



## Factors Associated with Severe Acute Malnutrition in Children 6-59 Months in the Nzaba Health Zone

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### Abstract

Acute malnutrition is a public health problem caused by a reduction in food consumption. It is a pathology that causes sudden weight loss or edema. It affects all age groups indiscriminately but more particularly preschool children. The general objective of this study was to determine the factors associated with severe acute malnutrition in children aged 6 to 59 months in the Nzaba health zone.

This study was of the transversal analytical type, which included a sample size of 423 subjects aged 6 to 59 months. The latter was calculated by the SCHWARTZ formula. SPSS version 20.0 and EPI info version 7.2.2 software. were used for data analysis and processing.

The following results were found: Age of the child, level of education of the mother, monthly income, exclusive breastfeeding, knowledge, lack of drinking water in the household, non-use of the mosquito net impregnated with insecticide, non-monitoring of SMC, vaccination status, and the presence of edema were factors associated with severe acute malnutrition in the Nzaba health zone.

To conclude, all social strata must be involved in the fight against malnutrition in order to safeguard the future of children. Parents must exclusively breastfeed their children until 6 months to effectively combat malnutrition and actively participate in activities based on the promotion of breastfeeding. In addition, household support policies must be taken to strengthen household livelihoods.

**Keywords:** Factors; Associated; Severe Acute Malnutrition; Nzaba

### Introduction

Malnutrition is a pathological condition resulting in an imbalance between the intake and the body's nutritional needs. It constitutes an underlying cause of deaths related to infectious diseases in children in developing countries, according to Louis W in 2015 [1,2].

Globally, 143 million children under the age of 5 suffer from malnutrition, including 20 million with severe acute malnutrition (SAM), according to Dembélé I, *et al.* in 2018. Approximately 10 malnourished children die every minute, amounting to nearly 5 million each year [3].

According to WHO in 2020, malnutrition is responsible for 45% of causes of infant mortality, particularly in countries where the healthcare system is fragile. Worldwide, the number of cases of chronic malnutrition is estimated at 155 million among children under 5 years old, with 39% recorded in Africa [4].

The distribution of malnutrition varies by geographic areas in Africa, particularly in sub-Saharan regions where prevalence ranges from 18% to 51%, according to Ndamobissi R in 2017 [5].

In Mali, the prevalence of chronic malnutrition is 24.1%, with 18.6% for underweight and 10% for acute forms, according to

EDSM in 2018. This prevalence shows significant variability depending on residential areas, ranging from 28.9% for chronic forms in Sikasso region to 11% in Bamako district and Kidal region [6].

Despite efforts made in screening and managing malnourished children, the situation of malnutrition remains mixed in Africa due to its multifactorial nature. It mainly arises from insufficient food intake and diseases, but certain factors also promote its occurrence, such as low dietary diversity, poor quality of health services, lack of hygiene, history of maternal malnutrition, and the socio-economic level of the family, according to Louis W in 2015 and Andre CC in 2018 [2,7].

In Niger, severe acute malnutrition among children aged 0 to 5 recurs almost every five years. It is characterized by periods of conjunctural exacerbation, notably the persistence of a nutritional emergency with a prevalence rate exceeding the intervention threshold of 10% and the emergency threshold of 15% [7,8].

In the DRC, according to the National Nutrition Program (PRONANUT), each year “160,000 children die in the Democratic Republic of Congo from malnutrition caused by physical and intellectual growth delays as well as poor dietary practices”. Malnutrition is a state of imbalance between the body’s energy needs and the actual intake of nutrients. It can be chronic or acute [9].

Among the five communes in Mbuji-Mayi city, three pose a real health problem with rates exceeding 10%. This is serious! For example, Bipemba commune has a rate of 13.2% for global acute malnutrition”, explained a nutritionist at the provincial coordination of Pronanut, Jean-Paul Kituadi [10].

The threshold above 10% for acute malnutrition is also observed in 14 out of 16 territories within the province. “Many children are dying from malnutrition. We have a societal problem in Kasai Oriental; the population has refused to engage in agriculture for diamond mining”, he added [4].

### Problem statement

The issue of malnutrition in Nzaba health zone remains a genuine public health concern. According to observations made in this

area, fifteen out of twenty-four children are malnourished. To address this suffering affecting particularly those aged between 0 and 59 months, socio-political and health-related factors would be very important. In light of this context, we pose the question:

- Does the income level of the household influence malnutrition?
- Does the quality of meals influence malnutrition?
- Does the quantity of meals influence malnutrition?

### Hypothesis

The risk factors for severe acute malnutrition in children aged 6-59 months in Nzaba would be related to characteristics of the parents, the child, and the households.

### Choice and interest

The choice to focus on this topic stems from an observation made in the commune of Bipemba, specifically in the Nzaba health zone. During our investigations, we noted several cases of malnutrition in different areas. It is with this perspective that we have chosen this topic to contribute to reducing morbidity and mortality rates due to malnutrition.

### Objectives

#### General objective

To determine the explanatory factors of malnutrition in children aged 0-59 months in the Nzaba health zone.

#### Specific objectives

- To describe the socio-demographic and socio-economic characteristics of parents and children aged 0-59 months in the Nzaba health zone;
- To determine the prevalence of malnutrition among children aged 0-59 months in the Nzaba health zone;
- To identify factors promoting malnutrition;
- To establish a link between intergenerational intervals and malnutrition;
- To highlight the most frequent type of malnutrition.

## Materials and Methods

### Material

#### Study framework



Figure 1: Mapping of the Nzaba health zone.

#### Geographical location

The Nzaba Urban Health Zone is located in the commune of Bipemba, town of Mbuji-Mayi, province of Kasai Oriental in the Democratic Republic of Congo.

The Nzaba Urban Health Zone is limited to:

- To the North by Avenue Inga which separates it from the urban health zone of Mpokolo,
- To the South, by the Kanshi River which separates it from the rural health zone of Tshishimbi,
- To the East by Kanshi Avenue which separates it from the Bonzola health zone,
- The west by the Nzaba River which separates it from the Mukumbi health zone,
- To the North-East by Dodome Avenue which separates it from the Bipemba health zone.

#### Socio-demographic situation

The NZABA Urban Health Zone supports a total population estimated at 347,517 inhabitants with the annual target birth of 13,901 children aged 0 to 11 months and surviving infants estimated at 12,128 children (0 to 11 months), over an area of 56 km<sup>2</sup>, Density of the population is 6206 inhabitants per km<sup>2</sup>.

#### Study population

The study population consisted of children aged 6-59 months.

#### Data collection tools

To properly collect the data we used a pre-established survey questionnaire.

## Methodology

### Type and period of study

This study was transversal analytical ranging from April 9 to August 9, 2024, i.e. 4 months.

### Inclusion criteria

Any parent with a child aged 6 to 59 months who consulted the CPS.

### Exclusion criteria

Any child not meeting the inclusion criteria will be excluded from this study.

### Sample size

To calculate the sample size of the present study, we used the SCHWARTZ formula.

$$n = \frac{Z^2 \times P(1 - P)}{d^2}$$

- n: sample size;
- Z: 95% confidence level (typical value set at 1.96);
- P: the proportion (50%) 0.50
- d: margin of error which is 5% (typical value of 0.05);

$$n = \frac{1.96^2 \times 0.5(1 - 0.5)}{0.05^2}$$

$$n = \frac{1.96^2 \times 0,50(1 - 0,50)}{0,5^2} = \frac{1,96^2 \times 0,069(1 - 0,069)}{0,05^2}$$

$$n = \frac{3.8416 \times 0,50(1 - 0,50)}{0.0025} = 384 = 384 + 38,4 = 422,4 \approx 423 \text{ children}$$

### Sampling technique

The four-stage probability sampling technique was used:

- At first stage we randomly selected 9 health areas out of the total in the Nzaba health zone;
- In the second degree the avenues;
- At the third level, the plots;
- In the fourth, households.

### Study variables

- Dependent variable
- Malnutrition
- Independent variables

### Characteristics of the mother

- Age
- Level of study
- Profession
- Religion

### Characteristics of the father

- Age
- Profession
- Level of study

Characteristics of the child

- Age
- Sex
- Weight
- Size

Household characteristics

- Access to drinking water
- Monthly income
- Number of daily meals
- Household size
- Vaccination schedule
- Type of malnutrition
- SOUL
- AMO
- IIG

Organization of data collection

To achieve reliable data collection, we used the field form at the faculty, we also used the signature of the head doctor of the Nzaba health zone, we trained the investigators on the method of data collection, everyone was in their collection area under the supervision of the researcher and a nutritionist, we identified the health centers which take care of malnourished children, took the consultation forms of these children, identified those who were malnourished and those who have not done so and based on the address that we found on the consultation form, and we went to the households to question the parents of these children.

Data processing and analysis

The data were encoded in Excel and analyzed using the epi-info software, the usual statistical parameters which were calculated are as follows:

- GOLD
- The confidence interval (95% CI)
- The mean and its standard deviation for quantitative variables whose distribution was normal
- The median and interquartile range for quantitative variables whose distribution was asymmetric.
- The sex ratio
- Frequency for qualitative variables.

Ethical considerations

Before the field investigation, we obtained research authorization from the authorities of the Official University of Mbuji mayi. A copy of the research certificate was given to the authorities of the Nzaba health zone, with a view to obtaining their favorable opinion

for carrying out this research. In addition, this study was carried out in strict compliance with the free consent of the respondents and the confidential treatment of the information collected. Everyone was informed that the survey was free and data collection was done anonymously.

Results

Sociodemographic characteristics of respondents

The majority of respondents with 181 out of 423 subjects or 42.8% had secondary education. Most of the mothers with 70 out of 423 cases or 74.5% had no profession, likewise the fathers of children with 158 out of 423 cases or 37.4% did not have a job. The majority of mothers with 366 out of 423 cases or 86.5% had married status. Many mothers of children with 128 out of 423 cases or 30.3% were under the age of 24. (Table I.a.)

Table I.a: Distribution of respondents according to socio-demographic characteristics.

		Effective (n = 423)	%
Mother's education level	None	94	22,2
	Primary	181	42,8
	Secondary	140	33,1
	Superior	8	1,9
Father's education level	None	70	16,5
	Primary	79	18,7
	Secondary	239	56,5
	Superior	35	8,3
Mother's occupation	None	315	74,5
	Trader	77	18,2
	Creator	4	0,9
	Pupil	10	2,4
	Teacher	6	1,4
	Student	5	1,2
	Official	5	1,2
	Housewife	1	0,2
Father's profession	Trader	109	25,8
	Creator	64	15,1
	Pupil	4	0,9
	Teacher	34	8,0
	Student	1	0,2
	Official	53	12,5
	None	158	37,4
Marital status of the mother	Bachelor	43	10,2
	Divorcee	6	1,4
	Bride	366	86,5
	Widow	8	1,9

**Table I.b:** Distribution of respondents according to socio-demographic characteristics.

		Effective (n = 423)	%
Age of mother	<24 years	128	30,3
	24 to 29 years	100	23,6
	30 to 34 years	70	16,5
	35 to 39 years	73	17,3
	40 years or older	52	12,3
Age of child	6 to 11 months	137	32,4
	12 to 23 months	133	31,4
	24 to 35 months	71	16,8
	36 to 47 months	43	10,2
	48 months or more	39	9,2
Father's marital regime	Monogamous	385	91,0
	Polygamous	38	9,0
Monthly income	Weak	333	78,7
	Average	89	21,0
	Great	1	0,2
Gender of child	Female	223	52,7
	Male	200	47,3
Number of children	Less than 5 children	261	61,7
	5 or more children	162	38,3
Household size	Less than 5 people	23	5,4
	5 peoples or more	400	94,6

Many mothers of children with 128 out of 423 cases or 30.3% were aged less than 24 years. The median age of mother was 28 ± 13 years with extremes ranging from 16 to 50 years. Most of the children were between 6 and 11 months old with 137 out of 423 cases or 32.4%. The fathers of children with 385 out of 423 subjects or 91% declared to be monogamous. Most households with 333 out of 423 subjects or 78.7% declared having a low monthly income. The majority of children with 223 out of 423 subjects or 52.7% were female with a ratio of 1.12. The majority with 261 out of 423 subjects or 61.7% had the number of children under 5 years old. Many households with 400 out of 423 cases or 94.6% had the number of people greater than 5, the average of which was 7.3 ÷ 2.2; with extremes ranging from 3 to 19 people (Table I.b).

**Factors associated with severe acute malnutrition in children aged 6 to 5 months**

The age of the child (p = 0.023), level of study of the mother (p = 0.000), were factors associated with malnutrition in children under 5 years old (Table II.a).

Monthly income (p = 0.034), sex of the child (p = 0.023), breast-feeding time after childbirth (p = 0.009), knowledge (p = 0.000), exclusive Martenel breastfeeding (p = 0.001), drinking water in the household (p = 0.000); use of LLIN (p = 0.004); type of withdrawal (p = 0.000); followed by SMC (p = 0.000) and vaccination status (p = 0.000) were factors associated with malnutrition in children under 5 years old (Table II.b).

Table II.a: Factors associated with severe acute malnutrition in children aged 6 to 59 months.

		MAS Effective (%)	OR [IC <sub>95%</sub> ]	p-value
Age of child	6 to 11 months	31 (79,5)	NA	0,023
	12 to 23 months	34 (79,1)		
	24 to 35 months	57 (80,3)		
	36 to 47 months	114 (85,7)		
	48 months or more	128 (93,4)		
Age of mother	<24 years	44 (84,6)	NA	0,713
	24 to 29 years	60 (82,2)		
	30 to 34 years	61 (87,1)		
	35 to 39 years	85 (85,0)		
	40 years or older	114 (89,1)		
Number of children Household size	Less than 5 children	227 (87,0)	1,218 [0,697 – 2,129]	0,488
	5 or more children	137 (84,6)		
Taille de menage	Less than 5 peoples or more	17 (73,9)	0,433 [0,163 – 1,147]	0,084
	5 peoples or more	347 (86,8)		
Mother’s education level	Superior	4 (50,0)	NA	0,000
	Secondary	118(84,3)		
	Primary	168 (92,8)		
	None	74 (78,7)		
Father’s education level	Superior	28(80,0)	NA	0,066
	Secondary	215 (90,0)		
	Primary	65 (82,3)		
	None	56 (80,0)		

Table II.b: Factors associated with malnutrition in children under 5 years old.

		MAS Effective (%)	OR [IC <sub>95%</sub> ]	p-value
Marital regime of the father	Polygamous	32 (84,2)	1,175 [0,469 – 2,944]	0,731
	Monogamous	332 (86,2)		
Monthly income	Weak	258 (85,6)	-	0,034
	Average	79 (88,8)		
Gender of child	Male	164 (82,0)	1,909 [1,088 – 3,350]	0,023
	Female	200 (89,7)		
Breastfeeding time after childbirth	One day after	9 (75,0)	NA	0,009
	Don’t know	2 (40,0)		
	Immediately	243 (88,7)		
	In the same day	14 (73,7)		
	Within an hour of birth	90 (84,1)		
Awareness	Sufficient	357 (87,7)	-	0,000
	InSufficient	7 (73,5)		
Exclusive breastfeeding	Yes	78 (76,5)	2,514 [1,413 – 4,475]	0,001
	No	286 (89,1)		



Type of withdrawal	Progressive	71 (74,7)	2,830 [1,584 – 5,057]	0,000
	Brutal	293 (89,3)		
Drinking water in the household	Yes	28 (60,9)	5,268 [2,682 – 10,348]	0,000
	No	336 (89,1)		
Use of the LLIN	yes	26 (70,3)	2,979 [1,383 – 6,415]	0,004
	No	338 (87,6)		
CPS monitoring	Yes	8 (47,1)	8,01 [2,955 – 21,715]	0,000
	No	356 (87,7)		
CPN monitoring	Yes	145 (87,3)	0,835 [0,471 – 1,480]	0,536
	No	219 (85,2)		
Vaccination status	Vaccination in progress	355 (87,2)		0,000
	Complete vaccination	4 (40,4)		
	Not vaccinated	5 (83,3)		
Edema	Yes	120 (92,3)	0,415 [0,203 – 0,848]	0,013
	No	244 (86,1)		

### Conclusion

In conclusion, the factors associated with malnutrition were non-compliance with the AME, age of weaning, access to drinking water, marital status, compliance with the vaccination schedule and income level.

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