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Prevalence and Distribution of Iron Deficiency, Anemia and Iron Deficiency Anemia and Its Level of Severity in the Populations of the Lekie Division in Cameroon

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Abstract

Background : Anemia is a major public health problem worldwide, affecting a quarter of the population. Iron deficiency is responsible for about 50% of anemia cases worldwide. Cameroon is one of the most affected country by this problem. Children under 5, pregnant women, women at childbearing age and elderly people are the most affected. The objective of this study is to determine the prevalence of iron deficiency, anemia and iron deficiency anemia and its level of severity according to socio-demographic parameters in the Lekie Division. The aim is to provide up-to-date, detailed data that will enable us to better guide treatment.

Methods : A one-month cross-sectional study was carried out in the Lekie Division in collaboration with local health centres in both urban and rural areas. The study sample consisted of 361 participants of all ages and sexes. One or two drops of blood were collected in order to perform the anemia test using a urit-12 hemoglobin device, and a questionnaire was developed to obtain information on participants' socio-demographic status. The assay of certain markers carried out on blood samples collected from participants provided further information on anemia.

Results : The prevalence of anemia in the study population was 54.85%, higher than that of iron deficiency anemia and martial deficiency. Mild anemia was more prevalent, while severe anemia was less prevalent. Of the different forms of anemia known, anemia caused by martial deficiency was the most predominant in the study population (57.6%).

Conclusion : Anemia in the Lekie Division has passed the 40% mark, and is therefore, according to the WHO, a serious public health problem. This locality therefore requires special attention, but above all, an urgent intervention to prevent further deterioration of the situation.

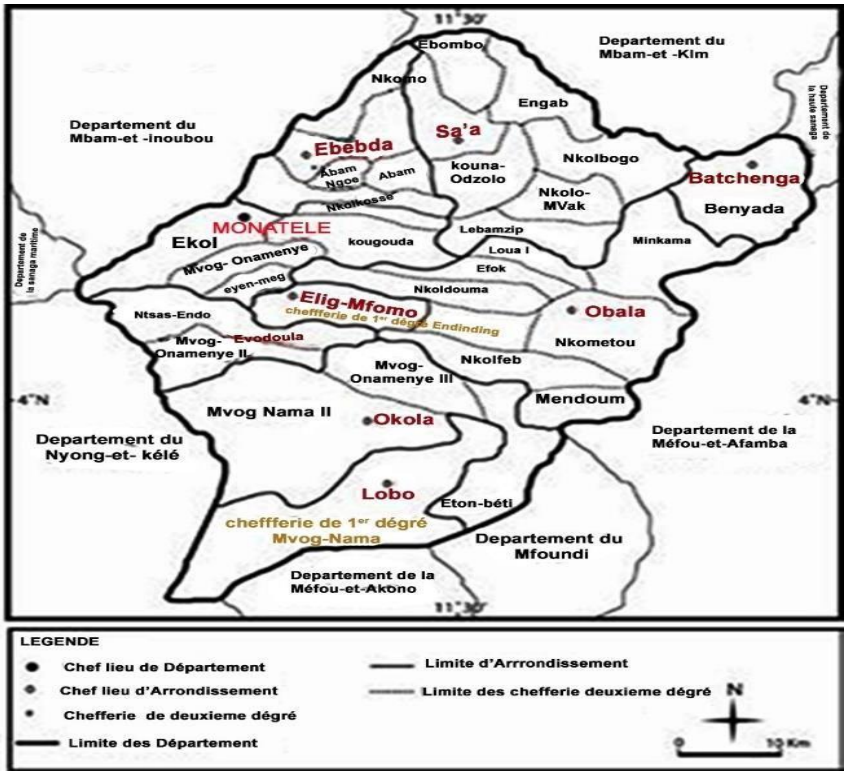
Keywords : Prevalence and distribution, Iron deficiency anemia, level of severity, Lekie Division, Cameroon.

Introduction

According to the WHO, anemia is the most common public health problem in the world, affecting all social strata, especially pre-school children, pregnant women, women at childbearing age and elderly people. Iron deficiency, the leading cause of anemia, is also the world's leading nutritional deficiency. Prevalence is highest in developing countries, where anemia rates of over 40% are reported, indicating a severe level of the problem. Industrialised countries are much less affected, with prevalence rates generally below 20% [1]. The Lekie Division in Cameroon, because of its proximity to the Sanaga River, is a major malaria-endemic area, and also a zone where anemia is taking a heavy toll. The need for up-to-date, detailed data on anaemia in this locality is essential for effective planning of control measures.

Methodology

Study framework



The Lekie Division is one of the 58 Divisions in the State of Cameroon, and one of the 10th Divisions in the Centre Region. With a surface area of approximately 302,360 km², it is the largest Division in the region and also the most populated after Mfoundi, with approximately 1,487,390 inhabitants grouped into 09 Sub-divisions which are : Sa'a, Obala, Okola, Evodoula, Monatélé, Elig-mfomo, Ebebda, Batchénga, and Lobo.[2] Its climate is equatorial with four seasons, characterised by alternating rainy and dry seasons. Average rainfall is 1,700 m/m per year. The population is predominantly young and very dynamic. The main ethnic groups are the Etons, who make up 80% of the population, Manguissas and others, who account for just 20%. Agriculture is the population's main activity.[3]

In terms of health and nutrition, malaria and parasitic infections are endemic in this locality and constitute a major public health problem[4].Tropical diseases such as schistosomiasis are still very much neglected in the area. Although they are permanent in the country, they still receive little attention from public health workers. Malaria, on the other hand, is receiving a great deal of attention, and is the leading cause of

morbidity and mortality in children under 5 and pregnant women in particular. It is closely followed by anaemia, mainly due to the poor eating habits suspected in this area.

Type and period of study

This was a descriptive cross-sectional study conducted between January and February 2023.

Study population and sample size

There were 361 participants, of all ages, sexes, professions and religions, from both urban and rural areas of the Lekie Division.

Criteria for Inclusion

People who were natives and residents (for at least six months) in the locality

Criteria for Exclusion

People with chronic or hemoglobin-related illnesses, and people on medication that may affect hemoglobin concentration.

Ethical considerations

This work was carried out with strict respect for the physical, moral and psychological integrity of all participants. Authorisation to carry out this study was obtained from the Centre regional research ethics committee **(N°02057/CRERSHC/2022),** by issuing an ethical clearance. The administrative and traditional authorities of the Lekie Division of were met and informed of the objectives of this study, with the aim of obtaining their consent and soliciting their support in carrying out this work.

Collection and analysis of samples

The field team consisted of two state-qualified nurses, local community health workers and researchers from the Food Science and Metabolism Laboratory of the University of Yaoundé I, who had been trained beforehand. A questionnaire was administered to participants in order to collect their socio-demographic data, they were then subjected to fasting and blood samples were collected between 8am and 12pm. A complete haemogram using an automated haematology machine and a serum ferritin assay using the Elisa method were performed at the Yaounde University Hospital Centre on each blood sample collected from the participants.

Data analysis

The Kolmogorov Smirnov test was used to verify the normality of the data distribution, IBM/SPSS 20.0 for Windows was used for the comparison of means and descriptive statistics. Spearman's rank correlation test was used to study correlations between anaemia and socio-demographic parameters, and Microsoft Excel 2016 was used for the graphical representations.

Results

Socio-demographic characteristics of the study population

Gender

The study population was made up of 37% male participants and 63% female participants, as shown in the figure below.

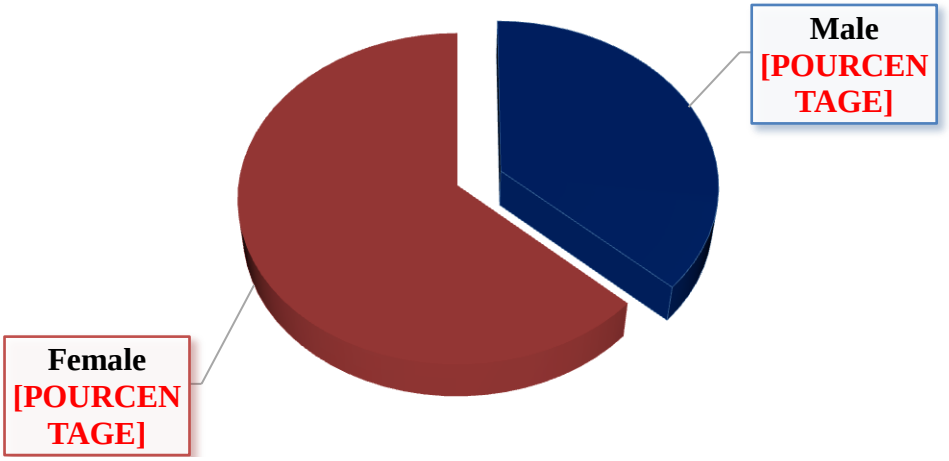
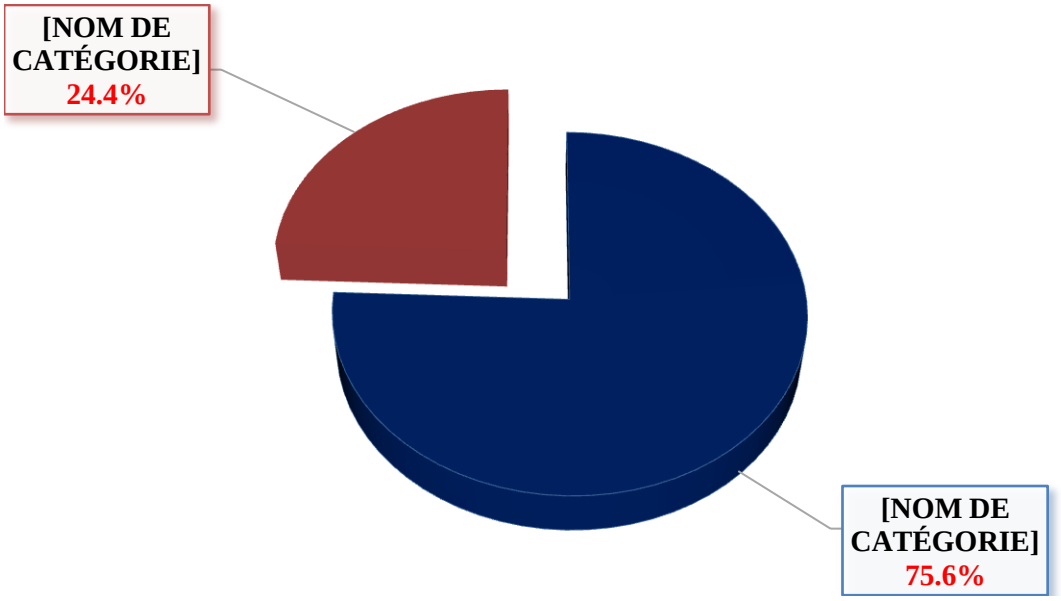


Figure 1: Breakdown of the study population by gender

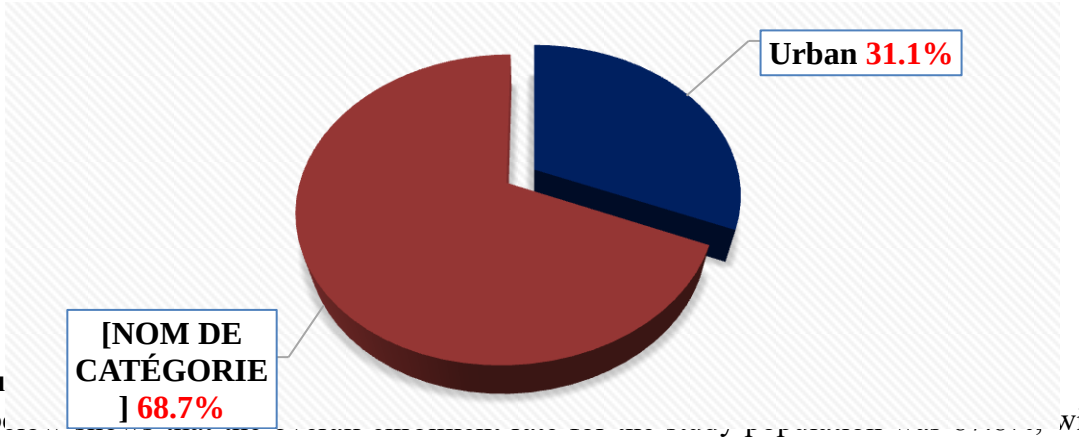
Ethnic group

The study population was made up of 75.6% of participants belonging to the Eton ethnic group and 24.4% belonging to the Manguissa ethnic group, as shown in the figure below.



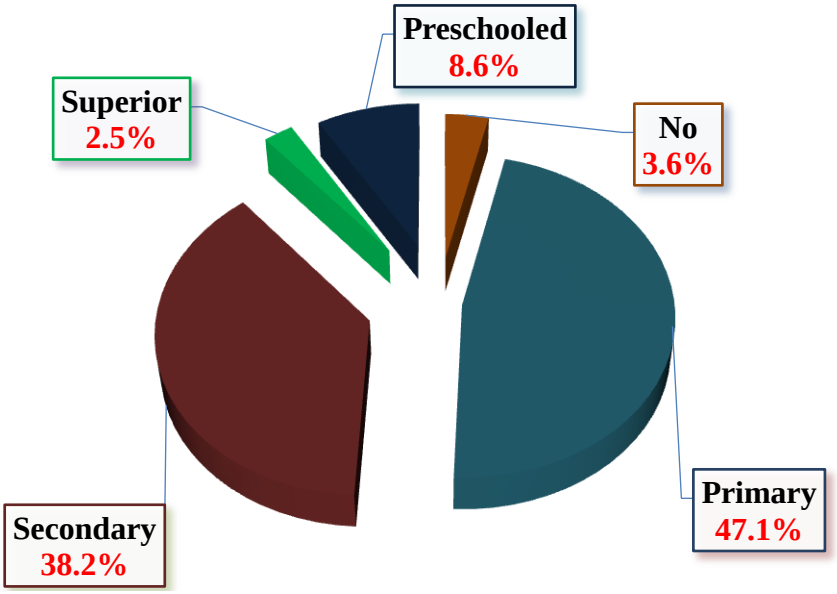
Place of residence

The study population comprised 31.3% of participants from urban areas and 68.7% from rural areas, as described below.



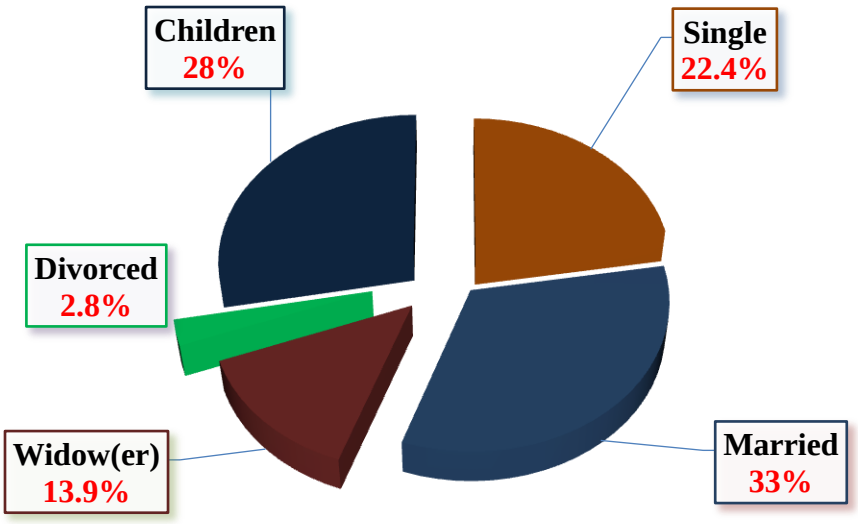
Level of edu

The figure b with 47.1% at Primary level, 38.2% at Secondary level and 2.5% at University level.



Marital status

The figure below shows that in the study population, 33% were married, 22.4 were single, 13.9% were widowed and 2.8% were divorced.



Profession

The figure below shows that the main activity carried out by the study population is agriculture, followed by small-scale jobs in the informal sector. Wage earners represent only 7.8% of the population, while 10.2% of the population are unemployment**.**

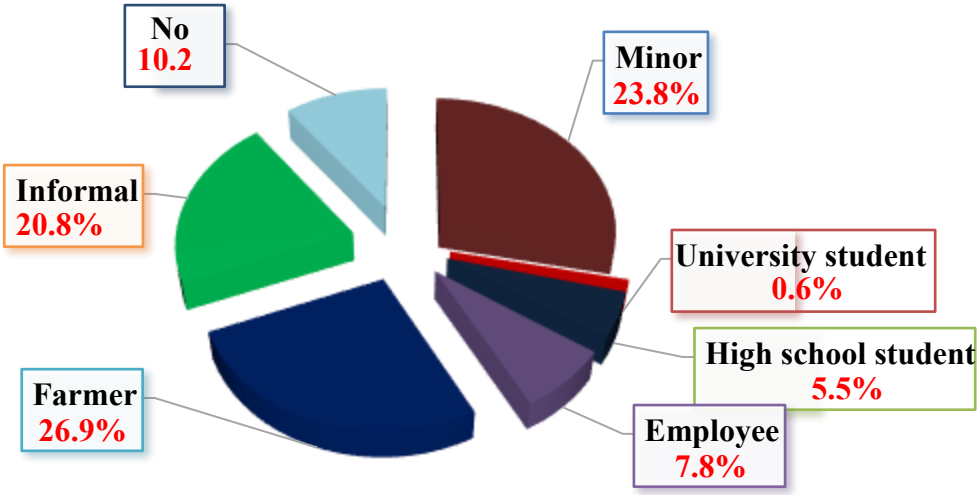


Figure VI : Breakdown of study population by profession

Prevalence of anemia, iron deficiency anemia and iron deficiency in the study population

As shown in the figure below, the prevalence of anemia in the study population is 54.85%, that of iron deficiency anemia is 31.6% and that of martial deficiency is 13.85%.

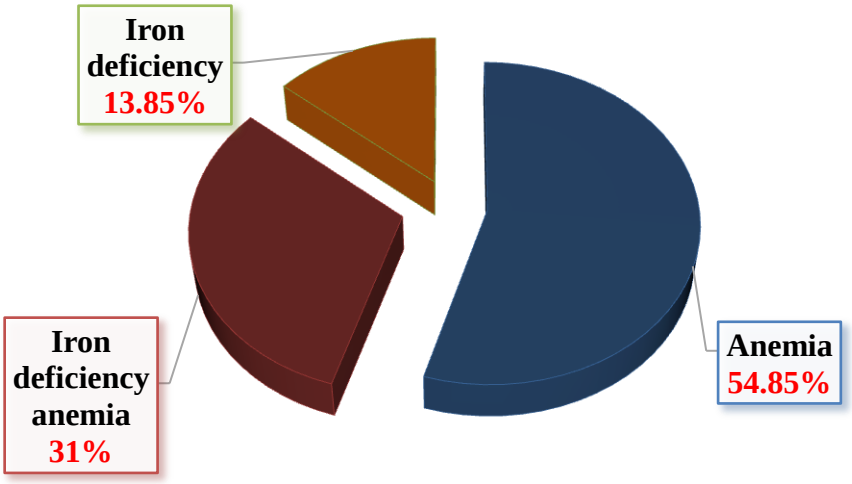


Figure VII : Prevalence of anemia, iron deficiency anemia and iron deficiency in the study population

Level of severity of anemia

Anemia in the study population was more prevalent in the mild form (67.17%), while the moderate and severe forms were 30.8% and 2.02% respectively.

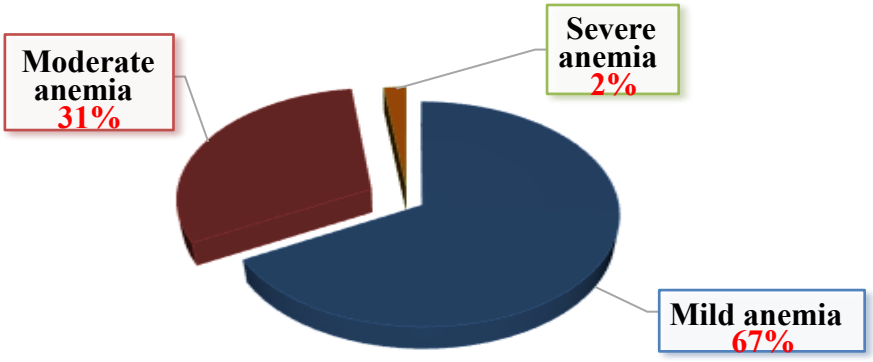


Figure VIII : Prevalence of anemia severity in the study population

Table I : Prevalence of iron deficiency, anemia and iron deficiency anemia according to socio-demographic characteristics of the study population

Features	Population N	Anemia N (%)	Iron deficiency anemia N (%)	Deficiency made of iron N (%)
Ethnic group				
-Eton	273	151 (57.51)	90 (33.00)	40 (14.65)
-Manguissa	88	47 (53.41)	24 (27.30)	10 (11.36)
Gender				
-Male	133	75 (56.40)	42 (31.58)	17 (12.78)
-Female	228	123(53.95)	72 (31.58)	33 (14.47)
Place of residence				
-Urban	113	71 (62.83)	47 (41.60)	19 (16.81)
-Rural	248	127(51.21)	67 (27.01)	31 (12.50)
Profession				
-No	37	19 (51.35)	12 (32.43)	04 (10.81)
-Minor	102	78 (76.47)	45 (44.11)	11 (10.80)
-High school student	20	12 (60.00)	11 (55.00)	08 (40.00)
-University student	02	01 (50.00)	01 (50.00)	00 (00.00)
-Informal sector	97	41 (42.26)	15 (15.46)	13 (13.40)
-Farmer	75	34 (45.33)	24 (32.00)	11 (14.66)
-Employee	28	13 (46.43)	06 (21.43)	03 (10.71)
Level of education				
-No	13	07 (53.85)	05 (38.46)	00 (00.00)
-Preschooled	31	23 (74.19)	13 (41.93)	05 (16.13)
-Primary	170	97 (57.06)	54 (31.77)	18 (10.60)
-Secondary	138	67 (48.55)	39 (28.26)	26 (18.84)
-University	09	04 (44.44)	03 (33.33)	01 (11.11)
Marital status				
-Child	101	78 (77.23)	45 (42.86)	11 (10.81)
-Single	81	39 (48.15)	29 (35.80)	15 (18.52)
-Married	119	56 (47.06)	29 (24.37)	19 (15.97)
-Divorced	10	03 (30.00)	02 (20.00)	02 (20.00)
-Widow(er)	50	22 (44.00)	09 (18.00)	03 (06.00)

Table II : Prevalence of anemia severity according to socio-demographic characteristics of the study population

Features	Population (N)	Mild anemia N (%)	Moderate anemia N (%)	Severe anemia N (%)
Ethnic group				
-Eton	151	101 (66.89)	48 (31.79)	02 (01.32)
-Manguissa	47	32 (68.09)	13 (27.66)	02 (04.25)
Gender				
-Male	75	55 (73.33)	18 (24.00)	02 (02.66)
-Female	123	79 (64.22)	42 (34.15)	02 (01.63)
Place of residence				
-Urban	71	39 (54.93)	30 (42.25)	02 (02.82)
-Rural	127	93 (73.23)	32 (25.20)	02 (01.57)
Profession				
-No	19	11 (57.89)	07 (36.84)	01 (05.26)
-Minor	78	43 (51.13)	32 (41.03)	03 (03.85)
- High school student	12	09 (75.00)	03 (25.00)	00 (00.00)
-University student	01	01 (100.0)	00 (00.00)	00 (00.00)
-Informal sector	41	34 (82.93)	07 (17.07)	00 (00.00)
-Farmer	34	24 (70.59)	10 (29.41)	00 (00.00)
-Employee	13	11 (84.61)	02 (15.38)	00 (00.00)
Level of education				
-No	07	05 (71.43)	01 (14.28)	01 (14.28)
-Preschool	23	09 (31.13)	12 (52.17)	02 (08.70)
-Primary	97	70 (72.16)	26 (26.80)	01 (01.03)
-Secondary	67	49 (73.13)	18 (26.86)	00 (00.00)
-University	04	03 (75.00)	01 (25.00)	00 (00.00)
Marital status				
-Child	78	44 (56.41)	31 (39.74)	03 (03.85)
-Single	39	28 (71.79)	11 (28.20)	00 (00.00)
-Married	56	42 (75.00)	14 (25.00)	00 (00.00)
-Divorced	03	03 (100.0)	00 (00.00)	00 (00.00)
-Widow(er)	22	17 (77.27)	04 (18.18)	01 (04.54)

Table III : Significant correlations between anemia and socio-demographic parameters of the study population

Parameters	Correlation coefficient (r)	P
Anemia/Age	-0.233	0.000**
Anemia/place of residence	-0.108	0.040*
Anemia/Marital status	-0.247	0.000**
Anemia/Level of education	-0.125	0.018*
Anemia/Profession	-0.188	0.000**

significance : * $p < 0.05$; **$p < 0.01$ based on Spearman correlation test

The table above shows that significant correlations were observed between anemia and a number of parameters, such as age ($r = -0.233$; $p = 0.00$), place of residence ($r = -0.108$; $p = 0.04$), marital status ($r = -0.247$; $p = 0.00$), level of education ($r = -0.125$; $p = 0.01$) and occupation ($r = -0.186$; $p = 0.00$).

Discussion

When it comes to health-related activities, women and their children are very often receptive, and therefore more participative, because of their health vulnerability, unlike men. This could therefore justify the high representation of women in this study. The Eton ethnic group is in the majority in the Lekie Division, accounting for around 80% of the population, compared with 25% for the Manguissa ethnic group. The population is much more concentrated in rural than in urban areas, due to the high level of agricultural activities. The high school enrolment rate can be explained by the presence of school infrastructure in almost every locality in the Lekie Division. However, the primary level was the most represented in this study, because the populations are more concentrated in rural areas, which mostly have primary education facilities, therefore only have access to basic education, except for those who have more resources and are therefore able to continue their studies in urban areas, at higher levels. With regards to the marital status of the participants in the study, it is the high level of education which characterises this study population, and their strong adherence to the Catholic religion, which would be the two major assets in these populations' knowledge could be advantages associated with marital stability, which would therefore justify the observed predominance of married people. The Lekie Division is a major agricultural production area, due to its proximity to River Sanaga and the fertility of its soil. Its proximity to the capital city provides a great opportunity for actors in the field, and therefore justifies the fact that agriculture appears to be the main activity pursued by the people of this Division. These results were similar to that obtained in the Democratic Republic of Congo. [5]

The overall prevalences obtained in the Lekie Division were similar to those obtained for anemia in Yaounde [6], higher for iron deficiency anemia and lower for iron deficiency for the same author. The prevalence of anemia here is not very far from that obtained in the central region (60%) according to the DHS figures for 2018.[7] This would imply that this locality has a lot to do with the high prevalence of anemia observed in the central region. These results could be justified by the fact that this Division is bordered for several kilometres by the Sanaga River, and also because of its equatorial climate, constitutes a malaria endemic zone, malaria being closely linked to anemia. Iron deficiency and iron deficiency anaemia appear to be public health problems in this locality, and this could be justified by the poor dietary habits that characterises the populations of this Division.[8] Indeed, it has been shown that poor dietary practices encourage the onset of nutritional diseases.[1]

As far as the severity of anemia in the study population is concerned, despite the poor eating habits that seem to characterise the populations of the Lekie Division, to our knowledge no study has yet been carried out classifying this locality as a major focus of malnutrition in Cameroon, as it is the case for the East region and the three Northern Regions [9]. This could therefore justify the fact that anemia is not very prevalent in this locality in the severe form, but much more so in the mild form. This result was contrary to that of [10] on malnourished subjects in Benin, as well as that of [6].

The prevalences of anemia, iron deficiency anemia and iron deficiency in the Eton ethnic group were 57.51%, 33.00% and 14.65% respectively. All three values were higher than those obtained in the Manguissa ethnic group. This could be justified by the fact that the Etons have a slightly greater inclination to work in the fields than the Manguissas. However, this work requires a substantial food intake. Since the two ethnic groups seem to have the same dietary habits, the Manguissas come out slightly less deficient than the Etons. The iron deficiency results obtained were much lower than those of.[10]

Women were less affected by anemia (53.95%) than men (56.40%) in the population studied. On the other hand, they were more affected by iron deficiency (14.47%) compared with men (12.78%). This result could be justified by the fact that women and their children are more likely to be targeted by various health programmes (vaccination, mosquito nets, etc.) than men. Hence the fact that they have fewer anemias. However, women are the main actors in farm work and in feeding the children at home, reason why they are more affected by iron deficiency than men. This result was different from that obtained by [11], for anemia, but similar for iron deficiency.

Urban areas had a higher prevalence of anemia, iron deficiency anemia and iron deficiency than rural areas. This can be explained by the fact that in rural areas, there is less pollution, which is a source of mosquitoes, and there is a slightly higher consumption of mineral-rich fruit and vegetables than in urban areas. Generally working subjects (employees, farmers, informal workers) were less affected by anemia than those not working. This could be explained by the fact that income from employment favours better access to healthcare and a balanced diet.

Subjects with a university education were less affected by anemia than uneducated subjects (44.44%) and (53.85%). A high level of education generally implies a better knowledge of hygiene and dietary recommendations, which could justify the results observed. Single people showed a slightly higher prevalence of the various parameters than married people. This is because marriage creates a degree of stability and synergy of effort, which in turn generates greater economic returns, promoting better access to healthcare and a balanced diet.

Concerning the degree of severity of anemia in the Lékié Division, it appears that, on the whole, anemia in this locality is much more prevalent in the mild form for all the socio-demographic parameters studied. It somehow appears in the moderate form, and is rare in the severe form. This result could be justified by the high level of education in this Division, the presence of health centres and the abundance of agricultural resources, which limit the serious deterioration of the situation. These results were very different from those of.[10]

Conclusion

Anemia in the Lékié Division has passed the 40% mark in the general population, and is therefore, according to the WHO, a serious public health problem. These results have shown evidence that this locality requires special attention, but above all, an urgent intervention to prevent further deterioration of the situation, as the consequences are generally serious and sometimes irreversible.

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Conflicts of Interest:

The authors declare that the have no know competiting financial interests or personal relationship that coul have appeared to influence the work reported in the paper.

Authors Contributions

Noah Guy : conceptualization, study design, data collection, data analysis and interpretation, drafting of the manuscript, reviewing of the manuscript

Fokou Elie : conceptualization, study design, literature review, data interpretation, revision of the manuscript

Bebbe Fadimatou : study design, literature review, data interpretation, revision of the manuscript

Haddison Eposi : study design, literature review, data interpretation, revision of the manuscript

Mbassi Manga Gilbert G : study design, literature review, data collection, revision of the manuscript

Kemzeu Raoul : study design, literature review, data collection, revision of the manuscript

Nomo Nga Genevieve : study design, literature review, data collection, revision of the manuscript

Saha Foudjo Brice Ulrich : study design, data interpretation, revision of the manuscript.

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