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RESEARCH ARTICLE

CULTURAL AND SOCIO-ECONOMIC FACTORS AND RISK OF PROTEIN-ENERGY MALNUTRITION, IN CHILDREN FROM 0 TO 59 MONTHS, ATTENDING THE GENERAL HOSPITAL OF BINGERVILLE (CÔTE D'IVOIRE)

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ABSTRACT

Protein-energy malnutrition is a major public health problem worldwide, particularly in developing countries. This work aims to determine the cultural and socio-economic risk factors of protein-energy malnutrition in children, from 0 to 59 months, attending the General Hospital of Bingerville (Côte d'Ivoire). The methodology is based on anthropometry. It thus gives ratios of weight for height (W/H), height for age (H/A) and weight for age (W/A) which respectively determine acute malnutrition, chronic malnutrition and global malnutrition. The results show that in a cohort of 129 children, aged 0 to 59 months, 5.22 % of children suffer from acute malnutrition, 14.78 % suffer from chronic malnutrition and 7.75 % are suffering from global malnutrition. It appears from these results that the nationality is linked to chronic malnutrition, the educational level of the mother is a risk factor of chronic and global malnutrition, and the type of housing is linked to the three kinds of malnutrition.

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INTRODUCTION

Malnutrition is clinically characterized by insufficient or excessive food intake of proteins, energy and micronutrients. It is usually associated with infections (WHO/FAO, 2006). These conditions reflect the status of nutrition security of a population, and occur mainly in children aged from 0 to 5 years (Briend, 1998). Malnutrition caused by nutrients deficiencies evolves from insufficient food intake, and can be due to deficiency of micronutrients and macronutrients. It is the cause of over a third of children death worldwide (Black, 2008). Protein-energy malnutrition (PEM) or macronutrient deficiency exists in three forms that are the acute, chronic forms and the overall shape. In the world, 805 million people suffer from various degrees of malnutrition, that is to say, one person over 9 (FAO, 2014).Worldwide, one child over three, under five years, suffers from protein-energy malnutrition (WHO, 2000). The severe form is estimated at over one billion people, 99% in developing countries, and 642 million of them in Asia and the Pacific (FAO, 2009). Child malnutrition is the cause of 6 million deaths annually. Children under 5 affected by underweight are around 146 million. 178 million victims have stunted growth.

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In Côte d'Ivoire, the latest national assessment of the nutritional status of children, under 5 years, showed 8 % of wasting, 30 % of stunted and 15 % of inadequacy weight (EDS, 2011-2012). The objective of this study is to determine the cultural and socio-economic factors, and the risk associated with PEM in children, from 0 to 59 months, attending the General Hospital of Bingerville (Côte d'Ivoire).

MATERIALS AND METHODS

Materials

The study is conducted in the pediatric service of the General Hospital of Bingerville (Côte d'Ivoire) from 1st to 31st August, 2014. The target population consisted of 129 children aged 0 to 59 months, composed of 65 females and 64 males. To determine the weight of children, two types of scales are used. Children who have not the ability to stand up are weighed using a baby scale (SECA, France) with an accuracy of 100 g. Another Scale (SECA, France) with a maximum range of 150 kg is used to weigh the tallest children. The weight of children who are very restless or who refuse to stand up is determined by the method of double weighing. A measuring rod of 150 cm long is used as instrument to measure the height of children. The height of children under 24 months is measured by lying them down. The measuring rod is placed on a flat, solid floor;

a technician holds the head of the child applied to the fixed end of the measuring board, and another maintains knees and right feet at the other end (the sliding part). For children of 24 to 59 months, the measuring rod is placed vertically against a wall; the child is standing, bare feet and straight. Whatever the position used, reading of the height is done at the nearest1/10 cm.

Methods

Cultural and socio-economic factors: The educational level of the mother, nationality, ethnic group and finally, the religion are considered as cultural factors. The variables selected for the socio-economic factors are daily food budget (daily cost), type of home, water and electrical equipments and the number of rooms in the house.

Characteristics used to assess nutritional status: The method used is that based on anthropometric measurements. The calculation of anthropometric characteristics is only possible if the sex, weight, height and age of the children are known. These anthropometric characteristics are: weight for height (W/H) used to search for acute malnutrition or wasting, height for age (H/A), to search for chronic malnutrition or stunting, and weight for age (W/A) for global malnutrition or underweight. These indexes are expressed in "z-score" and represent a standard deviation of the measurement of the children in relation to the median reference divided by the standard deviation of reference (WHO, 2006). The different types of malnutrition are identified according to the classification recommended by WHO (Prevel, 2006; Masson, 2007). Thus, regardless of the type of malnutrition (acute, chronic and global malnutrition), the moderate corresponds to a z-score threshold between -2 and -3 standard deviation of the median reference, and severe malnutrition is set when the value of the z-score is less than -3 standard deviation of the median reference.

Statistical analyses of data: The processing and analyses of data are made with the software "Epi Info", Version 3.4.5 and the version of November 2008 of "ENA" (Emergency Nutrition Assessment). The text is typed with "Word 2010". The graphics are made using "Excel 2010". Finally, the two Chi-Square test is used to analyze the different links. The level of significance is fixed at 5 %.

RESULTS

Cultural characteristics of children's mothers: The rate of illiteracy of mothers of surveyed children is very high, it is estimated at 62.8 %, against 37.2 % for those who are literate (Figure 1). For religious families, 70.5 % are Christians and Muslims represent 29.5 % (Figure 2). It is found that 79.8 % of these children are Ivorians, against 20.2 % non-Ivorians (Table 1). *Akan* group (Table 2) is represented by 44.7 %, which is the majority of ethnic groups. North *Mandé* people are less represented (8.7 %).

Socio-economic characteristics of children: One of the most important socio-economic characteristics is the daily household food budget. The daily budget allocated to food is between 1,000 FCFA and 3,500 FCFA for the whole family (Table 3). Children whose mothers use 2,000 FCFA for the daily market are the most numerous (47.3 %). Those mothers spending 1,000 FCFA represent 4.7 %, and children whose mothers spend at least 3,500FCFAper day are the least representative (1.6 %). For the type of housing, 37.2 % of children live in building apartments, 33.3 % in the villas and 29.5 % for those living in the neighborhood (Figure 3). It is also important to note the number of rooms of these types of housing and presence of all the equipments, that is to say, whether or not there are electricity and tap water. Most of these children (53.5 %) live in houses with three bedrooms and a living room (Figure 4).

Table 1. Distribution of children according to countries

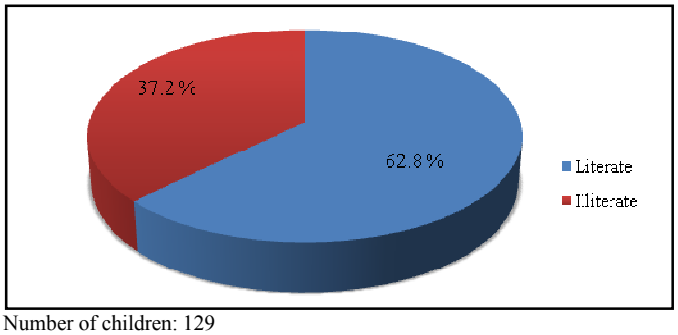
Nationality	Number of children	Percentage (%)
Ivorians	103	79.8
Other countries	26	20.2
Total	129	100

Table 2. Distribution of ivorian children according to ethnic groups

Ethnic groups	Number of children	Percentage (%)
Akan	46	44.7
North mandé	9	8.7
South mandé	17	16.5
Gour	14	13.6
Krou	17	16.5
Total	103	100

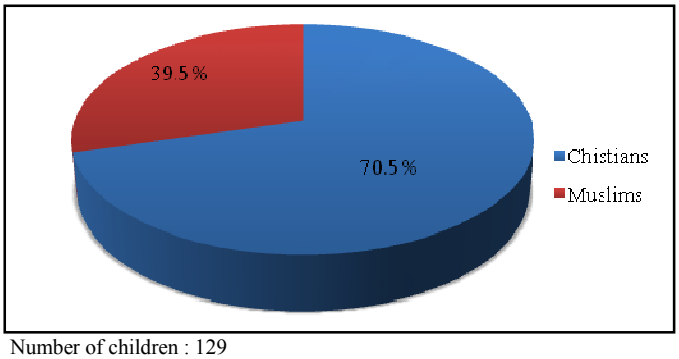
Table 3. Distribution of children according to family daily food budget

Daily food budget (FCFA)	Number of children per house	Percentage of children (%)
1,000	6	4.7
1,500	33	25.6
2,000	61	47.3
2,500	21	16.3
3,000	6	4.7
3,500	2	1.6
Total	129	100



Number of children: 129

Figure 1. Distribution of children according to the level of education of mothers

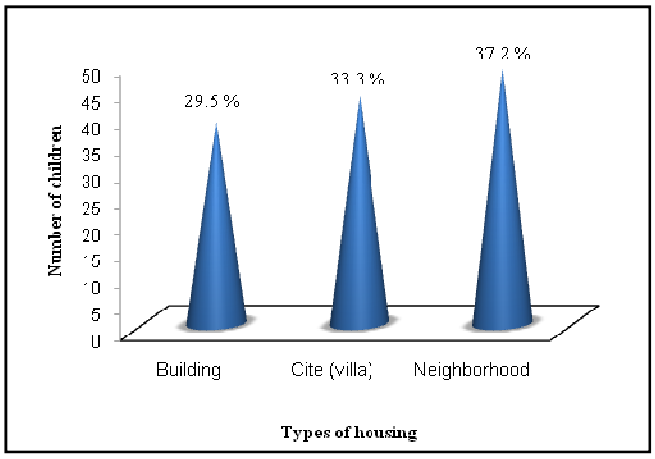


Number of children : 129

Figure 2. Distribution of children according to religions

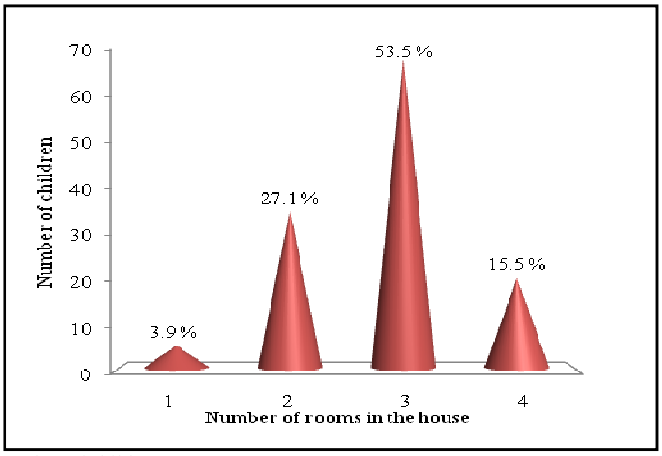
Table 4. Prevalence of malnutrition

Types of malnutrition	Absence of malnutrition >-2 z-score	Malnutrition		Total malnourished
		Moderate -3<z-score< -2	Severe < -3 z-score	
Acute malnutrition or emaciation (W/H)	109 (94.78%)	4 (3.48%)	2 (1.74%)	6 (5.22%)
Chronic malnutrition or slow growth (H/A)	98 (85.22%)	10 (8.69%)	7 (6.09%)	17 (14.78%)
Global malnutrition or underweight (W/A)	119 (92.25%)	7 (5.43%)	3 (2.32%)	10 (7.75%)



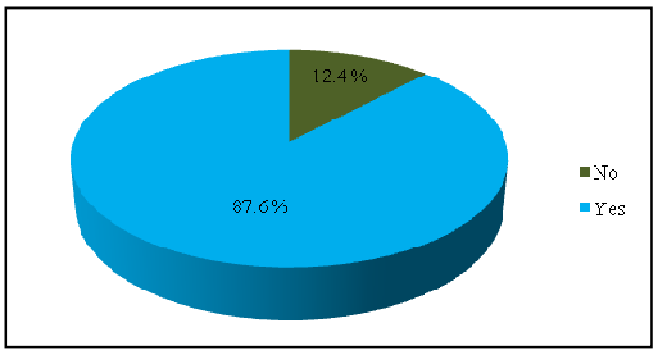
Number of children: 129

Figure 3. Distribution of children according to types of housing



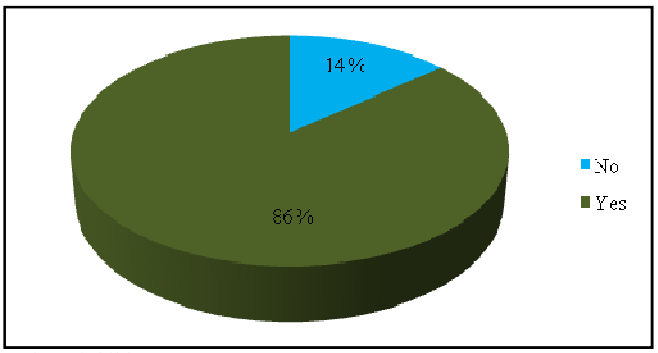
Number of children: 129

Figure 4. Distribution of children according to the number of rooms in the house



Number of children: 129

Figure 5. Electrical installation in the house



Number of children : 129

Figure 6. Tap water in the house

Only five, over 129 children live in individual room in these houses. Children who benefit from the presence of electricity represent 87.6 % against 12.4 % who don't have any (Figure 5). The tap water is used in 86 % of households against 14 % who do not use them (Figure 6).

Prevalence of malnutrition among children of 0 to 59 months: Children under 5 years old, attending Bingerville General Hospital, suffering from acute malnutrition or emaciation, with a prevalence rate estimated at 5.22 %, are less represented. Those with moderate wasting represent 3.48 %, against 1.74 % for the severe form. However, children are more affected by chronic malnutrition, with a prevalence that rises to 14.78 %, with 8.69 % as moderate, and 6.09 % in the severe form (Table 4). Underweight or global malnutrition, affects 7.75 % of children, with 5.43 % of these children suffering from moderate, against 2.32 % suffering from the severe form of global malnutrition. Throughout these three types of malnutrition, children are most affected by moderate than severe malnutrition.

Influence of cultural and socio-economic factors on malnutrition

Acute malnutrition: Table 5 shows that 13.6 % of non-Ivorians are acutely malnourished, against 3.2 % of Ivorian children. Among all the cultural factors, nationality of children is the only one that can significantly provoke malnutrition (P=0.05). Additionally, children under 5 years of informal settlements (neighborhoods, villas) are more emaciated than those living in cities, with rates of 12 % and 2.6 %. As a consequence, the type of housing, as a socio-economic factor, is significantly related to malnutrition (P = 0.04). All other factors are not related to any kind of malnutrition (P>0.05).

Chronic malnutrition: Table 6 shows that the educational level of mothers and nationality are important risk factor in this investigation (P = 0.004). Indeed, the prevalence of children suffering from stunted growth is estimated at 7.1 % for mothers literate against 26.7 % for illiterate mothers. Likewise for children of Ivorian nationality, with a rate of 10.7 % for ivorians and 31.8 % for non-Ivorian children (P = 0.01).

Table 5. Cultural and socio-economic risk factors of acute malnutrition

Variables		Malnutrition			p-value
		Yes		No	
		(n)	(%)	(n)	
Level of education of mothers	literate	2	2.8	68	0.16
	illiterate	4	8.9	41	
Nationality	Ivory cost	3	3.2	90	0.05
	Others	3	13.6	19	
	Akan	1	2.4	41	
	North mandé	1	6.7	14	
Ethnic groups	*South mandé*	0	0	8	0.65
	Gour	1	8.3	11	
	Krou	0	0	16	
Religion	christians	3	3.7	78	0.26
	muslims	3	8.8	31	
Daily food budget	< 2500 FCFA	5	5.5	85	0.76
	≥ 2500 FCFA	1	4	24	
	Building	0	0	34	
Type of housing	villa	1	2.6	38	0.04
	neighborhood	5	12	37	
Number of rooms	≤ 2 rooms	3	8.8	31	0.26
	> 2 rooms	3	3.7	78	

Number of children: 115

Table 6. Cultural and Socio-economic risk factors of chronic malnutrition

Variables	Modalities	Malnutrition			p-value
		Yes		No	
		(n)	(%)	(n)	
Level of education of mothers	literate	5	7.1	65	0.004
	illiterate	12	26.7	33	
Nationality	Ivory cost	10	10.7	83	0.01
	Other	7	31.8	15	
	Akan	4	9.5	38	
	North mandé	1	6.7	14	
Ethnic groups	*South mandé*	0	0	8	0.09
	Gour	4	33.3	8	
	Krou	1	6.2	15	
Religions	christians	11	13.6	70	0.58
	muslims	6	17.6	28	
Daily food budget	< 2,500 FCFA	9	10	81	0.006
	≥ 2,500 FCFA	8	32	17	
	building	4	11.8	30	
Types of housing	villa	2	5.1	37	0.02
	neighborhood	11	26.2	31	
Number of rooms	≤ 2 rooms	8	23.5	26	0.08
	> 2 rooms	9	11.1	72	

Number of children: 115

Table 7. Cultural and socio-economic risk factors of underweight

Variables	Modalities	Malnutrition			*p-value*
		Yes		No	
		(n)	%	(n)	
Level of education of mothers	literate	2	2.5	79	
	illiterate	8	16.7	40	0.004
Nationality	Côte d'Ivoire	6	5.8	97	0.10
	Others	4	15.4	22	
	Akan	2	4.3	44	
	North mandé	0	0.0	17	
Ethnic groups	*South mandé*	0	0.0	9	0.09
	Gour	3	21.4	11	
	Krou	1	5.9	16	
Religions	Christians	7	7.7	84	0.97
	Muslims	3	7.9	35	
Daily food budget	< 2,500 FCFA	8	8	92	
	≥ 2,500 FCFA	2	6.9	27	0.84
Types of housing	building	0	0.0	38	
	villa	3	7	40	0.04
	neighborhood	7	14.6	41	
Number of rooms	≤ 2 rooms	3	7.5	37	0.94
	> 2 rooms	7	7.9	82	

Number of children : 129

In the same table, children whose mothers spend more than 2,500 FCFA for the daily meal are chronically malnourished with a rate of 32 %, against 10 % for those whose parents are spending less. Daily food budget significantly remains a cause of malnutrition (P=0.006). Regarding the type of housing, the children from poor neighborhoods are affected by chronic malnutrition with a prevalence of 26.2 %, followed by 11.8 % for those living in the buildings and 5.1 % for children living in cities. The standing of housing has a significant influence on malnutrition (P=0.02). Other factors like number of rooms in houses, culture, and religion are not risk factors (P>0.05) for the occurrence of malnutrition.

Underweight: Table 7 shows that the educational level of the mothers affects underweight; and it's noted 16.7 % of malnourished children for illiterate mothers against only 2.5 % of mothers for literate, and the probability for this parameter is P=0.004. Considering the type of housing, no children living in a building is suffering from global malnutrition 0 %). On the contrary, 14.6 % of children from poor districts (neighborhood) are affected by this type of malnutrition and 7% are from cities (villas). The level of significance equal to P=0.04, for the effect of this risk factor on underweight. Underweight does not significantly affect (P>0.05) children exposed to other cultural (country, ethnic groups, religion) and socio-economic factors (daily food budget, number of rooms in houses).

DISCUSSION

From a cohort of 129 children who constitutes the study population, 5.22 % suffer from acute malnutrition with 3.48 % as moderate, and 1.74 % in the severe form. This prevalence is similar to that published by the Ministry of Health and Public Hygiene of Côte d'Ivoire (2008), after a survey, using the SMART methodology in Abidjan (5.2 % of acute malnourished children), and also that conducted in the mountain region, in the west of Côte d'Ivoire, by the Ministry of health and public hygiene (2010), (5.1 % of acute malnutrition), with 3.5 % in the moderate and 1.6 % in the severe form. Chronic malnutrition is the type of malnutrition which has the highest prevalence with a rate of 14.78 %, including 8.69 % for moderate and 6.09 % for the severe form. This value is close to that estimated at 13.1 %, in Abidjan, by the Ministry of Health and Public Hygiene (2010), but lower than that reported by Aké-Tano *et al.* (2010) in urban areas (16.7 %). Meanwhile, global malnutrition represents 7.75 % of the study population; its moderate form constitutes 5.43 % against 2.32 % for the severe form, while in 2010 it was estimated at 8.2 % in Abidjan. This difference is explained by the crisis in Côte d'Ivoire, in 2010. In terms of cultural and socio-economic factors, several parameters were investigated. And after the investigation, it appears that the daily food budget has no influence on the PEM. Mothers can use little money for the market, since they already have provision at home (a bag of rice, meat or fish, yams, bananas, *etc*.). Regarding the educational level of the mother, it was noted that illiteracy represents the largest proportion. The degree of significance p = 0.004 for stunting and underweight, means that the level of maternal education has a negative influence on both types of malnutrition. This was also reported by Aouehougon (2007) and Mukalay et al. (2010).Indeed, it's recommended that mothers acquire better knowledge on malnutrition, different types of food, as well as hygiene. The type of housing is also significantly associated with malnutrition. Thus, children living in shantytowns are exposed to diseases and infections because of the conditions in which they live (often without drinking water, no electricity, no toilet ...). This level of family life leads, in most cases, to malnutrition due to lack of money. This link between PEM and the type of housing is consistent with the survey of Fall (2011). The survey also showed that malnourished children are not Ivorian in majority. Therefore, there is a link between malnutrition and nationality, given that African populations immigrating in Côte d'Ivoire, especially the Burkinabe, Malians, Guineans are very poor. On the contrary, the parents' religion has no influence on the MPE. The results of the present study corroborate those reported by Amoikon *et al.* (2016).

Conclusion

In this study, it's noted that the MPE in all its forms, is a common disease in children from 0 to 59 months, and the moderate form is more common. Acute malnutrition is the only parameter which is a risk factor is the type of housing and nationality. Chronic malnutrition is entailed by the type of housing, the level of mother education, nationality and daily food budget. For global malnutrition, housing type and level of education of the mother are risk factors.

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