Scientific Research Publishing

Open Journal of Blood Diseases, 2026, 16(1), 1-7
https://www.scirp.org/journal/ojbd
ISSN Online: 2164-3199
ISSN Print: 2164-3180

Epidemiological, Clinical and Hematological Profile of Anemia in Children in a Hospital Setting in Dakar

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How to cite this paper: Dieng, Y.J.K.B., Sow, N.F., Mbaye, A., Sow, A., Cisse, D.F., Kane, A., Faye, C.M., Dème/Ly, I., Faye, P.M. and Ndiaye, O. (2026) Epidemiological, Clinical and Hematological Profile of Anemia in Children in a Hospital Setting in Dakar. *Open Journal of Blood Diseases*, **16**, 1-7.
https://doi.org/10.4236/ojbd.2026.161001

Received: December 14, 2025
Accepted: February 10, 2026
Published: February 13, 2026

Abstract

Introduction: Anemia is a major public health problem in Senegal. This study aimed to determine the hospital prevalence and describe the epidemiological, clinical and etiological profile of anemia in children admitted to the pediatric department of the Centre Hospitalier National Dalal Jamm, located in the Dakar suburbs. **Patients and Methods:** This is a retrospective, descriptive and analytical study conducted from January 1 to December 31, 2022. It included all children aged 2 months to 15 years hospitalized in the general pediatric unit who received a complete blood count. Data were analyzed using Excel and Power Query software, with a significance threshold set at $p < 0.05$. **Results:** Out of 310 collected files, 107 patients presented with anemia, representing a hospital prevalence of 34.5%. The mean age was 56.75 ± 48.23 months, with a predominance of the 60 to 143 months age group (34.58%). The sex-ratio was 1.61. Parental consanguinity was found in 26.17% of cases. Clinically, fever (27.1%) and tachycardia (72.90%) were the predominant signs. Acute malnutrition affected 14.96% of patients and the most frequent associated pathologies were acute gastroenteritis and pneumonia (9.35% each). Biologically, the mean hemoglobin level was 8.52 ± 1.97 g/dL, and the median was 9 g/dL. Anemia was moderate in 50.47% of cases and severe in 27.10% and the hypochromic microcytic type was largely predominant (62.62%). The most frequent etiologies were sickle cell disease (14.02% of new admissions and 17.2% of patients previously followed) and iron deficiency. A significant association was established between the severity of anemia and its etiology ($p = 0.000$).

Conclusion: Anemia is frequent in peri-urban hospital settings, characterized by a predominance of microcytic forms and a strong link between severity and terrain (sickle cell disease, malaria). Strengthening the screening of hemoglobinopathies and iron deficiency is necessary to improve both curative and preventive management.

Keywords

Anemia, Pediatrics, Child, Sickle Cell Disease, Iron Deficiency, Dakar

1. Introduction

Anemia is biologically defined by a decrease in hemoglobin levels below two standard deviations from the established mean for age and sex. Globally, it remains a major public health challenge, impacting cognitive development and immunity in young children. Estimates indicate that nearly 40% of preschool children in the world are affected [1]. The World Health Organization confirms that prevalence remains critical in limited-income regions, often exceeding the 40% threshold [2].

In Senegal, the situation remains concerning with a national prevalence of 71% in 2017. This persistence is explained by a multifactorial etiology including iron deficiencies, parasitosis and hemoglobinopathies [3]. However, few studies document the specific characteristics of hospitalized children in peri-urban areas. The pediatric service of the Centre Hospitalier National (CHN) Dalal Jamm, located in Guediawaye, constitutes a privileged observatory to analyze these dynamics.

Most available data in Senegal come from community surveys targeting children under 5 years old. Few recent studies have focused specifically on the characteristics of anemia in children hospitalized in the Dakar suburbs.

The objective of this work was to determine the hospital prevalence and describe the epidemiological, clinical and etiological aspects of anemia at the pediatric service of the CHN Dalal Jamm.

2. Patients and Method

2.1. Setting and Type of Study

This is a retrospective, descriptive and analytical study carried out over a period of 12 months, from January 1 to December 31, 2022, at the general pediatric service of the CHN Dalal Jamm, located in Guediawaye, a nearby Dakar suburb.

2.2. Study Population

The target population included children aged 2 months to 15 years hospitalized during the study period. The inclusion criteria were admission to the hospitalization unit and the realization of at least one complete blood count. Unexploitable or not found, files were excluded.

2.3. Data Collection and Definitions

Sociodemographic, clinical and biological data were collected from medical records. Anemia was classified according to WHO standards according to age. Severity was graded as light, moderate and severe (Table 1). Acute malnutrition was defined by a weight/height index < −2 Z-score and a BMI < 80% for age.

Table 1. Classification of anemia severity according to age groups.

Age group	Light	Moderate	Severe
2 to 6 months	8.5 - 9.5	7.5 - 8.4	<7.5
6 to 59 months	10.0 - 10.9	7.0 - 9.9	<7.0
5 to 11 years	11.0 - 11.4	8.0 - 10.9	<8.0
12 to 14 years	11.0 - 11.9	8.0 - 10.9	<8.0

2.4. Statistical Analysis

Data were entered and analyzed on Excel and Power Query. Univariate analysis allowed for the determination of frequencies and means. The Chi-square test was used for associations between qualitative variables, with a significance threshold set at $p < 0.05$.

3. Results

3.1. Sociodemographic Data

Out of 310 hospitalized children, 107 presented with anemia, representing a prevalence of 34.5%. The mean age of patients was 56.75 ± 48.23 months (median: 36 months). The age group from 60 to 143 months was the most represented (34.58%), followed by those from 6 to 24 months (29.91%). A male predominance was noted (sex-ratio 1.61). Regarding the family profile, 53.13% of mothers were housewives. Parental consanguinity was found in 26.17% of patients, mostly in the second degree (57.14% of consanguineous cases).

3.2. Clinical and Nutritional Data

Admission reasons were dominated by fever (27.1%) and vomiting (13.1%). On examination, tachycardia (72.90%) and pallor (30.84%) were the most frequent signs. Nutritionally, acute malnutrition affected 14.96% of patients (of which 7.48% was severe). The most frequent associated pathologies at discharge were pneumonia (9.35%) and acute gastroenteritis (9.35%).

3.3. Hematological and Etiological Profile

The mean hemoglobin level was 8.52 ± 1.97 g/dL (extremes: 1.8 - 11.3 g/dL) and the median was 9 g/dL. Anemia was classified as moderate in 50.47% of cases and severe in 27.10%. The hypochromic microcytic type was largely predominant (62.62%). Hemoglobin electrophoresis, performed in 14.87% of patients newly

known in the service, revealed a major sickle cell syndrome (SS form) in 92.86%; alongside 17.2% of patients already known as sickle cell patients in the service. Global etiologies retained for the severe form were dominated by sickle cell disease (14.02%), iron deficiency (4.67%) and malaria (3.74%) (Figure 1 and Figure 2).

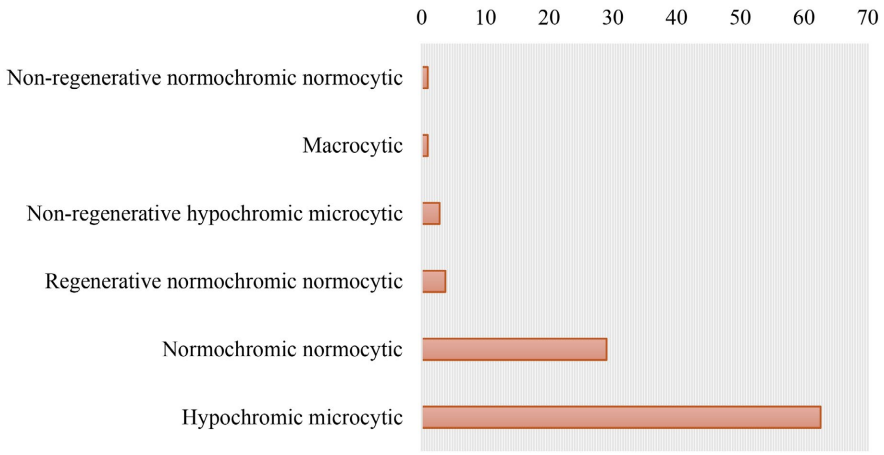

Figure 1. Distribution of patients according to anemia type.

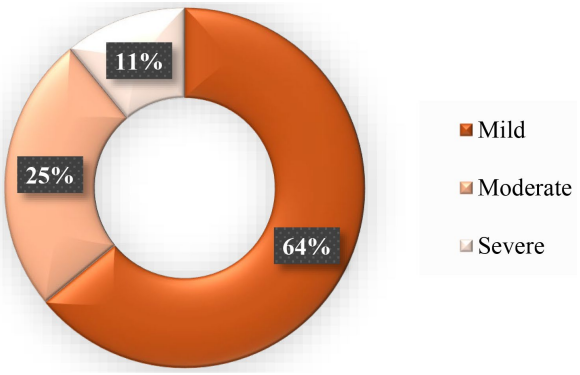

Figure 2. Distribution of patients according to anemia severity.

3.4. Analytical Analysis

Bivariate analysis showed significant associations between:

- The type of anemia and age (p = 0.021): microcytic anemia was significantly more frequent in the 6 - 24 month and 60 - 143 month age groups.
- Severity and type of anemia (p = 0.015): anemia in its severe form was significantly linked to the normochromic normocytic type.
- Severity and etiology (p = 0.000): a very strong correlation was established, severe anemias being mostly associated with sickle cell disease and severe malaria, while deficiency anemias were more often mild to moderate.

4. Discussion

4.1. Hospital Prevalence and Epidemiological Context

The prevalence of anemia at the CHN Dalal Jamm pediatric service is 34.5%. Alt-

hough this figure is concerning, it is below global estimates that evaluate the prevalence at 39.7% in preschool children [1]. Recent WHO reports emphasize that anemia remains a major public health challenge, particularly in limited-resource regions where prevalence often exceeds 40% [2]. Locally, our results corroborate the observations of Ba ID *et al.* in the Dakar suburbs, who reported a similar morbidity burden in peri-urban areas [3]. This hospital frequency, although lower than national community data of 71%, is explained by the hospital recruitment bias, but confirms the persistence of anemia as a frequent reason for seeking care in Senegal.

4.2. Environmental Factors and Nutritional Status

Analysis of the sociodemographic profile reveals that 53.13% of mothers are unemployed. This low socio-economic level is a major determinant of anemia in sub-Saharan Africa, limiting access to a diversified and high-quality diet, as observed in similar studies in Benin [4] and Ivory Coast [5]. Furthermore, acute malnutrition concerns 14.96% of our cohort. This result illustrates the deleterious synergy between food insecurity, parasitic infections and anemia, a vicious circle also described in rural and nomadic populations in Chad [6]. The presence of malnutrition is a recognized risk factor for mortality in hospitalized children, worsening the prognosis of underlying infectious pathologies [7]. In our study, fever (27.1%) and respiratory or digestives infections (9.35% each) constitute the main comorbidities. These results are in phase with Dakar data that identify febrile infections as the primary factors associated with decompensation of anemia [8].

4.3. Hematological Profile and Iron Deficiency

On the biological level, the predominance of hypochromic microcytic anemia (62.62%) is the salient finding of our study. This predominance strongly suggests an iron-deficiency etiology, linked to the depletion of iron stores and inadequate dietary diversification in young children [9]. Iron deficiency remains the most frequent cause of anemia worldwide, significantly impacting cognitive and immune development [10]. Although biochemical confirmations (ferritinemia) are limited in our context, this microcytic profile is systematically found in regional studies, notably in Cameroon, where nutritional determinants play a preponderant role from an early age [11].

4.4. Specific Etiologies and Severity

Sickle cell disease constitutes the main etiology identified (14.02% among new patients in addition to the 17.2% who were already screened during previous consultations or hospitalizations) in our series. This high rate reflects the prevalence of hemoglobin S in Senegal and is favored by a parental consanguinity rate of 26.17%. Our data align with the work of Thiam *et al.* in Ziguinchor, highlighting the heavy burden of hemoglobinopathies in the Senegalese hospital environment [12]. A very strong statistical correlation ($p = 0.000$) was established between the

etiology and the severity of anemia. Severe forms (27.10%) are mostly linked to the genetic terrain (sickle cell disease) and severe infections like malaria, as reported in Guinea [13] and during regional pediatric meetings [14]. This observation underscores the urgency of strengthening neonatal screening for sickle cell disease in Senegal to prevent early anemic complications and improve the overall survival of affected children [15].

4.5. Study Limits

- Retrospective character.
- Low rate of biological confirmation of iron deficiency nevertheless recognized as the main cause of microcytic anemia.

5. Conclusion

Anemia is frequent at CHN Dalal Jamm (34.5%), especially affecting school-aged children. The profile is mostly hypochromic microcytic, but severity remains dictated by sickle cell disease and severe malaria. These results impose systematizing neonatal screening of hemoglobinopathies and strengthening the fight against iron deficiencies to reduce infant mortality in Senegal.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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