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Factors contributing to nutritional Anemia in children aged 0 to 23 months in the Kananga health zone

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ABSTRACT

Our study focused on ‘Factors contributing to nutritional anaemia in children aged 0 to 23 months in the Kananga health zone’.

The aim of our study was to describe the factors contributing to nutritional anaemia in children aged 0 to 23 months in the Kananga health zone. To achieve this, we pursued the following specific objectives:

- To identify the factors contributing to nutritional anaemia in children aged 0 to 23 months;
- To determine the most common types of anaemia among children aged 0 to 23 months;
- To propose possible preventive measures to avoid anaemia.

We conducted a descriptive, cross-sectional study with an analytical focus, using a survey method supported by face-to-face interviews as the data collection tool for a sample of 362 respondents.

Following analysis and interpretation of the data, we obtained the following results:

- ✓ 40.61 per cent of respondents were in the 25 to 34 age group;
- ✓ 73.76 per cent of respondents were married;
- ✓ 35.64 per cent of respondents were unemployed;
- ✓ 45.86 per cent of respondents were Catholic;
- ✓ 39.7 per cent of respondents were part of a household of between 4 and 7 people;
- ✓ 35.64 per cent of respondents had a monthly income of 60,000–100,000 Congolese francs;
- ✓ 48.07 per cent of respondents eat fufu with leaves and small fish at home;
- ✓ 45.8 per cent of respondents eat one meal a day at home;
- ✓ 57.73 per cent of respondents wean their children at 12 months;

- ✓ 31.22 per cent of respondents give their children maize porridge as a complementary food;
- ✓ 57.46 per cent of respondents feed their children once a day;
- ✓ 71 per cent of respondents have not given birth to low-birth-weight babies;
- ✓ 51.10 per cent of respondents have not had children suffering from anaemia;
- ✓ 61.58 per cent of respondents cited severe malaria as the cause of anaemia.

Following a bivariate analysis of our results, we found that the following factors influence a history of anaemia: exclusive breastfeeding; complementary feeding; the age at which the child was weaned; the foods consumed in households; household size; marital status; the mother’s age; and occupation.

In light of these results and to address the study’s research questions, we confirm the initial hypothesis that the socio-demographic factors: the mother’s age, marital status, socio-economic factors (household size, occupation) and socio-environmental factors (food intake, food quality) underlie nutritional anaemia in children aged 0 to 24 months in the Kananga health zone.

Keywords: Factors, Explanatory, Anaemia, Nutritional.

Introduction

1. Background

Anaemia is a major public health problem, affecting mainly young children, pregnant and breastfeeding women, as well as adolescents and menstruating women (WHO, 2025). It is characterised by a lower-than-normal number of red blood cells or a lower-than-normal haemoglobin level in the red blood cells. Anaemia occurs when there is not enough haemoglobin in the body to transport oxygen to the organs and tissues. In severe cases, anaemia affects physical growth and the ability to perform physical work, and leads to cognitive and motor deficits in children; it can also cause problems in pregnant and breastfeeding women (WHO, 2019). It is a condition in which the number of red blood cells or the haemoglobin level is lower than normal. Haemoglobin is responsible for transporting oxygen; when there are too few red blood cells or they are abnormal, or when there is insufficient haemoglobin, the blood’s ability to transport oxygen to the body’s tissues is reduced. (WHO, 2024)

Anaemia can be caused by: poor diet, infections, chronic diseases, heavy menstruation, pregnancy complications and family history. It is often caused by a lack of iron in the blood. Anaemia in pregnant women increases maternal morbidity and mortality, postpartum haemorrhage and is a risk factor for foetal growth restriction. The WHO estimates that, globally, 40 per cent of all children aged between 6 and 59 months, 37 per cent of pregnant women and 30 per cent of women aged between 15 and 49 (of childbearing age) are affected by anaemia; this rate ranges from 20 per cent to 25 per cent in developed countries and rises to 56 per cent in developing countries (MARIE. C, 2019). The haemoglobin concentration thresholds used by the WHO for the diagnosis of anaemia are:

- ❖ In men: less than 13 g/dl
- ❖ In women: less than 12 g/dl
- ❖ In children: 11 g/dl (Palliative Medicine, 2021)

Anaemia is a reduction in the quality and quantity of red blood cells, a haemoglobin deficiency that causes sudden fatigue, dizziness, pallor (which can be very pronounced), or unexplained shortness of breath. (Gorzkowski.M, 2023)

Anaemia remains one of the most common conditions worldwide; according to recent estimates, it affects nearly 40 per cent of children under the age of five and one-third of women of childbearing age globally, with a disproportionately high prevalence in low- and middle-income countries, particularly in sub-Saharan Africa (WHO, 2023; STEVENS et al., 2022).

Currently, and according to the statistics, anaemia affects both developed and developing countries (MELGANI.Y, 2022).

Iron deficiency is one of the world's major nutritional problems. Anaemia is a widespread public health issue with significant consequences for both health and economic and social development. In Morocco, a study shows that the prevalence of anaemia is 12.2 per cent, whilst iron deficiency stands at 24 per cent. Younger children are twice as likely to be affected as their older counterparts, at 16.3 per cent compared with 7.3 per cent (HIOUI, M, 2007).

At the Benin Hospital Centre, a 2015 study indicates a prevalence of 41.43 per cent of children suffering from anaemia, with the prevalence of anaemia being significantly higher among children under 24 months of age. Furthermore, 55.8 per cent of children suffer from severe anaemia. The main cause of anaemia remains iron deficiency (78–80 per cent). Poor weaning practices and insufficient consumption of foods rich in bioavailable iron and fruit are thought to be the

factors contributing to the onset of nutritional anaemia within the study population (ABDOU, G, 2015).

2. Problem statement

Anaemia is one of the most common and complex nutritional and public health problems to be addressed globally. According to estimates by the World Health Organisation (WHO, 2023) and recent global epidemiological studies, anaemia now affects nearly 1.9 to 2 billion people worldwide, representing approximately one quarter (24.8 per cent) of the global population. The most vulnerable groups remain young children and women of reproductive age: globally, anaemia affects around 269 million children aged between 6 and 59 months, representing an overall prevalence of 40 per cent; 37 per cent of pregnant women and 30.7 per cent of women aged 15 to 49 (WHO,2023 ,2025). In response to this ongoing public health crisis, the World Health Assembly and the United Nations have set, as part of the Sustainable Development Goals (SDGs) for 2030, a global target to reduce the prevalence of anaemia among women of reproductive age by 50 per cent and to accelerate the reduction of iron deficiency among young children (WHO,2023 ,2025).

The leading cause of anaemia in France and worldwide remains iron deficiency. It is estimated that in the United States, as well as in Europe, 3 to 5 per cent of the population are iron-deficient, which, if left untreated, will lead to anaemia. Apart from insufficient intake, the causes of iron-deficiency anaemia are numerous and can be divided into two main categories: malabsorption or increased iron loss. In premenopausal women, a gynaecological cause must, of course, be investigated as a priority, whilst remaining vigilant for other causes of iron-deficiency anaemia, since in 34 per cent of cases it is not linked to a gynaecological cause. Similarly, in paediatrics, given the high iron requirements associated with growth, iron deficiency is more common and should raise suspicion of insufficient intake or iron malabsorption. The same applies during pregnancy, when iron requirements are increased and iron deficiency is exacerbated by blood loss during childbirth (LAURENT. A, 2009).

Anaemia is one of the most common and difficult-to-resolve nutritional problems worldwide. The WHO estimates that in 2011, anaemia affected around 800 million children in South-East Asia and Africa, with the highest proportion (62.3 per cent) coming from the African region. The World Bank estimates its prevalence amongst children in sub-Saharan Africa at 67.8 per cent, highlighting the urgent need to combat it and emphasising the importance of recognising its multifactorial aetiology, a prerequisite for the implementation of effective control programmes (WHO, 2011).

A prevalence study carried out in Lomé (Togo) involved 125 mother-newborn pairs. 48 per cent of mothers and 30 per cent of newborns were anaemic according to WHO thresholds. Three out of four mothers had at least one indicator of iron deficiency, which is the main determine of anaemia. 68 per cent had a folate deficiency, without any impact on haematological parameters (MARIE. D, 1992).

In the Democratic Republic of the Congo (DRC), national data reveal that 6 out of 10 children aged between 6 and 59 months (60 per cent) suffer from various forms of anaemia, with serious repercussions for their cognitive development and physical growth (EDS-DRC II, 2014). In the province of Kasai-Central, and more specifically in the Kananga health zone, this situation remains a cause for concern given local dietary habits and the low socio-economic status of households.

It is therefore appropriate to ask the following key question: What are the factors contributing to nutritional anaemia among children aged 0 to 23 months in the Kananga health zone?

3. Hypotheses

In response to the central research question, we put forward the following hypotheses:

a. General hypothesis:

Nutritional anaemia among children aged 0 to 23 months in the Kananga health zone is likely to have multiple causes, influenced jointly by the family's socio-demographic and socio-economic characteristics, complementary feeding practices and the presence of associated conditions (notably malaria).

b. Specific hypotheses:

- In terms of socio-demographic and socio-economic factors: The marital status of the head of household, the mother's occupation (particularly unemployment) and a large household size (4 to 7 people or more) are likely to be key factors increasing the risk of anaemia in children.
- In terms of nutrition and weaning practices: Early weaning (at 12 months), inappropriate complementary feeding or a diet consisting of a single food (predominantly plain maize porridge) and a household diet low in micronutrients of high biological value are thought to contribute significantly to the onset of nutritional anaemia.

- From a pathological perspective: Severe malaria is thought to be the major aetiological factor directly associated with episodes of anaemia in these children.

4. Objective of the study

a. General objective

- To describe the factors contributing to nutritional anaemia in children aged 0 to 23 months in the Kananga health zone.

b. Specific objectives

- To identify the factors contributing to nutritional anaemia in children aged 0 to 23 months;
- To determine the most common types of anaemia in children aged 0 to 23 months;
- To propose possible preventive measures to avoid anaemia.

5. Choice and significance of the topic

5.1. Choice of topic

Following a distressing observation made during our visit to Kananga General Hospital, where we encountered an alarmingly high proportion of children aged 0 to 23 months suffering from nutritional anaemia – a condition that poses a serious threat to the health and growth of children in this age group – we were motivated to choose this topic in order to understand this health problem and identify the factors contributing to this condition among children aged 0 to 23 months in the Kananga health zone, with a view to proposing some possible solutions.

5.2. Significance of the topic

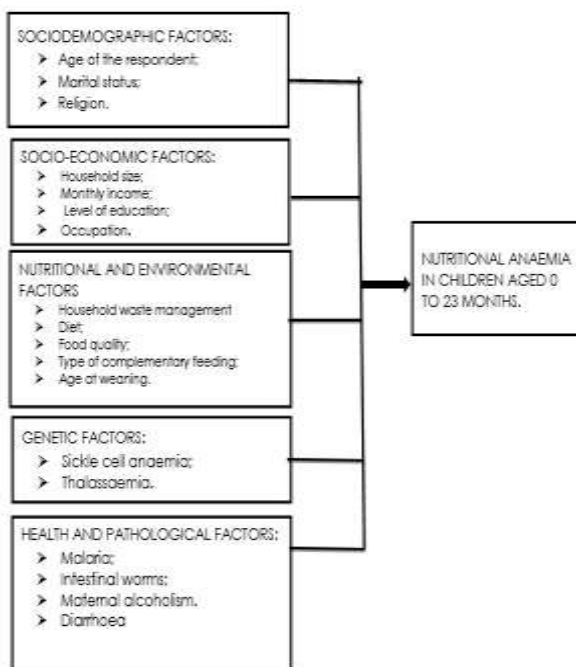
Our work aims to encourage decision-makers (the government of the Democratic Republic of the Congo) to strengthen measures for the nutritional management of anaemic children aged 0 to 23 months and to improve surveillance of this condition. It also aims to ensure that care services are properly equipped and established throughout the country, and more specifically in the province of Kasai Central, so that these services can monitor all children suffering from nutritional anaemia. This study will enable us to broaden our understanding of the factors contributing to nutritional anaemia in children aged 0 to 23 months

6. Scope of the study

Our research spanned a period of six months, from January to July 2025. The Kananga health zone served as the setting for our research.

7. Conceptual model of the study

In order to identify the factors contributing to anaemia in children aged 0 to 23 months, it is essential to construct a conceptual framework. The conceptual framework is a summarised representation comprising a set of explanatory variables and clarifying the causal or interactive links that govern the phenomenon under study.



CHAPTER I: Research methodology

I.1. Study setting

The Kananga health zone served as the setting for our study.

I.2. Target population

The target population for our study consists of all breastfeeding women with children aged between 0 and 23 months.

I.3. Scope and type of study

I.3.1. Field of study

Our study falls within the field of nutrition, dietetics and public health.

I.3.2. Type of study

This is a descriptive, cross-sectional study with an analytical focus, conducted in households using a quantitative approach.

I.4. Sampling and sample

I.4.1. Sampling technique

For our study, a three-stage probabilistic random sampling technique was applied to select the survey units.

The health areas comprising the Kananga health zone will be considered as 'clusters'.

- ❖ FIRST STAGE: Random selection (simple random sampling to select the 8 health areas within the Kananga health zone);
- ❖ SECOND STAGE: simple random sampling to select the neighbourhoods within each health area;
- ❖ THIRD STAGE: systematically select households in each selected health area, applying the sampling interval k calculated using the formula: $k = \frac{N}{n}$ (where N is the total population of households and n is the sample size).

I.4.2. Sample size

The sample size will be determined on the basis of a study conducted by COSTA KAZADI MWADIANVITA (2013) in the Department of Biomedical Sciences, Faculty of Medicine at the University of Lubumbashi in the Democratic Republic of the Congo, in the city and province of Lubumbashi, on <A study of anaemia among HIV-positive children who have not yet received antiretroviral treatment in Lubumbashi>. From this, he found that, overall, the prevalence of anaemia was 69.1 per cent.

Thus, the following formula will enable us to determine our sample size sample size (n).

$$n = \frac{Z\alpha^2 \times p \times q}{d^2}$$

light

Key: n
n: sample size
Za²: confidence interval (1.96)
q: margin of error
d²: degrees of freedom (0.05)

- ❖ P = 0.69
- ❖ q = 1 – p = 1 – 0.69 = 0.31
- ❖ za² = (1.96)²
- ❖ d² = (0.05)²

$$n = \frac{(1.96)^2 \times 0.69 \times 0.31}{(0.05)^2} = \frac{3.8416 \times 0.69 \times 0.31}{0.0025} = \frac{0.82171824}{0.0025}$$

$$= 328.7 \approx 329 \text{ to be surveyed}$$

To minimise the risk of bias and non-response, we add 10 per cent to n, which gives:

$$n = \frac{329}{10} = 32.9$$

Therefore, n = 329 + 32.9 = 361.9 ≈ 362 households.

n = 362 respondents

Health areas to be surveyed after sampling

No.	Health areas	Target population	Households to be surveyed
1.	KANANGA II	21,937	54
2.	20 MAY	20,401	50
3.	BIKUKU	20,261	50
4.	MALOLE	15,652	39
5.	MOBUTU	22,127	54
6.	SNEL	21,705	53

7.	KAWELE	11,789	29
8.	TUBULUKU	13,225	33
Total		147,097	362

1.5. Method and technique

1.5.1. Method

For our study, the survey method is used to collect data.

1.5.2. Technique

We used structured interviews, with a questionnaire administered to women breastfeeding children aged between 0 and 23 months in the Kananga health zone. The focus was on nutritional anaemia in this health zone.

1.5.3. Data collection tool

For our study, the survey questionnaire serves as the instrument for collecting the necessary information, alongside a literature review.

1.6. Data analysis plan

Following data collection, the data were analysed using EpiInfo software, version 7.3, and converted to Microsoft Word, version 2010.

Descriptive analysis was carried out by calculating measures of central tendency (mean, median) and simple frequency expressed as a percentage. The results were recorded in tables, followed by comments. Furthermore, comparative analysis was made possible by calculating the chi-squared statistic.

1.7. Ethical considerations

For reasons of ethics and professional conduct, we adhered to the Helsinki Declaration to ensure confidentiality in the collection and transcription of data; we used anonymous questionnaires; and we obtained consent from the health district authorities before collecting the data.

I.8. Inclusion and exclusion criteria

I.8.1. Inclusion criteria

- ❖ Being a woman breastfeeding children aged between 0 and 23 months;
- ❖ Living in one of the eight health zones within the Kananga Health Zone;
- ❖ Speak one of the survey languages (French, Tshiluba, etc.);
- ❖ Be present on the day of our survey;
- ❖ Agree to take part in our study and complete the questionnaire.

I.8.2. Exclusion criteria

Any participant who does not meet the criteria listed above is excluded from our study.

CHAPTER II: Results and discussion

II.1. Results

II.1.1. Univariate analysis

Table I: Distribution of respondents by age.

AGE in years	Number	Percentage
15–24	107	29.56%
25–34	147	40.61%
35–44	54	14.92%
45 and over	54	14.92%
Total	362	100.00%

Source: Our field surveys

This table shows that the 25–34 age group constituted the majority of our respondents, with 147 people, or 40.61 per cent.

Table II: Breakdown of respondents by marital status of heads of household.

Marital status	Number	Percentage
Married	267	73.76%
Single	61	16.85%
Divorced	34	9.39%
Total	362	100.00%

Source: Our field surveys

This table clearly shows that the majority of our respondents were married, with 267 cases, or 73.76 per cent.

Table III: Breakdown of respondents by occupation.

Occupation	Headcount	Percentage
Teacher	77	21.27%
Nurse	68	18.78%
Doctor	36	9.94%
Shop assistant	36	9.94%
Unemployed	129	35.64%
Other	16	4.42%
Total	362	100.00%

Source: Our field surveys

This table shows that approximately 129 out of 362 respondents were unemployed, representing 35.64 per cent.

Table IV: Breakdown of respondents by religion.

Religion	Number	Percentage
Catholic	166	45.86%
Protestant	68	18.78%
New Apostolic	68	18.78%
Muslim	20	5.52%
Other	40	11.05%
Total	362	100.00%

Source: Our field surveys

From this table, we find that 166 out of 362 respondents were Catholic, i.e. 45.86 per cent.

Table V: Breakdown of respondents by household size.

Household size	Number	Percentage
1–3	122	33.70%
4–7	144	39.78%
8 and over	96	26.52%
Total	362	100.00%

Source: Our field surveys

This table shows that the most common household size is between 4 and 7 members, accounting for 39.7 per cent, or 144 respondents out of 362.

Table VI: Breakdown of respondents by monthly household income.

Monthly income	Number	Percentage
25,000–50,000	21	5.80%
60,000–100,000	129	35.64%
110,000–200,000	120	33.15%
210,000	76	20.99%
More	16	4.42%
Total	362	100.00%

Source: Our field surveys

This table clearly shows that the monthly income for the majority of our respondents was between 60,000 and 100,000 Congolese francs, accounting for 35.64 per cent.

Table VII: Breakdown of respondents by food consumed in the household.

Foodstuffs consumed	Number	Percentage
Foufou with leafy greens	128	35.36%
Foufou with meat and green vegetables	60	16.57%
Foufou with greens and small fish	174	48.07%
Total	362	100.00%

Source: Our field surveys

This table shows that around 5 out of 10 respondents consume foufou with leaves and small fish in their household, i.e. 48.07 per cent.

Table VIII: Breakdown of respondents by frequency of food consumption in the household.

Frequency of food consumption in the household	Number of respondents	Percentage
1 time	165	45.58%
2 times	137	37.85%
3 times	60	16.57%
Total	362	100.00%

Source: Our field surveys

This table shows that most of our respondents consume this food once a day at home, with 165 cases, or 45.58 per cent.

Table IX: Breakdown of respondents by adherence to exclusive breastfeeding.

Exclusive breastfeeding	Number	Percentage
Yes	153	42.27%
No	209	57.73%
Total	362	100.00%

Source: Our field surveys

This table shows that 209 out of 362 respondents did not exclusively breastfeed their children, i.e. 57.73 per cent.

Table X: Breakdown of respondents by age at which children were weaned.

Monthly income	Number	Percentage
12 months	124	34.25%
15 months	92	25.41%
18 months	36	9.94%
24 months	110	30.39%
Total	362	100.00%

Source: Our field surveys

This table clearly shows that 124 out of 362 respondents wean their children at 12 months, i.e. 34.25 per cent.

Table XI: Breakdown of respondents by children's complementary feeding.

Complementary food	Number	Percentage
Foufou	112	30.94%
Maize porridge	113	31.22%
4-star porridge	16	4.42%
Imported porridge	80	22.10%
Other	41	11.33%
Total	362	100.00%

Source: Our field surveys

From this table, we find that the complementary food most commonly given to children is maize porridge, with 113 children, or 31.22 per cent.

Table XII: Breakdown of respondents by frequency of children's meals.

Frequency of children's meals	Number	Percentage
1 time	208	57.46%
2 times	113	31.22%
3 times	41	11.33%
Total	362	100.00%

Source: Our field surveys

This table shows that children are fed once a day, with 208 respondents, or 57.46 per cent.

Table XIII: Breakdown of respondents by the birth of a low-birth-weight child.

Birth of a low-birthweight child	Number	Percentage
Yes	105	29.00%
No	257	71.00%
Total	362	100.00%

Source: Our field surveys

This table shows that 257 respondents did not give birth to low-birth-weight babies, i.e. 71 per cent; conversely, 29 per cent of our respondents did give birth to low-birth-weight babies.

Table XIV: Breakdown of respondents by the child's history of anaemia.

Anaemia	Number	Percentage
Yes	177	48.90%
No	185	51.10%
Total	362	100.00%

Source: Our field surveys

This table clearly shows that 51.10 per cent of our respondents claim not to have caused their children to suffer from anaemia, whilst 177 respondents did cause their children to suffer from anaemia, representing 48.90 per cent.

Table XV: Breakdown of respondents by cause of anaemia.

Cause of anaemia	Number	Percentage
Recurrent fevers	36	20.34%
Severe malaria	109	61.58%
Other	32	18.08%
Total	177	100.00%

Source: Our field surveys

This table shows that, amongst our respondents, 109 subjects cited severe malaria as the cause of their anaemia, representing 61.58 per cent.

III.1.2. Bivariate analysis

Table XVI: Comparison of age, educational attainment, marital status, occupation and history of anaemia

Variables	Categories	History of anaemia		Total	X ²	Ddl	P-value
		YES	NO				
Age	15–24	80	27	107	15,929	2	0.015
	25–34	41	106	147			
	35–44	25	29	54			
	45 and over	31	23	54			
Total		177	185	362			
Level of education	No qualification	14	2	16	12,014	2	0.062
	Primary	121	24	145			
	Secondary	32	65	97			
	University	10	94	104			
Total		177	185	362			
Marital status	Married	98	169	267	42,095	3	0.000
	Celtiberian	52	9	61			
	Divorced	27	7	34			
Total		177	185	362			
Occupation	Teacher	17	60	77	10,019	2	0.004
	Nurse	9	59	68			
	Doctor	4	32	36			
	Sales assistant	16	20	36			

	Unemployed	124	5	129			
	Other	7	9	16			
Total		177	185	362			

The results in this table clearly show that for Age, the Chi-squared value is 15.929, $df = 2$ and the p-value is 0.015; for marital status, the Chi-squared value is 42.095, $df = 3$ and the p-value is 0.000; and for occupation, the Chi-squared value is 10.019, $df = 2$ and $P = 0.004$. In light of these results, we conclude that age, marital status and occupation have a e influence on a history of anaemia. Thus, there is a highly significant difference between the mother's age, marital status, occupation and history of anaemia.

Table XVII: Comparison between exclusive breastfeeding, complementary feeding, the child's weaning age, foods consumed in households and a history of anaemia.

Variable	Categories	History of anaemia		Total	X ²	Ddl	P-value
		YES	NO				
Exclusive breastfeeding	YES	6	147	153	40,091	2	0.022
	NO	171	38				
Total		177	185	362			
Supplementary feed	Foufou	94	18	112	18,024	2	0.005
	Boiled maize	62	51	113			
	4-Star stew	0	16	16			
	Imported boiled meat	1	79	80			
	Other	20	21	41			
Total		177	185	362			

Age at weaning	12 months	95	29		10,044	2	0.000
	15 months	72	20	18			
	18 months	09	27				
	24 months and over	1	109				
Total		177	185	362			
Food consumed in households	Bidia with foliage	78	50	128	11,012	3	0.003
	Bidia with meat and green vegetables	2	58	60			
	Bidia with greens and small fish	97	77	174			
Total		177	185	362			
Household size	1–3	28	84	122	26,082	2	0.001
	4–7	101	43	144			
	8 and over	48	48	96			
Total		177	185	362			

It can be seen from this table that for exclusive breastfeeding, the Chi-square value is 40.091, Ddl is 2 and the p-value is 0.022. For complementary feeding, the Chi-square value is 18.024, df = 2 and the p-value is 0.005. For the child's weaning age, the Chi-square value is 10.044, df = 2 and the p-value is 0.00. For 'Foods consumed in households', the Chi-square value is 11.012, df = 3 and p-value = 0.003; and for 'Household size', the Chi-square value is 26.082, df = 2 and p-value = 0.001. In light of these results, we conclude that there is a significant difference between exclusive breastfeeding, complementary feeding, the child's weaning age, foods consumed in households, household size and history of anaemia. Therefore, complementary feeding, the child's weaning age, foods consumed in households and

household size have a highly significant influence on a history of anaemia.

II.2. Discussion

II.2.1. Univariate analysis

1. By age

Our results showed that the 25–34 age group constituted the majority of our respondents, with 147 individuals, or 40.61 per cent. In contrast to a study conducted by SAMAILA ISSA IBRAHIM on the explanatory factors and prevalence of nutritional anaemia in children aged 0–59 months, which found that the child's age is significantly associated with anaemia (62.71 per cent).

2. Marital status of heads of household

Our surveys show that the majority of our respondents were married, with 267 cases, or 73.76 per cent. These results are consistent with those found in the 2021–2022 DHS survey, which found that the number of married people was 30, representing 48.10 per cent.

3. Occupation

The results in Table III show that approximately 129 out of 362 respondents were unemployed, representing 35.64 per cent. According to El HOUÏ in 2007, he found that the majority of fathers (92.9 per cent) and mothers (4.7 per cent) were manual workers, whilst 95.3 per cent of mothers and 8.7 per cent of fathers were not in employment. This may be explained by the fact that, in our community, people do not apply themselves to work, as well as by the nature of our province, which is an administrative centre where there are many bureaucrats; however, unemployment is also observed amongst a minority who lack formal qualifications.

4. Religion

The results in Table IV show that 166 out of 362 respondents were Catholic, representing 45.86 per cent. Our findings contrast with those of KONE A. et al., who reported that 336 pregnant women were Muslim, compared with 48 who were Christian. Furthermore, 105 out of 384 were Senoufos, representing 27.3 per cent, followed by the Peulhs at 25 per cent. This may be due to the large number of churches found in every corner of the DRC.

5. Household size

Our results showed that the most common household size was between 4 and 7 members, accounting for 39.7 per cent, or 144 respondents out of 362. These findings are consistent with those from the 2022–2023 EDS survey, which found that the average household size was 7 people, accounting for 58.15 per cent.

6. Household monthly income

The results in Table VI show that the monthly income for the majority of our respondents was between 60,000 and 100,000 Congolese francs, accounting for 35.64 per cent. According to the study conducted by ABYSINA M. in 2011 on risk factors for anaemia in children in the DRC, it appears that a low household economic well-being index is a risk factor for anaemia among children in the Democratic Republic of the Congo.

Children from poor households (4.85 per cent), rich households (6.62 per cent) and very rich households (14.07 per cent) are less likely to develop anaemia than their counterparts from poor households. Children living in households with a lower monthly income are more likely to suffer from anaemia than those from households with a higher income.

7. Foods consumed at home and their frequency

Our surveys showed that approximately 174 out of 362 respondents consume fufu with leafy greens and small fish at home, representing 48.07 per cent. This further highlights the problems of undernourishment or malnutrition, as the meals consumed are deficient in certain nutrients and are indicators of hunger. When we combine the factors of household size and monthly income, we can confirm that there are problems relating to the quantity and quality of meals in the households studied.

This is in line with the findings of JACQUES DIOUF, who, in his study on nutrition in the commune of LEMBA in Kinshasa, found that the nutritional status of the populations of Kinshasa, as well as those of the Congo, should be subject to ongoing monitoring. At the same time, our surveys have shown that most of our respondents eat one meal a day at home, with 165 cases, or 45.58 per cent. This is consistent with the findings of JACQUES DIOUF, who stated in his work that an unbalanced diet, meal frequency and the vagaries of the socio-economic crisis currently affecting these populations are all reasons to fear the onset of chronic protein-energy malnutrition and also expose certain groups of people to anaemia. Both caloric and protein intakes are found to be

deficient compared with the respective average standards of 23 calories per person and 78 per person weighing approximately 60–70 kg.

8. The importance of exclusive breastfeeding

Our study shows that 209 out of 362 respondents do not exclusively breastfeed their children, representing 57.7 per cent. These results corroborate those of ABDOULAYE G., who found in his study entitled ‘Mothers’ knowledge, attitudes and practices regarding exclusive breastfeeding’ that 60.8 per cent of his respondents did not practise exclusive breastfeeding, whilst only 39.2 per cent of respondents did. This is also a factor that exposes children to diarrhoeal diseases and to chronic and severe acute malnutrition, which are caused by a deficiency of the nutrients the body needs.

9. Age at weaning

The results of our study clearly showed that 124 out of 362 respondents weaned their children at 12 months, representing 34.25 per cent. These results do not align with WHO recommendations, which state that children should continue to be breastfed until 24 months or beyond. This remains a serious public health issue.

10. On complementary feeding for children and the frequency of meals

The results in Tables XI and XII highlight that the most common complementary food given to children is maize porridge, with 113 respondents (31.2 per cent); 208 respondents (57.46 per cent) reported that their children are fed once a day.

These findings are consistent with those of a study conducted by DIOUF. S in 2015 on the prevalence and determinants of anaemia in young children in French-speaking Africa – the role of iron deficiency – in which it was found that less than half of children regularly consume iron-rich foods, and only 12.6 per cent of them receive iron supplements; protein-energy and vitamin malnutrition contribute to the onset of anaemia.

11. On the birth of low-birth-weight children

Our surveys showed that 257 respondents had not given birth to low-birth-weight children, representing 71 per cent, whilst 29 per cent of our respondents had given birth to low-birth-weight children.

This may be explained by the fact that, amongst vulnerable groups, low birth weight is attributable, amongst other things,

to intermediate factors such as poor nutrition, a high prevalence of infections, pregnancy complications and unfavourable working conditions; which is why pregnant women require a specific diet given the demands placed on them.

12. The child's history of anaemia

Our studies have clearly shown that 51.10 per cent of our respondents stated that their children had not suffered from anaemia, whilst 177 respondents reported that their children had suffered from anaemia, representing 48.90 per cent. According to the study conducted by Charlotte NGUEFACK TCHENTE in 2016 on the prevalence and factors associated with anaemia in pregnancy at Douala General Hospital, it appears that the prevalence of anaemia among women with a history of anaemia during pregnancy was 62.2 per cent.

This may be explained by the fact that these women did not have time to correct their deficiency before their next pregnancy, either due to a diet low in iron and folate, intercurrent illnesses such as malaria, or a short interval between pregnancies.

13. Causes of anaemia

Our results in Table XV show that 109 subjects cited severe malaria as the cause of their anaemia, accounting for 61.58 per cent of cases. A study conducted by ABYSINA M. Soda in 2011 on risk factors for anaemia in children in the DRC shows that fever and diarrhoea are risk factors for anaemia in children in the DRC. Furthermore, children who had a fever within the previous two weeks had a 1.43 per cent and 8.74 per cent higher risk, respectively, of developing severe, moderate and mild anaemia compared with those with normal growth.

III.2. Bivariate analysis

1. Comparison of age, educational attainment, marital status, occupation and history of anaemia

The results of our surveys clearly show that:

- For age, the Chi-square value is 15.929, $df = 2$, and the p-value is 0.015.
- For marital status, the Chi-square value is 42.095, $df = 3$ and the p-value is 0.000.
- For occupation, the Chi-square value is 10.019, $df = 2$ and the p-value is 0.004.

In light of these results, we conclude that there is a significant difference between age, marital status, occupation and history of anaemia. Therefore, age, marital status and occupation have a very significant influence on the history of anaemia. Our results are similar to those found by Idrissa (2015, op. cit.), who demonstrated that age and educational attainment influenced a history of anaemia.

2. A comparison of exclusive breastfeeding and complementary feeding, the age at which children are weaned, the foods consumed in households and a history of anaemia

It is clear from our study that:

- For exclusive breastfeeding, the Chi-square value is 40.091, $df = 2$ and the p-value is 0.022.
- For complementary feeding, the Chi-square value is 18.024, $df = 2$ and the p-value is 0.005.
- For the child's weaning age, the Chi-square value is 10.044, $df = 2$ and $P = 0.00$.
- For 'Foods consumed in households', the Chi-square value is 11.012, $df = 3$ and the p-value is 0.003.
- For household size, the Chi-square value is 26.082, $df = 2$ and p-value = 0.001.

In light of these results, we conclude that there is a highly significant difference between exclusive breastfeeding, complementary feeding, the child's weaning age, foods consumed in households, household size and a history of anaemia. **Therefore, exclusive breastfeeding, complementary feeding, the child's weaning age, foods consumed in households and household size have a highly significant influence on a history of anaemia.** This contrasts with the study conducted by SAMAILA ISSA I (2014) on the factors explaining the prevalence of anaemia among children aged 6–59 months in Niger, where it was shown that only the child's weaning age and the foods consumed in the household had an influence on the history of anaemia.

Conclusion And Recommendations

Our study focused on 'Factors contributing to nutritional anaemia in children aged 0 to 23 months in the Kananga health zone'.

The aim was to describe the factors contributing to nutritional anaemia in children aged 0 to 24 months in the Kananga health zone. To achieve this, we set the following specific objectives:

- ✓ To identify the factors contributing to nutritional anaemia in children aged 0 to 23 months,
- ✓ To determine the most common types of anaemia among children aged 0 to 23 months,
- ✓ To identify possible preventive measures to avoid anaemia.

We employed a descriptive cross-sectional study with an analytical focus, using a questionnaire-based survey conducted via face-to-face interviews as the data collection tool.

Following the analysis and interpretation of the data, we obtained the following results:

40.61 per cent of respondents were in the 25–34 age group; 73.76 per cent of respondents were married; 35.64 per cent of respondents were unemployed; 45.86 per cent of respondents were Catholic; 39.7 per cent of respondents were in households of between 4 and 7 people; 35.64 per cent of respondents had a monthly income of 60,000–100,000 Congolese francs; 48.07 per cent of respondents consumed fufu with leafy vegetables and small fish at home; 45.8 per cent of respondents eat one meal a day at home; 57.73 per cent of respondents wean their children at 12 months; 31.22 per cent of respondents give their children maize porridge as a complementary food; 57.46 per cent of respondents feed their children once a day; 71 per cent of respondents have not given birth to low-birth-weight babies; 51.10 per cent of respondents have not had children suffering from anaemia; 61.58 per cent of respondents cite severe malaria as the cause of anaemia.

Following a bivariate analysis of our results, we found that the mother's age, exclusive breastfeeding, complementary feeding, the age at which the child was weaned, the foods consumed in households, household size, marital status and occupation are factors that influence a history of anaemia.

In light of these results and to address the study's research questions, we confirm the initial hypothesis that the socio-demographic factors: the mother's age, marital status, socio-economic factors: household size and occupation, as well as socio-environmental factors: exclusive breastfeeding, dietary intake and food quality, underlie nutritional anaemia in children aged 0 to 23 months in the Kananga health zone.

We therefore suggest the following:

a. To the Ministry of Public Health:

- To organise awareness campaigns on preventive measures and the appropriate course of action in the event of nutritional anaemia in children aged 0 to 23 months in the Democratic Republic of the Congo, and more specifically in the Kananga area;
- To train healthcare staff at all levels in communication techniques to improve the quality of nutritional advice given to parents of anaemic children.

b. To the public:

- ❖ To take children to health facilities for appropriate and organised care.
- ❖ To strictly adhere to preventive measures against anaemia in children in order to combat the condition.

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