

Explanatory Factors for Severe Acute Malnutrition in 6 - 59 months of age Patients Admitted in the Therapeutic Nutritional Unit of N'Djamena, Chad

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Abstract:

Introduction: Globally Severe acute malnutrition (SAM) affects more than 29 million children under the age of five. Demographic and Health Survey and Multiple Indicators in Chad (EDS-MICS) of 2014-2015 survey found an acute malnutrition level of 13% out of which 9% was moderate and 4% was severe. The Causes of SAMs are multifactorial, relating to multiple domains such as society, culture, environment, education, livelihoods, agriculture, water, hygiene, etc. Despite this established evidence, the evidence of parental knowledge is unknown. **Objective:** The objective of our study was to determine the explanatory factors of SAM and its level of knowledge, understanding by the parents. **Materials and Methods:** A prospective descriptive study was conducted in 238 children aged 6-59 months admitted to therapeutic nutritional unit Alerte Santé of Ndjamen from November 15 to December 30, 2017. **Results:** During the study, the male sex (58.8%), the age group of 12-17 months (26.9%) and 6-8 months (24.4%) were the most represented and are the majorities in the urban area (72.3%). We were able to identify the various explanatory factors among which the level of education of mothers (62.2%), exclusive breastfeeding (2.3%), the food taboo (81%) are not insignificant. Malnutrition would be decompensated by the breakdown of food access (59%) and digestive diseases (74.8%) and respiratory diseases (73.5%). We found that parents have poor knowledge of malnutrition (87%). **Conclusion:** A good understanding of these main factors of malnutrition by parents might help to effectively combat severe acute malnutrition.

Key words: explanatory factors, Chad, children, severe acute malnutrition, therapeutic nutritional unit.

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Abbreviations: SAM, Severe acute malnutrition; EDS-MICS, Demographic and Health Survey and Multiple Indicators in Chad; DHS-MICS, Demographic and Health Survey and Multiple Indicators in Chad; MDG, Global Development Goal; TNU, Therapeutic Nutritional Unit; IUGR, intrauterine growth retardation; RUTF, ready-to-use therapeutic food; NGO, Non-Governmental Organization; UNA, Ambulatory Nutrition Units; MUAC, Mid Upper Arm Circumference; WHZ, Weight-to-Height Z-score.

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Introduction

Malnutrition is the commonest public health problem among children in low to middle-income countries. Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients [1]. In Children aged 6–59 months, severe acute malnutrition (SAM) is defined by a very low weight-for-height/weight-for-length (below -3z scores of the median WHO growth standards), or clinical signs of bilateral pitting oedema, or a very low mid-upper arm circumference (less than 115 mm). Globally SAM has affected 19 million children under 5 years of age, accounting approximately 400,000 child deaths each year [2]. In 2019, Africa and Asia have reported the greatest share of all forms of malnutrition. Almost 40% stunted and 69% of all wasted children under 5 years lived in Africa [3]. SAM is the main health problem in Chad as it is in other African countries. Almost one in eight children (13%) is acutely malnourished; out of them 9% in moderate and 4% in severe form, according to the Demographic and Health Survey and Multiple Indicators in Chad (DHS-MICS) 2014-2015 [4].

SAM is known to weaken the immune system, increasing children's susceptibility to diseases and death [5]. It is the underlying cause of more than 50% of infant mortality in Chad [6]. Risk factors associated with malnutrition include social and environmental factors such as poverty, poor education, limited health care access and contaminated environments [7-10]; along with living in areas with a high burden of infectious diseases, such as respiratory tract infections, diarrheal diseases [11], HIV and tuberculosis [9, 12]. Other risks include dietary factors, such as acute and chronic food insecurity [13], as occurs during famines, as well as suboptimal breastfeeding and suboptimal complementary feeding practices [14].

Malnutrition rates are high in the poorest families. A reduction in the prevalence of malnutrition would also contribute to the achievement of the Global Development Goal (MDG) aimed at reducing child mortality according to Demographic and Health Survey and Multiple Indicators in Chad of 2010 [15]. Although these causes are well documented, they are not necessarily known to parents. Their knowledge will have an impact on the prevention and management of this condition. This is the reason that motivated the present study in the Therapeutic Nutritional Unit (TNU) "ALERTE SANTÉ".

The present study aims to provide an idea of the parents' knowledge of SAM in children aged 6 to 59 months and the identification of the factors explaining SAM. In order to achieve our objectives, we determine the socio-demographic characteristics of the study population, Identify the triggers of SAM in children 6 months to 5 years old, and report the level of

knowledge of parents on SAM.

Material and methods

Design and population study

This was a prospective descriptive study over a period of 18 months from July 2017 - December 2018. The data collection was spread over a period of forty-five (45) days from November 15 to December 30 2017

Study population

The study included children (female and male) between 6 and 59 months of age with SAM and hospitalized during the study period.

Inclusion criteria

- (1) SAM Children between 6 and 59 months of age; hospitalized in the Therapeutic Nutritional Unit (TNU) of Alerte Santé during the study period; born at full term without intrauterine growth retardation (IUGR);
- (2) Having no identified somatic pathology (cancer, tuberculosis, congenital heart disease, HIV / AIDS etc.);
- (3) SAM children whose parents gave valid consent.

Non-inclusion criterion

- (1) All children aged under 6 months and over 59 months;
- (2) All premature infants and those with a known IUGR;
- (3) All SAM children with an identified somatic pathology (cancer, tuberculosis, congenital heart disease, HIV / AIDS, etc);
- (4) All SAM children readmitted to "TNU", Alerte Santé";
- (5) All SAM children whose parents did not consent

In our study, children admitted to UNT or UNA once previously for severe acute malnutrition were not included in the inclusion criteria because of the following reasons:

SAM patients with treatment failure may have an underlying pathology;

According to some parents interviewed, the child's illness would benefit the family. And some mothers cause diarrhea with a traditional decoction;

Child diagnosed with SAM cannot eat normally, ready-to-use therapeutic food (RUTF) is diverted for sale, allowing food to be purchased for family members;

In short, readmitted children are not included because there is unwillingness on the part of the parents for an investigation and proper care, whether medical, nutritional or psychological.

Study frameworks

The Nutritional and Therapeutic Unit (TNU) "ALERTE SANTE" located within the Chad-China Friendship Hospital (HATC) served as our study

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framework.

History and activities of the TNU "ALERTE SANTÉ"

TNU was created on April 13, 2013 by a national Non-Governmental Organization (NGO) called "ALERTE SANTÉ". The NGO is funded by ALIMA (The Alliance For International Medical Action) and ECHO (European commission Humanitarian Aid). Its goal is the care of severely acutely malnourished children with medical complications. It has four Ambulatory Nutrition Units (UNA) for outpatient monitoring of malnourished children without medical complications. These UNAs are: Atrone, N'djari, Madjorio, and Hilé houdjaj. They are headed by nurses. The UNAs refer children with malnutrition with medical complications to TNU.

TNU's activities run 24 hours a day, with three teams of nurses, nutritional assistant and hygienists rotating every eight hours. They give therapy, therapeutic milks, ready-to-use therapeutic foods to patients and keep the room clean. The consultation and the medical visit are made by the physicians. They decide the change in therapy, discharge and other medical decisions in the management of patients.

Data collection

Sampling: This was an exhaustive sample, met consecutively with children between 6 and 59 months of age hospitalized in the TNU of ALERTE SANTÉ structure for the duration of collections meeting the study's criterion.

Data collection technique: The data was collected on a pre-established form filled in using information collected during the interview and data from patient records.

Data was collected under following headings : the sociodemographic characteristics (age and gender); the religion; the age at onset of diversification; clinical factors (methods and duration of breastfeeding, and the vaccination status).

Sociocultural characteristics

We collected information about food taboos [16] which are in our case the statements from mothers: children don't consume vegetables and fruits; children don't eat eggs; children don't eat any meat or liver; and breastfeeding is harmful for newborn.

We assessed further information such as: the family income; the family planning; the hygienic conditions; the Parents' level of education; the occupation and marital status; and the knowledge of the disease by parents.

Clinical features

Related to the clinical features, we identified the types of SAM, and looked for medical complications that

triggered the admission of the patients. These medical complications are: malaria; respiratory infection; digestive infection; and measles.

Anthropometric measurement

We confirm the MAS diagnosis of the patients by measuring the Height, weight, MUAC (Mid-Upper Arm Circumference); this subsequently helps for the classification of malnutrition. The temperature of each patient is systematically taken before any consultation.

Measurements and tools used

The length of the patients is measured using a simple horizontal length scale and stadiometer [17], and weight is measured by using a standard weight machine. Children are labeled to have SAM when weight-to-height is below -3 standard deviation (SD) using the WHO child growth standards [18]. As recommended by the World Health Organization, a Shakir cuff is used to measure the Mid Upper Arm Circumference (MUAC) [19].

A WHO Weight-to-Height Z-score (WHZ) scale is used to evaluate the malnutrition [19].

We classified into marasmus, kwashiorkor, or marasmic-kwashiorkor (a mix of the two) the SAM.1 [20, 21].

The patient is identified as SAM type marasmus based on the WHO as having MUAC<115 mm or a WHZ<-3 [19]. The bipedal pitting edema was used in the identification of cases of edematous malnutrition or kwashiorkor [21, 22]. The edema is detected by pressing the skin, at certain parts (upper or lower limbs) of the children, then releasing to find out if there is a remaining dimple [21].

We used the thermometer to measure the temperature [23]: the child is considered febrile or pyrexial if the oral temperature taken exceeds 37.5°C (99.5°F) or the rectal temperature measured is more than 38°C (100.5°F).

Ethical considerations

We had an authorization from the dean of the Faculty of Medicine of the Bon Samaritain hospital. A research authorization was issued by the Chad-China Friendship Hospital (HATC) with the approval number of N°810PR/PM/MSP/SE/SG/HATC/SHG/SRH/2017.

The authorization approved by the Allerte santé referral physician, as well as the agreement of the supervisor at TNU and the heads of department before data collection has been obtained. Verbal consent was also obtained from the parents and accompanying persons.

Statistical analysis

We analyzed our results by using the Statistical Package for the Social Sciences (SPSS) software, version 20.0. IBM Corp. Released 2011. IBM SPSS

Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Descriptive statistics were used to summarize the data concerning the demographic characteristics and breastfeeding. Categorical variables (vaccination, uvulectomy, malnutrition types, medical complications, breastfeeding, weaning age, food diversification, educational level, profession, knowledge) were described by using frequency, percentages, and pie chart. The comparison of qualitative variables was performed by using a Chi2 test. The level of significance is less than 5 percent (0.05) and a 95% confidence interval is applied for variables that are normally distributed.

Results

Characteristics of the study population

The male sex was the most represented among study population (58.8%, 140/238) (sup table 1), favouring male sex with the sex ratio of 1.42. Most of the SAM children, 26.9%, were in the age group of 12–17 month (64/238) (sup table 1), followed by the age group of 6 - 8 month (24.4%, 58/238). The average age of SAM Children was 16.66 months.

The proportion of our study population who didn't have an immunization update is 63.9% (n = 152) (sup table 1).

We found in the study 89.92% (sup table 1) of malnourished children who had uvula removal.

Of the 238 patients in our sample, 202 (84.9%) (sup table 1) have SAM such as Marasmus. The difference is significant at 0.000%. The medical complications (sup table 1) diagnosed during hospitalization are respiratory diseases at 73.5%, digestive diseases at 74.9% followed by malaria at 20.2% of cases.

Characteristics of parents and family as a factor in malnutrition

The age of the parents: The majority of the mothers of these SAM children are between 19 and 25 years of age (91, 38.3%) followed by the age group between 26 and 30 years of age (60, 25.2%). More than half of the mothers of SAM children (64.4%) were between 19 and 30 years of age. The accompanying patients interviewed did not know the age of the patients' fathers in 73.5% of cases.

The educational level of the parents: Uneducated mothers and uneducated fathers are more represented, notably at 62.2% (n = 148) and 36.6% (n = 238). Uneducated mothers are twice as many as uneducated fathers.

Profession of the parents: A higher percentage of mothers are housewives with a percentage of 92.4% or 220 out of 238 cases.

Fathers who have a military profession are the most represented with 17.2% (n = 41/238) of cases, followed by the unemployed fathers that represented at 16.4% or 39/238 then mechanics/carpenters with

9.7% and 9.2% of motorcycle drivers.

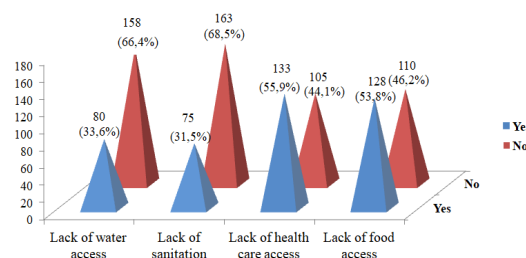


Figure 1: Distribution of patients according to sanitation, health care and food access, and potable water access.

Hygienic, primary care and food conditions

In our study population, more than half (figure 1) reported difficulty to health care access and finding food. Respectively 55.9% (n = 133/238) for lack of health care access and 53.8% (n = 128/238) for lack of food supply. Only a third (figure 1) of our study population reported a lack of drinking potable water and sanitation in their environment. The study found that only 13.04% (n = 18/238) of parents are aware of the malnutrition.

Combined influences of sex and age as factors of malnutrition

The structure by age group and sex shows that the study population of both sexes, male and female, were more represented in the age group between 6 to 8 months (sup table 2) and 12 to 17 months (sup table 2). This distribution is significant at 0.005%.

Influence of mother's education level on knowledge of malnutrition

Uneducated mothers do not know malnutrition in 98% (sup table 3) of the cases. Knowledge of malnutrition gradually increases as the level of education increases. It ranges from 2% in mothers with no education to 100% (sup table 3) in those with a higher level of education.

Knowledge of parents (or children accompanying persons) about malnutrition

Overall, only 13.04% (n = 18/238) of parents of the study population know malnutrition as a pathological condition. And 220/238 of them are unaware of malnutrition as an illness.

Influence of the father's education level on knowledge of malnutrition

The study found that 96.6% (n = 84/87) (sup table 3) of uneducated fathers do not have any idea of malnutrition and 32.1% (n = 9/28) (sup table 3) of

those who have completed college education know malnutrition.

Influence of the mother's profession on knowledge of malnutrition

There are about 37.5% (sup table 3) of student / student mothers and 100% (sup table 3) of commercial mothers that know malnutrition. The study found that almost all housewives (95.5%) (sup table 3) report not having any knowledge of malnutrition. The distribution is significant at 0.000%.

Influence of religion on knowledge of malnutrition

Christian parents knowledge of malnutrition is at 60% (n = 18/30) (sup table 4) and 2.5% (n = 5/198) (sup table 4) for the parents who have a Muslim religion.

Social factors unbalancing children's nutrition

Abrupt disruption of food access is by far the cause of the infant's dietary imbalance at 59% (141/238) (sup table 4) followed by parents' inter country move in 18.1% (43/238) (sup table 4) of cases.

Planning family

We found 92.4% (n = 220/238) (sup table 4) of children, in the study population, whose mothers have not used modern contraceptive methods in their marriage.

Influence of knowledge of malnutrition on breastfeeding modality

There is a significant difference of mothers who exclusively breastfed 66.7% (n = 4/6) (sup table 2) for knowledge of malnutrition.

Influence of knowledge of malnutrition on the weaning age of children

There are 66.7% (n = 12/18) (sup table 2) mothers who knew malnutrition and weaned their children between 18 and 23 months. There is not a significant difference (P = 0.11%) between knowledge of the disease and the age of weaning.

Influence of knowledge of malnutrition on knowledge on food diversification

More than half, 66.7% (n = 16/30) (sup table 2), of parents who have knowledge of diversification experience malnutrition. Almost $\frac{3}{4}$ (73.7%) of those who do not have knowledge of malnutrition do not know the right diversification with a significance of 0.001%.

Influence of knowledge of malnutrition on the food taboo

The food taboo does not depend on knowledge of malnutrition. This difference was not significant with Pearson's chi-square at 1.91 and p = 0.16%.

Influence of mother's occupation on breastfeeding

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modality

Mixed breastfeeding is representative among mothers in the household profession at 90.5% (199/220) (sup table 3). All student mothers (n = 2) breastfed exclusively. This difference is significant at 0.000%.

Influence of mother's level of education on adherence to the immunization schedule (sup table 2)

All mothers who have completed a college education 100% (n = 2/2) (sup table 2) and 76.9% (n = 30/39) (table 2) of mothers who have completed high school have an up-to-date vaccination schedule for their child. The majority of uneducated mothers do not have their child's vaccine calendar up to date, which is 73% (n = 108/148) (sup table 2).

Discussion

The sex of the child

In our study, we found 58.8% (n = 140) male and 41.2% (n = 98) female. There is a predominance of the male sex with an M / F sex ratio of 1.42. This difference is significant (p = 0.006%). This greater vulnerability of boys to malnutrition was identified by the Demographic and Health Survey and Multiple Indicators in Chad (EDS-MICS) 2014-2015 with a gender ratio M / F of 1.25 [4]. Henry W. et al. [24], analyzed sixteen Demographic and Health Surveys of countries in sub-Saharan Africa which reveal a high risk of malnutrition among boys.

The age of the child

In our study, the age group of 12-17 months is the most represented at 26.9% (n = 64), followed by the age group of 6-8 months at 24.4% (n = 58). Beyond the 18 to 23 month age group 17.7% (n = 42%), the rate of malnutrition gradually decreases to 1.3% (n = 3) at 59 months. This result could be explained by the diversification which is not done adequately and followed by abrupt withdrawal from maternal breastfeeding. In our study 47.5% (n = 113) diversified before the age of 6 months and the most represented weaning age group is 12-17 months at 34.45% (n = 82%) with a significant difference (p = 0.000%). Similar findings were also reported by Ekerette E et al, in Nigeria, who reported 31.5% as a rate of dietary diversity [25]. Before the age of 6 months many mothers introduce very liquid and poorly nutritious porridge, and family meals that are not suitable for this age group. However, children have high nutritional needs for their growth at this age [26]. The WHO and UNICEF (United Nations Children's Fund) recommend [27] : exclusive breastfeeding for the first 6 months of life; and introduction of nutritionally-adequate and safe complementary (solid) foods at 6 months together with continued breastfeeding up to 2 years of age or beyond. The high

malnutrition rate in this age group was found during the DHS-MICS [4] in Chad: respectively the prevalence reaches its 21% of peak at 12 to 17 months of age and gradually decreases beyond this age to 2% at 5 years of age. Huynh G et al. [28] in Ho Chi Minh City, Vietnam, also reported a higher incidence of malnutrition in children under 5 years old, with the highest incidence in those between 6 and 12 months of age.

Birth interval and family planning use

Our results show that the most common delivery interval is 36 to 47 months (26.5%). On the other hand, most of the families (92.4%) do not use modern contraception. This result could be explained by the fact that 71.4% of our patients that live in a single-parent household (either with the father only or the mother). This birth spacing will be due to the fact that the father and mother do not reside together. In the 2015 Chad Demographic and Health Survey, the birth space is 38% between 24 to 36 months and the use of modern contraception is 5% [4].

Food taboo

In our cohort 81% (n = 193) reported having taboos with at least one food, whether plant or animal, with a very significant difference at 0.000%. This was cited as a cause of malnutrition in the Qualitative Analysis of Causes of Malnutrition Survey in Kanem, Chad (29). An analysis of child malnutrition performed in 2013 in Burundi [30] showed that mothers of malnourished children follow cultural food taboos and breastfeeding compared to mothers of well-nourished children.

Uvula removal

The rate of uvula removal in our patients is 89.9%. This cultural practice is harmful for the health of children and can trigger malnutrition [31]. The 2015 MICS [4] survey in Chad found that around one in two children under the age of five (48%) have had their uvula removed. In just over one in two cases (53%), traditional practitioners performed this procedure [4].

Parents' level of education

The study shows that the parents of malnourished children are predominantly uneducated with a significance of 0.0000%. Uneducated mothers are at 62.2% (n = 148) and fathers at 36.6% (n = 87), followed by primary education level at 20.6% (n = 49) for mothers and at 26% (n = 62) for fathers. Our results are lower than those of Pravara NK et al. [32] who obtained 84.2% (n=123) of uneducated mothers with SAM children, but greater than those of YISAK H. et al. [33] who obtained 56.9% (n = 450) of uneducated mothers. This illiteracy for girls and women is cited as a determinant of undernutrition among under-five children in rural areas in India [34]. The analysis of

child malnutrition in a case control study in Nepal in 2017 [32] shows that secondary education in particular has a significant effect on reducing the number of stunted or underweight children.

The burden of the mother's education is of utmost importance in the care of the child. The way we feed, educate and care for children is mistakenly seen as a mother's role. Yet if the mother is not educated, it will be difficult for her to cope with this heavy task. This illiteracy for girls and women is cited as a determinant of undernutrition among under-five children in rural areas in India.

The profession of mothers

Housewives are more represented in our study with a percentage of 92.44% (n = 220) followed by the students with 5.88% (n = 14) of cases. The activity of mothers influences significantly (0.0000%) on the nutritional status of children. YISAK H. found a percentage of 72.4% of housewives and 10.9% of merchants in 2015 in Ethiopia [33].

The source of income for the head of the family

Globally, almost all of our patients come from a low socio-economic background. Parents are generally small employees or workers. Fathers who have a military profession are more represented at 17.2% followed by unemployed fathers at 16.4%, then mechanics/carpenters at 9.7% and motorcycles-drivers at 9.24%. YISAK H. in 2015 found that 71.2% were farmers and 10.9% were government employees [33]. The socio-economic level is a determining factor [30] of the nutritional status of children of the lower socio-economic class.

Breastfeeding

Regarding breastfeeding, we noticed in our study that only 2.5% (n = 6) breastfed exclusively. This result could well explain that breastfeeding improves the nutritional status of children [35]. Our result is lower than this of Seid A. et al., in northeast Ethiopia in 2017 [36], who found 51.4% (n=72) of mothers that did not exclusively breastfeed their children until 6 months of age. Breastfeeding has, Indeed, several health benefits resulting from the nutritional and bioactive components in human milk [37].

Vaccination

We found in our study 63.9% (n = 152) who had an outdated vaccination schedule. The same association has been documented for an hospital based analytic survey in Pakistan led by SAND A. et al. in 2018 who found that 47.6% of children with SAM had an incomplete vaccination status [38].

Vaccines decrease the risks of having an illness by working with the human body's natural defenses to make protection [39]. An unvaccinated child is at risk of getting sick, and the disease can lead to anorexia in

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the child. Therefore the child has a risk of malnutrition.

Access to child care and hygienic conditions

During our study, we observed the lack of drinking potable water at 66.4% and sanitation (use of a latrine and sanitary disposal of the child's faeces) at 68.5%. This difference is significant with the chi-square value at 25.6 and 32.5 and significance at 0.0000%. According to the results of a cross sectional study led by NIGUSU D., et al. [40] in Ethiopia in 2018, the source of drinking water for household was one of the main factors having an effect on nutritional status of under-five children; children who drank water from unprotected wells were 1356 times more likely to be underweight than children who drank water from pipe line. The predominance of lack of potable water and sanitation in our result is due to the limited level of knowledge on basic hygiene principles. Regarding the lack of access to health care and food in our study, we obtained 44.1% and 46.2% respectively. This difference is not significant with significance at 0.70% and 1.36%. This result could be explained by the fact that this study setting is in an urban area, where there are enough health care facilities and food. Only that there is a problem of family income for procuring these services.

Dietary factors decompensating malnutrition

Dietary factors are responsible for the decompensation of acute malnutrition [32]. Children need the right amount of food, and at the right time, to provide the body with the energy it needs and the micronutrients it needs [27]. But often factors such as abrupt weaning, abandonment of the child, the death of parents or illness can lead to disruption of access to food and decompensate the nutritional status of the child. In our cohort, 59% (n = 141/238) reported having a sudden loss of access to food due to the loss of work or the drop in income of the head of the household; 13.4% (n = 32/238) concerns the disease of the father and / or the mother. Since the fathers are workers and are paid according to their performance, once they are sick, they cannot afford the basic needs of the household.

Diseases

The dominant symptoms were respiratory symptoms at 84%, digestive symptoms at 80.7% and fever 58.4%. These symptoms lead to refusal to eat in 86.1% of cases. Acute malnutrition is correlated with episodes of diarrhea that have occurred in the previous two weeks. This illustrates the importance of hygiene promotion initiatives in preventing diarrhea. For the respiratory signs that are dominant, this could be explained by the study period that took place at the start of the dry season [41]. The medical complications diagnosed during hospitalization are respiratory (73.5%), digestive (74.8%) and malaria infections in 20.16% of cases. The lower percentage of malaria could be

explained by the study period. There are not enough mosquitoes in the dry season; the malaria transmission is higher in the rainy season [42].

Combined analysis between the factors of malnutrition and the lack of knowledge of malnutrition

We crossed the knowledge of malnutrition by parents and other factors that may explain malnutrition, namely: the profession and the level of education of the parents, religion, the method of breastfeeding, weaning, food taboo and the family planning. We have also crossed the factors that could explain the occurrence of malnutrition between them. All have a significance of less than 0.005% except the knowledge of malnutrition by the parents with the food taboo (P = 0.16%) and the weaning age of the children (P = 0.11%) which are not significant.

From the results obtained, we can see that these factors influence the occurrence of malnutrition in children aged 6 to 59 months in our study population.

The housewives do not have knowledge of malnutrition in 95.5% while the students have a good knowledge of malnutrition in 100% of cases. Knowledge of the disease increases with the level of education of mothers up to 100% for a higher level. Therefore, for a good knowledge of malnutrition, mothers must be educated.

The choice of breastfeeding, diversification and family planning depends on the parents' level of knowledge of malnutrition at 66.7%.

Although the causes of malnutrition are complex and multifactorial, knowledge of the disease itself and its determining factors may help in the fight against this condition.

Conclusion

The results of the study gave us guidance on the determinants of children's health that could explain severe acute malnutrition in our cohort. These determinants are multidimensional, complex and interdependent. They are relatively linked to the characteristics of the parents (level of education, profession, religion, lifestyle, etc.), of the household and of the environment. The nutritional status of children could be greatly degraded because of the low family income source, which leads to a lack of access to food (59.2%). This is due to a combination of factors such as: poor knowledge by parents of the adequate food supply of young infants and children (87.4%); the occurrence of acute diseases such as diarrheal diseases (74.9%), respiratory diseases (73.5%) and malaria (20.2%); and a lack of access to child care (44.1%) as well as problems related to a lack of hygiene (68.5%). A main problem is also linked to food beliefs and taboos (81.1%), and poor knowledge of malnutrition (87%) by parents.

At the end of this paper, we suggest a study on the level of knowledge of fathers and mothers of children under 5 years old, health care workers on the knowledge of malnutrition. A study with an aim to assess the health care workers' ways to pass the information about malnutrition to the community. This might result in a thorough understanding of malnutrition and its magnitude, for better management.

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