 41 years and 46 years. The 16 to 40 age group was the most represented (40%). Our results are superimposable with those reported by Nanko *et al.* in Mali [11]. Also, Faye *et al.* in Senegal reported that the age group of 16 to 40 years was the most represented (38%). In his study, Zinebi *et al.* in Morocco reported a prevalence of anemia in elderly subjects at 36% [12]. This frequency of anemia in elderly people corroborates the data in the literature [14, 15].

During our study, 30.5% of patients were housewives, 16.8% of patients were employed, and 15.8% of patients were unemployed. For El Hioui *et al.* in Morocco, according to the professional situation on 82 patients, 86% of patients were unemployed and 13% of patients were workers [13]. For Nanko *et al.* in Mali, housewives constituted the largest professional group (45.05%) [11]. The low socio-economic level explains the significant increase in the risk of developing anemia due to iron deficiency in food.

### 4.4. Clinical Data

The majority of patients were admitted via the emergency department (56.8%). Similar results were reported by Khelil *et al.* in Tunisia (65.5%) [16] and Delforge *et al.* in France who reported only 56.2% [17]. This could be explained by the delay in consultation, hence the emergency admission.

The main reasons for consultation were asthenia and severe pallor noted in 41.6% and 17.9% of cases respectively. Our results are consistent with the data in the literature. Thus, Zinebi *et al.* in Morocco reported asthenia and pallor in 41% and 16% respectively [12]. For Faye *et al.*, asthenia and dyspnea were the main functional signs (97% and 91% respectively) [6]. As for Nanko *et al.* in Mali, the main functional signs were asthenia (78.02%), dizziness (74.72%) and dyspnea (63.13%) [11]. In his study, Balaka *et al.* in Togo noted pallor (74.73%) and dyspnea (32.26%) as functional signs of anemia [8]. The way anemia is revealed is the same regardless of age, sex and race.

Regarding medical history, 43 patients had a history of HIV (22.6%), 43 patients were hypertensive (22.6%) and 29 patients were diabetic (15.3%). Diarra *et al.* in Mali reported diabetes (57.4%) and hypertension (41%) as associated pathologies [18].

The physical signs found in patients on admission were: pallor which was found in almost all patients (98.4%) followed by asthenia (41.1%), and jaundice (11.8). The results agree to those reported by authors such as Zore in Burkina who noted as physical signs pallor (77.3%) and tachycardia (70.21%) [19]., Nanko *et al.* in Mali who found as physical signs pallor (60.44%), tachycardia (58.24%) and systolic murmur (47.25%) [11]. Faye *et al.* in Senegal also noted pallor at 80% [6], as did Zinebi *et al.* in Morocco who noted as main signs pallor (82%) and tachycardia (64.66%) [12].

#### 4.5. Biological Data

The average hemoglobin level of 7g/dL (minimum TH =2 g/dL and maximum TH =12 g/dL) noted in our series is comparable to those of other African authors [6, 11, 12]. This anemia was severe to profound in 56.9% of patients. Faye *et al.* in Senegal and El Hioui *et al.* reported in their series a severe to profound anemia respectively at 56% and 67% [6, 13]. This frequency of cases of severe to profound anemia can be explained by the absence of early diagnosis of anemia, the late recourse to care.

Regarding the type of anemia, normocytic anemia was the most frequent with a rate of 55.3% (n= 105), followed by microcytic anemia with a frequency of 43.2% (n=82). Our results are similar to those of Faye *et al.* [6] who reported a frequency of normocytic anemia of 59% followed by microcytic anemia in 38%. However, our results are not consistent with those of other authors who had reported a predominance of microcytic anemia in Africa [11, 12, 13, 18].

#### 4.6. Etiological Data

In our study series, the main etiologies were severe malaria (26.3%), HIV infection (24.7%), and chronic renal failure (17.9%). Hematological malignancies were found in eight patients (4.2%); bone marrow suppression was rare (0.5%). Balaka *et al.* in Togo reported as the main etiologies chronic renal failure (47.85%), HIV infection (27.96%) and severe malaria (10.75%) [8]. In Cameroon, Ngonde-Essome *et al.* mentioned malaria (5.26%), HIV infection (2.68%) [5]. This diverges somewhat from the main causes of anemia noted in the West.

Thus, in Italy, according to Zaninetti *et al.* the main causes of anemia were inflammatory diseases (52.9%) and chronic renal failure (25.2%) [20]. In the United States, the main etiologies of anemia were inflammatory diseases [21]. Malignant hematological diseases were not left out, and 7.4% of our patients suffered from them. They included multiple myeloma and lymphomas. These data are similar to those of Faye *et al.* in Senegal which reported 13% of malignant blood diseases [6].

In detail, the main causes of normocytic anemia were severe malaria (26.3%), chronic renal failure (17.9%), acute

hemorrhage (6.3%) and sickle cell disease (5.8%). In his series, Balaka *et al.* reported that chronic renal failure (47.85%), severe malaria (10.75%) were frequent [8]. The high frequency of severe malaria and sickle cell disease in our study series is explained by the fact that malaria is endemic in our country and by the fact that Togo is located in the Lehmann sickle cell belt where genetic abnormalities of red blood cells are common. Chronic renal failure was noted in 17.9% of patients. This frequency of chronic renal failure was reported by Balaka *et al.* and by Zaninetti *et al.* in 47.85% and 11.1% respectively [8, 20].

HIV infection (56.1%), chronic viral hepatitis B&C (14.6%) dominated microcytic anemias. In the literature, iron deficiency represents the main mechanism of microcytic anemia and pregnant women and children are the most affected [9, 11, 12]. The discrepancy between our results and those in the literature can be explained by the absence of systematic iron assessment when it was indicated and also by the frequency of cases of HIV and viral hepatitis in our environment.

As for macrocytic anemia, it was the least frequent (1.5%). This low proportion was also reported by various authors in their series [6, 11, 18]. No vitamin deficiency was reported in our study series. According to El Hioui *et al.* Biermer's disease was the most frequent etiology with 12% of cases, therefore deficiency [13].

#### 4.7. Scalable Data

The average length of hospitalization in our series was  $6 \pm 3$  days with extremes of 1 day and 21 days. Faye *et al.*, Zaninetti *et al.* and Randi *et al.* reported a hospital stay of 15 days, 11 days and 10 days respectively [6, 20, 22]. According to its authors, anemia prolongs the duration of hospitalization and the association between anemia and duration of hospitalization was significant ( $p < 0.001$  in each of the studies).

This hospitalization was prolonged in patients with chronic hepatitis B&C virus infection and HIV infection and also in patients with renal insufficiency, chronic kidney disease (1 to 15 days). Randi *et al.* [22] in Italy had made the same observation. In Rwanda and Ivory Coast, Havugimana *et al.* and Konin *et al.* had reported prolonged stays for patients presenting respectively with chronic inflammatory pathology and chronic renal failure [23, 24].

Finally, speaking of the outcome of hospitalization, the mortality rate was 18.9% in our series. This result is comparable to that of Almozino-Sarafian *et al.* in Israel who reported a mortality rate of 17.4% [25]. In Senegal, in 2017 [6], this rate was higher at 35%. Unlike, in Greece, in Ioannou *et al.* reported low rates at 4.1% [26]. This discordance can be explained by the comorbidities presented by the patients, the different etiologies found during the different studies as well as the study settings and methods.

## 5. Conclusion

We conducted a retrospective and descriptive study in the internal medicine department of the Lomé University Hospital campus with the aim of determining the profile of anemia in the department. It is common and often due to chronic transmissible and non-transmissible pathologies. It is therefore urgent to optimize awareness strategies and improve access to care for populations, which guarantee early diagnosis and adequate management.

## Abbreviations

HIV Human Infection Virus

## Author Contributions

TT and KM developed the study concept. TT, KT collected and collated the data and carried out the statistical analysis. LD, ST, AB did the literature search and prepared and contributed to the primary manuscript and all made critical contributions to the manuscript. All the authors read and agreed to publish the manuscript.

## Conflicts of Interest

The authors declare no conflicts of interest.

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