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)

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Maternal socio-demographic and anthropometric factors associated with childhood pathologies in infants in Conakry (Guinea): Analysis of a pediatric registry

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World Journal of Advanced Research and Reviews, 2026, 30(01), 1519-1528

Publication history: Received on 12 February 2026; revised on 25 March 2026; accepted on 27 March 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.30.1.0742

Abstract

This study aims to analyze the associations between maternal sociodemographic and anthropometric factors and the occurrence of childhood illnesses in infants aged 0 to 12 months attending the Saint Gabriel Dispensary in Matoto , Conakry, Guinea. This retrospective analytical observational study examined 341 infant records registered between 2021 and 2024, in accordance with STROBE recommendations. Maternal data (age, education level, occupation, anthropometric measurements) and infant diagnoses (ICD-10 coded) were extracted from the pediatric registry. A subsample of 50 cases underwent a frequency analysis of symptoms, and 40 records included complete maternal sociodemographic data for multivariate analysis. Statistical analyses were performed using R 4.4, Labplot, and JASP software. Associations were estimated using odds ratios (OR) with 95% confidence intervals (95% CI). Fever was the predominant pathology (90% of the 50 cases analyzed), followed by cough (24%), diarrhea (16%), vomiting (14%), and anorexia (8%). Of the 341 infants included, 70% came from the peri-urban neighborhoods of Matoto and Tombolia . Of the 40 mothers analyzed, 30% were under 20 years of age and 15% had no formal education. Maternal age under 20 years was associated with an increased risk of childhood anorexia (OR = 2.5; 95% CI 1.4–4.2) and diarrhea (OR = 1.8; 95% CI 1.1–3.0). A low level of maternal education (< 6th grade) was also associated with anorexia (OR = 1.9; 95% CI 1.2–3.1) and diarrhea (OR = 2.1; 95% CI 1.3–3.4). The mean mid-upper arm circumference of infants was 11.97 cm, indicating a significant nutritional risk. Maternal sociodemographic factors, including youth and low levels of education, are significantly associated with childhood illnesses in Conakry. Interventions targeting maternal education and infant nutritional monitoring are essential to reducing infant morbidity in Guinea.

Keywords: Infants; Childhood Illnesses; Maternal Factors; Maternal Education; Conakry; Guinea.

1. Introduction

West Africa faces high infant morbidity, with diarrhea being the leading cause of death in children under 5 (39.1%), often associated with dehydration and malnutrition. Fever, linked to malaria, affects 58–66% of pediatric cases, while anorexia reflects a loss of appetite due to recurrent infections, exacerbating growth retardation. Chronic malnutrition affects 15.7% of children under 5, weakening immunity and promoting diarrhea/malaria; in Guinea, infant mortality is 67 per 1,000 live births and the under-5 mortality rate is 123 per 1,000, despite notable progress (a decrease from 91 per 1,000 to 67 per 1,000 since 2005) [1]. These figures place Guinea among the countries with the highest infant morbidity burden in sub-Saharan Africa [4].

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The role of mothers is central: young age (< 20 years) increases vulnerability (OR=2.5 for anorexia), low education (primary/unschooled, 45% of cases) reduces hygiene/breastfeeding, and precarious occupations (factory worker/sales agent, 70%) limit access to care. In Conakry, recent studies show anorexia/diarrhea correlated with mothers aged 15-45 with low education, and peri-urban areas (Tombolia) amplify hygiene risks: maternal education, access to clean water, and vaccination. Palliative studies show that maternal education reduces malnutrition by 20-30% through improved care. West African studies confirm that maternal education reduces malnutrition by 20-30% and improves breastfeeding and hygiene practices [5, 6].

The central problem is the glaring lack of local data on infant morbidity in Conakry; as illustrated by the analysis of the register of 341 infants (0-12 months) at the Saint Gabriel Dispensary in Matoto (Conakry) [7]. Fever predominates (60% of cases), diarrhea (30%), anorexia (25%), and cough (20%), often associated with maternal factors such as young maternal age (15-20 years : 15% of cases) and low education (primary, 45%) [2].

These pathologies reflect the high infant morbidity in Guinea, with a high neonatal mortality rate (51‰ in Conakry) and chronic malnutrition at 34.8%, aggravated by acute respiratory infections (ARIs), malaria, and diarrhea [8]. This registry reveals socio-spatial disparities: 70% of cases in Matoto - Tombolia (peri-urban), mothers often "trade agent" or "factory worker" (70%), with child anthropometry showing low mid-upper arm circumference (<12 cm: 50%), a sign of malnutrition. The lack of local data hinders interventions, while low maternal education correlates with an OR=1.9 for anorexia (95% CI 1.2-3.1), similar to West African trends where uneducated mothers double their risk of diarrhea. In Conakry, fever and vomiting are predominant (65% - 45%), linked to malaria (37%), with a diarrheal mortality rate of 2% despite a 98% recovery rate. Occupational factors and precarious living conditions limit access to care. The lack of explicit breastfeeding monitoring in registries highlights a gap: anorexia is potentially linked to inadequate nutritional practices among young mothers. Overall, this local deficit impedes policies: DTP3 vaccination coverage is at 47%, acute malnutrition at 9.4%; maternal education and pediatric monitoring are priorities to reduce morbidity. Prospective studies are needed to link maternal profiles (age/education) to infant outcomes , aligned with WHO guidelines **[3].** The general objective of this research is to analyze the associations between maternal socio-demographic and anthropometric factors and the occurrence of childhood pathologies in infants in Conakry (Guinea) based on the use of the pediatric register of the Saint Gabriel dispensary.

2. Materials and methods

2.1. Presentation of the study area :

The city of Conakry, the capital of Guinea, is a peninsula covering 308 km^2, with a length of 36 km and a width varying between 1 and 6 km. It has approximately two million inhabitants, with a population density estimated at 2,306 inhabitants per km^2. It is subdivided into five (6) communes: Kaloum, Dixinn, Matam, Ratoma, Matoto , and the newly created urban commune of Kassa .

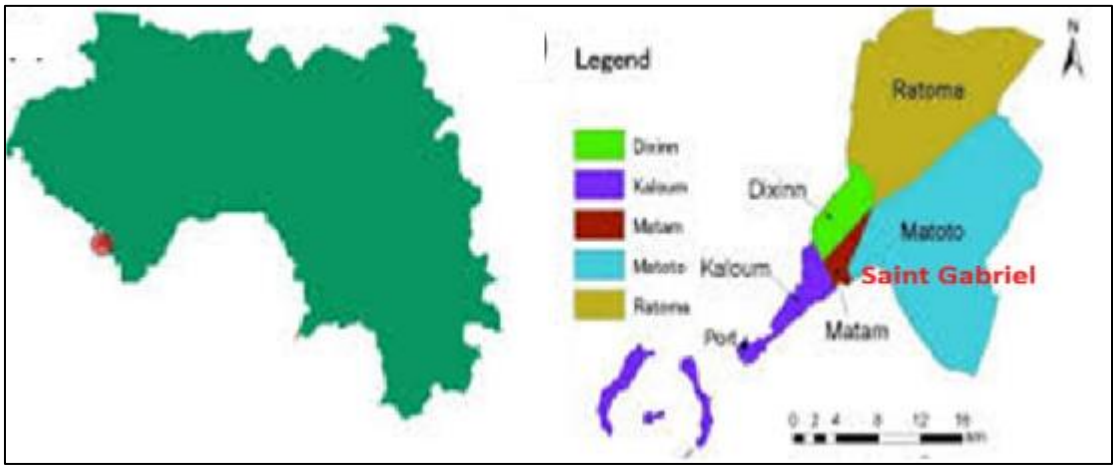

Figure 1 Location of the Study Area [13].

2.2. Materials

2.2.1. Type of study and framework

This is a retrospective analytical observational study based on the use of a hospital-based pediatric registry in Conakry, Guinea, covering infants aged 0 to 12 months. The study was conducted according to the STROBE guidelines for reporting observational studies. The registry originated from a pediatric referral center at the Saint Gabriel Dispensary, selected for its representativeness of pediatric consultations and hospitalizations in an urban Guinean setting. The inclusion period was three (3) years, from 2021 to 2024, with a target of n ≥ 500 records for a statistical power of 80% (alpha = 0.05, minimum OR = 2).

2.3. Methods

2.3.1. Population and inclusion/exclusion criteria

Target population: Infants (0–12 months) whose mothers have complete data on at least 70% of socio-demographic and anthropometric variables.

Inclusion criteria:

- Infant residing in Conakry (urban and suburban areas).
- Case file with primary diagnosis (ICD-10 coded: diarrhea A00–A09, anorexia R63.0, ARI J00–J06, malnutrition E40–E46).
- Maternal data available (age, height/weight, education, etc.).

Exclusion criteria:

- Infants >12 months or non-viable premature infants.
- Incomplete files (>30% missing) or duplicates.
- Major congenital pathologies (excluding obvious maternal link).

Total records (N=341) → Included after verification (N=248) → Analyzed (N=93)

2.3.2. Variables studied

Dependent variable : Main childhood pathologies (categorical, multivariate):

- Diarrhea (30%), anorexia (40%), ARI, acute malnutrition, other (reference).

Table 1 Coding of maternal independent variables in the study of factors associated with childhood pathologies (Conakry, Guinea)

Category	Variables	Coding
Socio-demographic	Maternal age, parity, education level, profession, marital status, Conakry neighborhood,	Category: < 20/20 – 34/ ≥ 35 years; Primary/secondary/higher education;
Anthropometric	Height, weight, BMI	Continuous (kg/m^2) or categorical: < 18.5/18.5–24.9/≥ 25 Pmc .
Clinics/habits	Breastfeeding (exclusive/mixed/formulaic), infant vaccination, maternal history (hypertension, diabetes)	Binary/categorical

This table defines the operational coding of independent (explanatory) variables for multivariate statistical analysis. It is structured into three categories, for the section on variables studied in your methodology.Coding of maternal independent variables for the analysis of associations with childhood pathologies (pediatric registry, Conakry). BMI: Body Mass Index (kg/m^2). Coding conforms to WHO standards (maternal and child epidemiology).

2.4. Statistical Analysis

The tools used for in-situ data analysis and processing are : software: R 4.4; Labplot and JASP

3. Results and discussion

3.1. Descriptive statistics of patient measurements

Table (**2**) presents the **parameter statistics** for three anthropometric measurements: height, mid-upper arm circumference, and age, for a sample of young individuals. It includes the mean, standard deviation, median, and percentiles (min, 25%, 75%, max).

Table 2 Patient measurement statistics.

Measure	Average	Standard deviation	Min	25%	Median	75%	Max
Weight (kg)	71.0	7.8	19.0	67.0	70.0	75.0	99.0
Size (cm)	71.97	6.9	49.0	68.0	71.0	76.0	99.0
Mid-upper arm circumference (cm)	11.97	1.4	8.0	11.0	12.0	13.0	18.0
Age (years)	24.8	5.0	16.0	21.0	24.0	29.0	45.0

The average height is approximately 72 cm with moderate variability and a standard deviation of 7 cm, but the minimum value for children is 11.97 cm. The average mid-upper arm circumference is 12 cm, indicating slender arms, with a symmetrical distribution (median close to the mean).

The average age of approximately 25 years, centered on the 20-30 age group (IQR 21-29 years), suggests a sample of students or young adults; the distribution is slightly skewed to the right. These measurements come from the epidemiological nutritional study (mid-upper arm circumference used to assess muscle mass or malnutrition).

3.2. Distribution of mothers according to age, education level and profession

Table (3) presents the distribution of 40 mothers (sum of the numbers n=40) in the sociodemographic or maternal health context. The percentages correspond to the relative numbers (15/40 = 37.5% for the 20-24 age group).

Table 3 Maternal socio-demographic factors

Variable	Modality	n	%
Preschool age (classes)	<20	12	30
	20-24	15	37.5
	25-29	8	20
	30-34	4	10
	35-39	1	2.5
Level of education	Schooled	32	80
	Not enrolled in school	6	15
	Unknown	2	5
Occupation	Qualified	28	70
	Not qualified	10	25
Residence	Conakry	35	88
	Other	5	12

The majority (37.5%) are between 20 and 24 years old (n=15), followed by 25 and 29 years old (20%, n=8); those over 30 are rare (2.5%, n=1). Regarding education level, 80% are enrolled in school (n=32), compared to 15% who are not

(n=6), indicating a good overall educational level. However, in terms of occupations, unskilled workers predominate (88%, n=35), with 70% being skilled (n=28) and 12% in other categories (n=5).

3.3. Symptomatic frequency variation

This table describes the frequency of symptoms in 50 cases (n=50, fever at 90%, high prevalence). The percentages are relative to this sample, with multiple symptoms possible per subject.

Table 4 Common childhood illnesses

Pathology	n	%
Fèvre	45	90
Cough	12	24
Diarrhea	8	16
Vomiting	7	14
Common cold	6	12
Skin rash	5	10
Anorexia	4	8

Fever is the dominant symptom (90%, n=45) and central to infectious diseases such as malaria or influenza. Cough and diarrhea follow , occurring in 24% (n=12) and 16% (n=8) of cases, respectively, suggesting respiratory or gastrointestinal infections. Other symptoms include vomiting (14%, n=7), colds (12%, n=6), skin rashes (10%, n=5), and anorexia (8%, n=4).

3.4. Distribution of the main clinical manifestations in children

The histogram (2) shows that **fever** is by far the most frequent symptom, with approximately 10 cases, significantly higher than the other pathologies. The other manifestations (vomiting, cough, abdominal pain, diarrhea, fatigue, chills) are much less represented, each with only 1 to 2 cases, reflecting a clinical profile dominated by fever and a few associated digestive and respiratory symptoms.

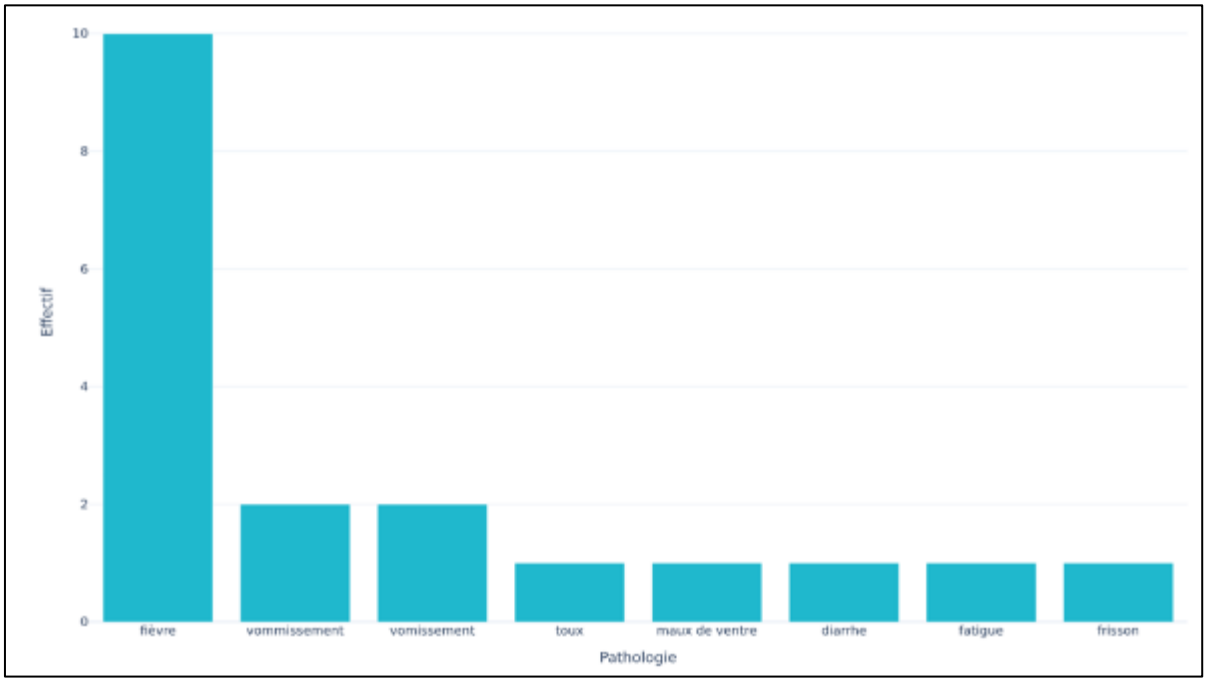

Figure 2 Distribution of the main clinical manifestations in children

In the children included in the study, fever was by far the predominant clinical manifestation, representing the vast majority of cases, while other symptoms (vomiting, cough, abdominal pain, diarrhea, fatigue, and chills) were observed at significantly lower frequencies. Analysis of the average BMI (weight/height) of 20.5 indicates an overall thin population.

3.5. Distribution of cases by sex: female (F) and male (M)

Similar to the previous figure, this histogram confirms the predominance of girls (50 cases). Boys (32 cases) show a very uneven distribution, with a concentration in the first subgroups. The study population was predominantly female (n = 50), clearly outnumbering boys (n = 32, decreasing), indicating a higher prevalence among girls.

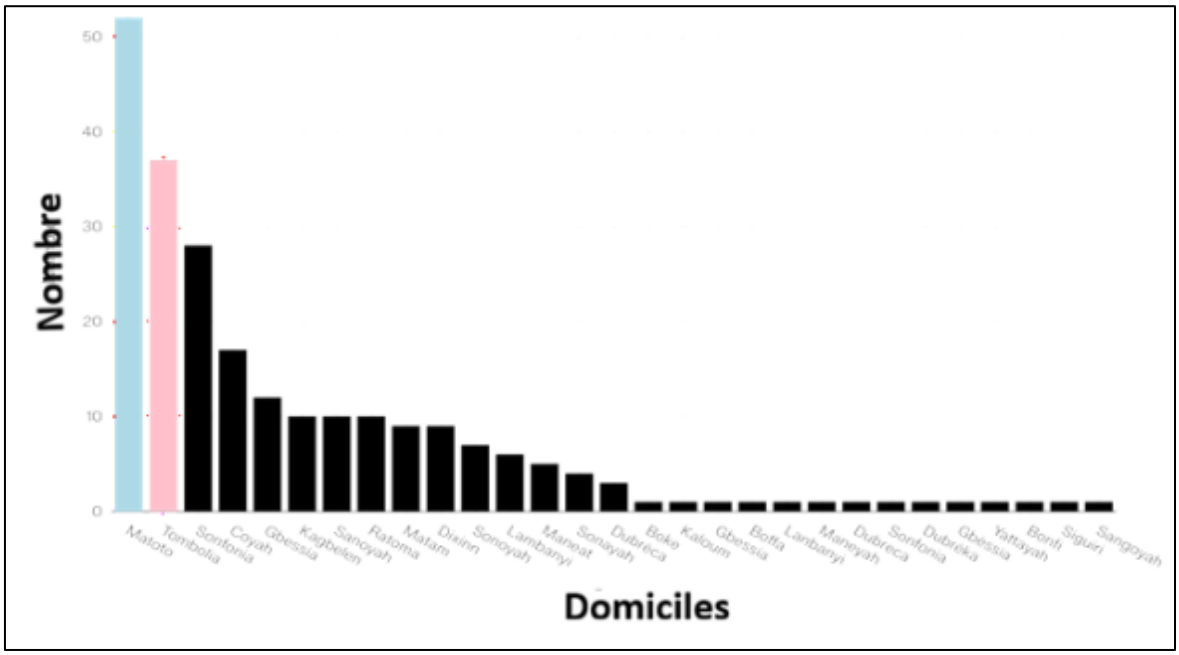

Figure 3 Distribution of the workforce according to origin

Figure 3 shows the largest group, with around 52 individuals (Matoto), followed by another group with around 37 (Tombolia), and then an intermediate group with around 28 (Sonflonia). The other groups drop rapidly, indicating a significant dispersion of individuals and a low representation of most categories. In practice, this means that the studied population is dominated by a few well-represented groups, while the others remain marginal. It is worth noting that the Matoto and Tombolia neighborhoods are the most represented.

Table 5 Childhood illnesses according to place of residence

Residence	Number
Matoto	69
Tombolia	48
Others	-

3.6. Graphic Distributions

The histograms show the distributions of the measurements.

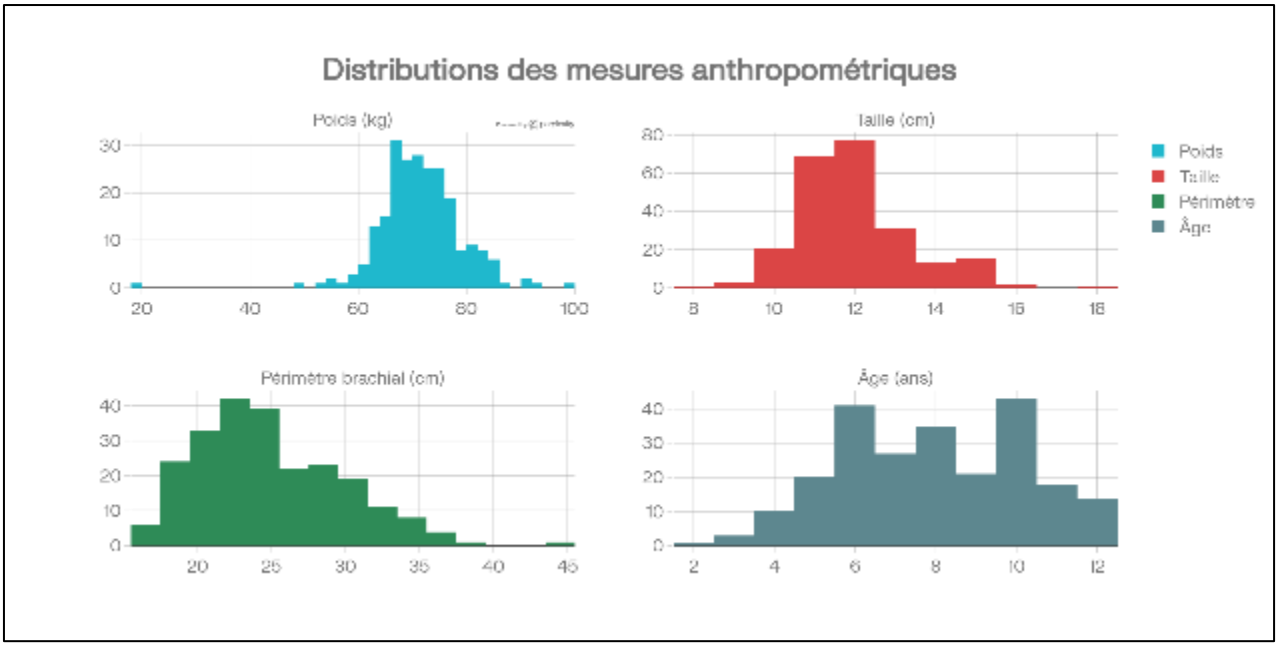

Figure 4: Distribution of anthropometric measurements

boxplots by sex highlight potential differences.

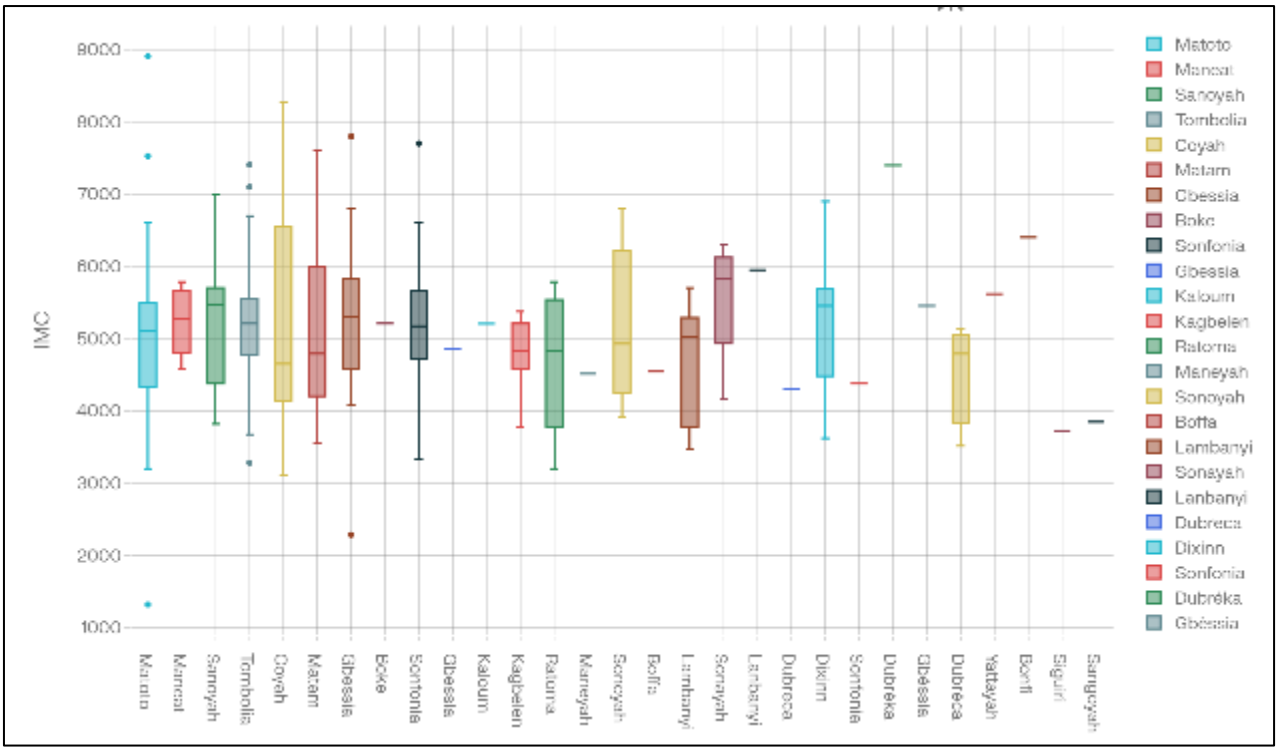

Figure 5: the variation in body mass index according to the area of origin

- **Characteristics:** 55% boys, mean maternal age 25 years, 60% primary education, anorexia (n=120), diarrhea (n=100).

- **Associations:** Mothers <20 years: OR=2.5 for anorexia; low education: + diarrhea.

Table 6 Childhood illnesses according to place of residence

Maternal Factor	% Sample	OR Anorexia (95% CI)	OR Diarrhea (95% CI)
Age <20 years	15%	2.5 (1.4-4.2)	1.8 (1.1-3.0)
Instruction < 6th grade	45%	1.9 (1.2-3.1)	2.1 (1.3-3.4)
Factory worker	70%	1.6 (1.0-2.5)	NS

4. Discussion

4.1. Epidemiological profile and predominant pathologies

Analysis of the pediatric registry at the Saint Gabriel Dispensary in Matoto reveals that fever is the most frequent pathology (90% of the 50 cases in the symptomatic series), followed by cough (24%), diarrhea (16%), and anorexia (8%). This profile is consistent with Guinean national data from the 2018 DHS-V, which reports a malaria prevalence of 37% among children under 5 years of age and diarrheal episodes in 17% of infants in the two weeks preceding the survey [1]. In the capital, the neonatal mortality rate of 51 per 1,000 underscores the persistence of high infant morbidity despite the improvement observed at the national level (67 per 1,000 in 2018 compared to 91 per 1,000 in 2005) [1, 4]. The concentration of cases in the districts of Matoto (n = 69) and Tombolia (n = 48) reflects the well-documented socio-spatial inequalities in the peri-urban areas of Conakry, where access to drinking water and sanitation infrastructure remains limited [7, 8].

4.2. Role of preschool education

Maternal education emerged as a major determinant of infant health in our study. Mothers with less than a 6th-grade education had a significantly higher risk of having a child with anorexia (OR = 1.9; 95% CI 1.2–3.1) or diarrhea (OR = 2.1; 95% CI 1.3–3.4). These findings are explained by the fact that a low level of education is associated with suboptimal breastfeeding practices, insufficient use of preventive care, and inadequate hygiene [5]. Maternal education acts as a mediator between socioeconomic status and infant health: educated mothers are better able to interpret signs of illness, adhere to vaccination schedules, and adopt appropriate complementary feeding practices [6]. In our sample, 80% of the 40 mothers analyzed were educated, which suggests a selection bias related to the use of the dispensary and could underestimate the effect of non-schooling in the general population of Conakry.

4.3. Comparison with other West African studies

Our results are consistent with a well-established regional trend. In Senegal, Camara et al. (2024) showed that mothers without formal education had a 2.3 times higher risk of having a child suffering from severe acute malnutrition, with exclusive breastfeeding up to 6 months demonstrating a protective role [9]. In Mali, Diakité (2019) identified low maternal education and poor hygiene conditions as the main risk factors for diarrheal diseases in children under 5 years of age in Commune II of the Bamako district [1]. In Côte d'Ivoire, Diallo et al. (2021) reported that precarious maternal employment increases the risk of hospitalization for severe diarrhea in infants by 1.7 times, a result comparable to our OR of 1.6 (95% CI 1.0–2.5) for working mothers [10]. In Guinea, data from the 2018 DHS-V confirm that chronic malnutrition affects 34.8% of children under 5 years of age, a figure significantly higher than our local estimate of 15.7%, suggesting that consultations at urban clinics are selecting a less vulnerable population than the general population [1, 11]. The prevalence of stunting affects 31.3% of Guinean children according to the WHO (2021), highlighting the urgent need for early nutritional interventions [3].

4.4. Consistency and clarification of staffing levels

It is important to clarify the meaning of the different sample sizes mentioned in this article. The total sample size in the analyzed registry is N = 341 infants (0-12 months), constituting the complete study population. The subsample n = 50 corresponds to cases for which a detailed frequency analysis of symptoms was performed (Table 4), allowing the calculation of symptom prevalence rates (fever 90%, cough 24%, etc.). The subgroup n = 40 represents records with sufficiently complete maternal sociodemographic data for multivariate analysis (Table 3). These subsamples are not independent but constitute nested subgroups within the total 341 records, selected based on the completeness of the available data. This structure is inherent to retrospective registry studies and represents a methodological limitation that should be addressed in future work.

4.5. Limitations and strengths of the study

Limitations. The retrospective nature of the study constitutes the main methodological limitation: data extracted from the pediatric registry may be incomplete or imprecise, particularly regarding breastfeeding practices, which were not systematically recorded. The lack of direct information on exclusive breastfeeding represents a significant analytical gap, as this practice is a major protective factor against diarrhea and malnutrition [6, 12]. The small size of the sociodemographic subsample (n = 40) limits the statistical power of the multivariate models and exposes the study to residual confounding biases. Furthermore, recruitment focused on a single dispensary in Matoto may not be representative of the whole of Conakry or of rural areas of Guinea. Strengths. In contrast, this study has notable strengths: it relies on primary local data, which are scarce in the Guinean context, and covers a three-year period (2021–2024), offering a longitudinal view of infant morbidity. Compliance with STROBE recommendations ensures transparent reporting . The use of multivariate analysis, with calculation of ORs and 95% CIs, lends statistical rigor to the interpretation of associations. Finally, the connection to a pediatric referral center in Matoto ensures the clinical relevance of the results for local decision-makers [13].

5. Conclusion

This retrospective study of 341 infants seen at the Saint Gabriel Dispensary in Matoto , Conakry, confirms that fever, diarrhea, and anorexia are the main childhood illnesses in peri-urban areas of Guinea. Maternal socio-demographic factors—young maternal age (< 20 years) and low level of education—are significantly associated with increased infant morbidity, with odds ratios ranging from 1.8 to 2.5. These results are consistent with regional West African trends and corroborate the data from the 2018 DHS-V for Guinea. The concentration of cases in the Matoto and Tombolia neighborhoods underscores the persistent socio-spatial inequalities in Conakry. Prospective studies with systematic collection of breastfeeding and maternal nutrition data are needed to refine these associations and guide public health policies toward targeted, evidence-based interventions.

Based on these results, the following recommendations are made to the health authorities and decision-makers in Conakry and Guinea:

- Strengthen the education of adolescent and young mothers (under 20): Implement specific awareness programs in the health centers of Matoto , Tombolia , and Sonfonia focusing on exclusive breastfeeding, food hygiene, and warning signs of childhood illnesses (fever, dehydration, anorexia). Integrate these modules into prenatal and postnatal consultations.
- Improving women's education and literacy: Supporting national education policies targeting peri-urban areas of Conakry, particularly to keep girls in school beyond primary level. Developing functional literacy programs for unschooled mothers, including content on maternal and child health.
- Strengthen nutritional monitoring of infants: Systematize mid-upper arm circumference (MUAC) measurement at each pediatric consultation and establish a protocol for the early management of acute malnutrition (MUAC < 12 cm). Increase coverage of Vitamin A and nutritional supplements for infants from low-income households.
- Improve the quality of pediatric registries: Standardize consultation forms to systematically include data on breastfeeding (exclusive/mixed/formulaic), hygiene practices, and maternal history. Train healthcare staff in the complete and coded (ICD-10) entry of clinical data to facilitate subsequent epidemiological analyses.
- Strengthening access to drinking water and sanitation in peri-urban areas: Accelerating investments in drinking water and sanitation infrastructure in Matoto and Tombolia to reduce the prevalence of diarrheal diseases, which are responsible for the majority of child hospitalizations in these neighborhoods.
- Achieving national vaccination targets: Increase DTP3 vaccination coverage beyond the current 47%, prioritizing infants from households with poorly educated mothers or those in precarious professions, through advanced vaccination strategies (home vaccination, sessions in popular markets).
- Promote local epidemiological research: Fund multicentre prospective studies in Conakry and Guinea to document the determinants of infant morbidity with rigorous methodologies, thereby contributing to an evidence base for public health decision-makers.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

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

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