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FACTORS ASSOCIATED WITH MALNUTRITION IN CHILDREN AGED ZERO TO FIVE IN THE SALA 2023 GROUPEMENT IN THE KWILU PROVENCE DWE SECTOR, DRC

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Abstract

Child malnutrition is a major public health problem in low-income countries. The aim of this study was to investigate the factors associated with malnutrition in children from birth to five years of age in the Groupement Sala, which is made up of eleven villages in the Provence of Kwilu in the Democratic Republic of Congo: Miah, Muyene, Kimputu, Molili, Mpukumlu, Sala Matadi, Sala Budimbu, Sala Mangaba, Sala Kitambo, Sala Père Père and Sala Wane. Among the 50 households surveyed and 60 malnourished people of all sexes and from all villages were identified, 34% of cases or 0.34Fr, distributed as follows: the villages of Miah and Muyene with 15 cases each, i.e. 25%, compared with 8 cases of malnutrition in Sala Wane, i.e. 13%, followed by Mpukulu with 7 cases, i.e. 11%, in descending order, Sala Kitambo, Sala Mpère-Mpère, Sala Budimbu, Kimputu, Molili, Sala Matadi and finally Sala Mangaba. The sample size, calculated using the Schwartz formula, was divided into 60 clusters. Data collected by observation and questionnaire survey were processed and analysed using Epi Info 7.2.2 and Emergency Nutrition Assessment (ENA) software. A child was malnourished if he or she suffered from at least one form of malnutrition. Associated factors were identified using stepwise logistic regression at the 5% significance level. 34% of the 60 children surveyed had taken colostrum at birth and 14% were still being breastfed. The main reason for stopping breastfeeding was weaning, at an average age of 21 ± 3.4 months. The fight against malnutrition in the Sala Group must involve parents as well as grandparents (guarantors of tradition), to bring about a change in nutritional behaviour in households. It will be complemented by the Integrated Management of Childhood Illness strategy, to be applied in health facilities.

Keywords: associated factors; children; malnutrition; raising awareness; Sala;

1. Introduction

Malnutrition is an unusual physiological condition caused by insufficient, unbalanced or excessive consumption of macronutrients (proteins, carbohydrates and fats) or micronutrients (minerals and vitamins). It is the result of a poor diet in terms of quantity and quality, but can also be the result of illness or an inappropriate lifestyle. According to the World Food Programme (2000), malnutrition can take the form of stunted growth (children who are too small for their age), underweight (children who are too thin for their age) or wasting (children who are too thin for their height). It is estimated that malnutrition is responsible for almost half of all child deaths and has lasting consequences for millions of survivors, such as infirmities, chronic vulnerability to disease and intellectual disability.

According to the United Nations (2015), despite a near halving of the proportion of malnourished children under five between 1990 and 2015, more than 90 million children under five, or one in seven, are underweight. In 2015, the proportion of underweight, stunted and wasted children was 15%, 25% and 8% worldwide, while in sub-Saharan Africa it was 21%, 37% and 9% (United Nations Children's Fund, 2015 ; Sand A, et al.2020).According to the latest survey conducted in December 2022 in our study area, the 2021-2023 Demographic and Health Survey revealed that 26% of children under five were chronically malnourished or stunted due to chronic health or nutrition problems. Van Den Broeck and colleagues, 1993 Malnutrition has multiple and varied causes, involving elements of a demographic, economic, social, cultural and biological nature. According to the literature, malnutrition can be influenced by the parents' level of education, the household's economic status, food security, the number

of children under five in the household, the child's age, sex and birth weight, sibling rank, measles vaccination, the duration of breastfeeding, the mother's body mass index and the child's illness (Rahman A et al. 2007; World Health Organization, 1988 ;Acf,2020). In response to the many factors that impact on nutritional status, measures to combat malnutrition are multidisciplinary and complex. These initiatives include the promotion of food security, the fight against poverty, the creation of protocols for the detection and management of malnutrition, and the Integrated Management of Childhood Illness (IMCI) strategy (World Food Programme, 2000; World Health Organization, 2007; Mérino M. 2008; UNICEF, 2019). The aim of this study was to investigate the factors associated with malnutrition in children aged between zero and five in the Sala Organisation. According to Tal D. A. (2001), the results will make it possible to explain the persistence of malnutrition in this grouping and help to reduce it.

2. Methods and Techniques

Our study was carried out in the Kwilu province, in the Democratic Republic of Congo, very precisely in the Bulungu territory within the Sala nutritional centre, in the Sala grouping, Dwe sector. This study was carried out in 11 villages in the Sala group, namely: the Miah village, the Muyene village, the Kimputu village, the Molili village, the Mpukulu village, the Sala matadi village, the Sala budimbu village, the Sala Mangaba village, the Sala kitambo village, the Sala Mpère Mpère village and the Sala wane village.

2.1. Sampling

Data were collected using a questionnaire administered to the mothers or childminders and by observation, using an observation grid. Weight, height and brachial circumference were measured using a "SECCA" brand scale, a "SHORR" brand measuring tape and a brachial perimeter, respectively. Children under the age of five were selected by sampling into four groups (village, home, household and children). From the 11 villages in the Sala cluster, 60 clusters were randomly selected according to village population, with the village as the cluster unit. Within each cluster, the first house was chosen at random, from the list of houses located in the direction indicated by the mouth of the bottle facing the centre of the village. When there were several households in the first house chosen in the cluster, the first household to be visited was selected by simple random choice from the list of all the households in the house. A household was defined as all the individuals living under the same roof and sharing the same meal. Where there were several children under the age of five in the household, only one child was interviewed; this child was selected by simple random selection from the list of all children under the age of five in the household. In a cluster, once the first child surveyed had been selected, houses were visited closely until the required number of children for the cluster had been reached. Using Schwartz's

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

formula :

n = minimum required sample size
Z = critical value corresponding to the confidence level (1.96 for 95% confidence)
p = estimated prevalence of malnutrition (in proportion, e.g., 0.20 for 20%)
d = tolerated margin of error (e.g., 0.05 for ±5%)

The sample size was calculated with a precision of 5% and a dominance of 34%, for the cluster effect of 2 and the non-response rate. In total, 60 children were used, distributed in households of 2%, which means that 30 children should be included in the sample.

2.2. Study variables

The anthropometric indices ‘height for age’ (= height/age), ‘weight for height’ (= weight/height) and ‘weight for age’ (= weight/age) were the dependent indicators of malnutrition. The independent variables considered in this study are grouped into several categories (age of the mother, feeding method (exclusive, mixed or artificial breastfeeding, frequency of the child's daily meals, access to drinking water (yes/no), hand hygiene practices (before feeding the child, after latrines, etc.), etc.). To this end, information on the child's height (in metres), weight (in kg) and age (in months) was provided.

Chronic malnutrition or stunting was indicated by the ‘height for age’ (T/A) index, which was classified as severe (T/A <-3 standard deviations (SD)), moderate (-3 SD ≤ T/A < -2) and no malnutrition (T/A ≥ -2 SD). The weight-for-height (W/H) index indicated the presence of acute malnutrition or

wasting, classified as severe (W/H <-3 SD), moderate (-3 SD ≤ W/H < -2) and no malnutrition (W/H ≥ 2 SD). Finally, weight-for-age (WFA) indicated underweight, which was classified as severe (WFA <- 3 SD), moderate (-3 SD ≤ WFA < -2 SD) and no malnutrition (WFA ≥ -2 SD). Any child with a z-score below -2 standard deviations was classified as malnourished, i.e. one of three types of stunting (severe and moderate), underweight (severe and moderate) and wasting (severe and moderate). (National Bureau of Statistics et Unicef, 2018)

2.3. Ethical and deontological aspects

The mothers of the children interviewed were given information about the aims of the study and how the data collected would be used. They gave their verbal, free and informed consent before the questionnaire was sent out. The data collected was preserved and used exclusively for the purposes of this study. They will not cause any harm to anyone.

3. Results

The sample consisted of 60 children under the age of five from eleven different villages.

3.1. Description of the sample

Table 1. Distribution of families of malnourished children in selected villages

N°	Village	Number of malnourished families	%
01	Miah	**15**	30
02	Muyene	10	20
03	Kimputu	2	4
04	Molili	2	4
05	Mpukulu	5	10
06	Sala matadi	1	2
07	Sala budimbu	2	4
08	Sala mangaba	1	2
09	Sala kitambo	4	8
10	Sala père – père	3	6
11	Sala wane	5	10
	TOTAL	50	100

Table 2. Characteristics of malnourished children by village and sex in the sala group (sala nutritional centre)

N°	Villages	G	%	FR	F	%	FR
01	Miah	10	27	0,27	5	21	0,21
02	Muyene	8	22	0,22	7	29	0,29
03	Kimputu	1	3	0,03	1	4	0,04
03	Molili	2	5	0,05	0	0	0
05	Mpukuu	5	13	0,13	2	8	0,08
06	Sala Matadi	0	0	0	1	4	0,04
07	Sala Budimbu	0	0	0	2	8	0,08
08	Sala Mangaba	1	3	0,03	0	0	0
09	Sala Kitambo	2	5	0,05	2	8	0,08
10	Sala Mpère Mpère	3	8	0,08	0	0	0
11	Sala Wane	4	11	0,11	4	17	0,17
	TOTAL	36	100	1	24	100	1

G : Boys ; FR : Frequency ; F: Girls

3.2 Household characteristics

The average household size was 6.1 ± 1.7 people, while in 17.6% of households, the average size was 6.1 ± 1.7 people.

3.3. Eating habits

With regard to feeding habits, 60, i.e. 34% of the children questioned, had consumed colostrum at birth and 14% continued to breastfeed. Weaning was the main reason for stopping breastfeeding, at an average age of 21±3.4 months.

3.4. Household food security characteristics

According to the two indicators used, it is clear that food insecurity exists among households in the Sala 2023 group. According to the 'perception of food security' criterion, 90% of households were faced with food insecurity, while the 'food consumption score' criterion indicates 75%. of the food security criteria used, only food consumption was associated with malnutrition. Food consumption is a composite score used as a proxy indicator of access to food (PAM,2011). The main economic activities carried out in the above villages, in order of importance, are agriculture, livestock farming, trade, handicrafts and the processing of food products. Agriculture comprises 65% perennial crops (oil palm, orange groves) and 45% annual crops (maize, groundnuts, cassava and cowpeas). In terms of health, the Sala Group has relatively good coverage in terms of health infrastructure, with all arrondissements having a public health center. The most common illnesses are malaria, diarrhea, parasites and pulmonary diseases.

3.5. Factors influencing malnutrition in children aged zero to five in the cluster

Following a univariate analysis, three elements, namely the child's gender, the presence of a specific disease and anemia, were linked to malnutrition in children under five in the Sala cluster in 2023.

4. Discussions

The translation of questions and answers or questions requiring memory, such as the estimation of the quantity of food, the time taken to put the newborn to the breast and the intake of colostrum, may lead to biases in the results of this survey.

In order to reduce these biases, the data was collected by the same pair of interviewers in all clusters in order to reduce biases related to taking measurements and translating questions from French into the local language and answers from French into the local language. In addition, UNICEF recommends the use of 'SECA' brand bathroom scales and 'SHORR' brand height gauges for anthropometric measurements. According to Judith and Brown (1987) and McDonald (2013), the prevalence of stunting in children aged zero to five in the Sala groupement is similar to that observed nationally in the DRC. This is the case for hypoglycaemia and acute malnutrition (wasting). The prevalence of stunting has decreased (33.1% in 2015) (Diawara F et al.2013; Pérez Moreno J et al.2019) compared with 34.0% in this study. Beneficial screening and nutritional recovery interventions in the Sala cluster could explain this decrease.

In contrast, wasting increased by 3.7% in 2015 (Diawara F et al.2013 ; ins et unicef. 2015) compared to 5.2% in 2015. According to the WHO, although this form of malnutrition is uncommon, it has a very high mortality rate (60%) if the child is not properly managed (Ernest, 2016 ; Paul Allison,2019). There is a need to improve the monitoring of weaning modalities during interventions to combat malnutrition in the commune. According to several authors, the child's sex has been identified as a factor linked to malnutrition (World Health Organisation 1988; Ernest, 2016; Mboumba H. 2010). The correlation between gender and malnutrition in children under the age of five could be explained by the culture that pays particular attention to male children, sometimes from birth. According to these traditions, boys are seen as the heirs and guarantors of the family's continuity, unlike girls. It is possible that this discrimination against girls justifies a disparity in child nutrition in favour of boys, which exposes girls to malnutrition. According to Mboumba, in Africa, gender preference for children differs between societies, and there is a disparity between the vulnerability of girls and boys to illness and death.

In societies where children are privileged, their gender has a considerable influence on their nutritional status. In these circumstances, there is a higher rate of malnutrition in girls than in men. According to Mboumba H. (2010), it has been shown that boys benefit from a better level of nutrition than girls, and that mothers invest more in the medical care of boys than girls. Chen and his colleagues also attribute these results to feeding practices and the distribution of food within the family, which favour the development of male children (World Health Organisation,1988; OMS,2019). There is a clear association between malnutrition and food insecurity, as the quantity and quality of food are influenced

by food security, which is defined as 'permanent access for all to the foodstuffs necessary to lead a healthy and active life' (Mérino M. 2008 ; Alphonse Nshimyiryo et al.,2019).

Several studies have highlighted this association (Sinnaeve O, 2006; Ajao et al 2010 ; Calixte Ida Penda et al.2028). According to Ajao et al (2010), it has been shown in Nigeria that in households where food insecurity is present, children under the age of five were five times more likely to be malnourished (OR=5.707, 95% CI=1.31-24.85). However, the food security indicator used was not specified. In this study, only the level of food consumption was linked to malnutrition among the food security indicators used. According to the World Food Programme (2011), food consumption is a composite indicator that substitutes access to food based on a seven-day recall of different food types/groups and their consumption frequencies.

Given the high agricultural productivity of the Sala group, our study area, we believe that food insecurity could be masking ignorance (under-information) about good nutrition within households. The reduction in household dietary diversification could explain the low consumption of dairy products and the lack of iron (anaemia). However, malnutrition can also lead to anaemia, which is a frequent comorbidity, as demonstrated by Yessoufou (Yessoufou A G, et al.,2025 ; McCarthy A et al,.2020) and Thakur N. et al. (2014). Finally, research shows that the association between low birth weight and malnutrition is in line with the literature (Avachat S S et al.2009; Penders C L et al.2011; Mukuku O et al.). According to Savadogo L.G.B et al (2026; Tomkins, A. 2000 ; Nguemo N.C 2019), these children are particularly vulnerable because their risk of morbidity is 40 times higher than that of children of normal weight. If households have already reduced their food consumption, it is clear that low-birth-weight children are exposed to malnutrition. Indeed, a reduction in household food consumption would certainly have an impact on the nutritional status of mothers, as well as on the quality of breastfeeding, which is essential for ensuring children's weight growth. However, 11.3% of these mothers had a chronic lack of energy.

5. Conclusion

In the Sala district, and particularly in the Sala health zone, malnutrition remains a major concern. There is a risk of entering a cycle of malnutrition from mother to child. Given the complexity of malnutrition and the factors associated with it, it is essential that everyone gets involved to find lasting solutions.

It is essential to integrate communication into strategies to combat malnutrition in order to encourage a change in nutritional behaviour within households. Not only mothers of children will be concerned by this communication, but also fathers, heads of household and grandparents, who are the guarantors of tradition. Its subject will be the diet of children under five and that of the whole family, with the emphasis on dietary variety and breastfeeding in all its aspects.

In addition, effective implementation of the IMCI strategy in health facilities would complement community actions to combat malnutrition. To prevent the rapid spread of this disease, nutritional surveillance must be strengthened and followed by nutritional screening, ideally across the entire health zone. Consequently, it is essential to continue raising public awareness on key issues related to nutrition, health, and hygiene to prevent the re-emergence of epidemic diseases. Efforts should also include integrating and sustaining activities to prevent acute malnutrition through essential nutrition actions and appropriate infant and young child feeding practices. In addition, strengthening food security initiatives to support families, establishing monitoring and evaluation systems for children at risk of malnutrition, and promoting programs that enhance food security through family farming, crop diversification, and improved market access are crucial

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