

# Management of Severely Malnourished Children Aged 6 - 59 Months Hospitalized in the Pediatric Ward of Kayanza Hospital/Burundi

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## Abstract

The implementation of WHO guidelines has significantly reduced hospital mortality due to severe malnutrition. Nevertheless, severe acute malnutrition in children under five remains a major public health problem in all low-income countries and is little studied. The study aimed to assess the nutritional status and quality of management of severe acute malnutrition in children aged 06 to 59 months hospitalized in the pediatric ward of Kayanza Hospital. This is a prospective study with descriptive and analytical aims over 6 months from February 10 to July 9, 2023. All children aged 6 to 59 months admitted for severe acute malnutrition are included in this study. The results show that the most affected age group is 12 to 23 months (42.55%). Marasmus is the most common clinical form, at 70.2%. Housewives and mothers from rural areas are the most affected, with rates ranging from 69.14% to 91.49%. The study shows that the reasons for consultation are respectively: edema (29.78%), diarrhea (26.59%), vomiting (19.14%), and fever (14.89%). Dehydration and hypothermia were the main complications observed in 45.74% and 22.34% respectively. Medical treatment was provided by antibiotics (44.68%), artesunate (31.91%), and resomal (21.27%). Nutritional treatment consisted of F75 100% milk and F100 100% milk. Pathologies observed were: anemia 38.29%, malaria 37.23%, urinary tract infection 12.7%, measles 11.7%. The national protocol for integrated management of acute malnutrition (PCIMA) was followed. This study shows that 72.3% of children were

successfully treated, with 9.5% dropping out and dying, and 8.5% not responding. We found that malnutrition remains a public health problem, affecting mostly children aged 12 to 24 months. The main complications or pathologies associated with malnutrition are diarrhea, malaria, and fever, and the majority of children suffer from marasmus.

## Keywords

Severe Acute Malnutrition, Child, Burundi

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## 1. Introduction

Malnutrition is a pathological state resulting from the relative or absolute deficiency or excess of one or more essential nutrients, whether manifested clinically or detectable only by biochemical, anthropometric or physiological analyses [1].

Child malnutrition remains a major public health challenge worldwide, particularly in sub-Saharan Africa [2]. During the first six months of life, adequate nutrition is essential for proper growth and the formation and development of the nervous system [1]. Giving every child, from birth, the best chances of survival and development is an essential condition for reducing the under-five mortality rate. Nearly 20 million children under the age of five suffer from Severe Acute Malnutrition. Most of them live in South Asia and sub-Saharan Africa [3].

Severe acute malnutrition can take several forms: marasmus (severe emaciation), kwashiorkor (oedematous malnutrition) or the mixed form. It is the stage of malnutrition where the risk of child mortality is highest [4]. According to the FAO (Food and Agriculture Organization of the United Nations) and the WHO (World Health Organization), malnutrition exists in one form or another in almost every country [5].

In Burundi, the prevalence rate of acute malnutrition is 4.5%. Severe malnutrition is extremely rare, at 0.5% nationwide. The groups most affected are those aged 6 to 11 months and 12 to 23 months. They are more affected than older children aged 24 to 59 months [6]. In Kayanza Province, the prevalence of stunting is 58%, which the WHO considers a serious nutritional situation, while the prevalence of wasting is mediocre at 6.5%. The consequences of malnutrition in children under five are high mortality and morbidity, retarded cognitive development and delayed psychomotor development, and are closely linked to the mother's nutritional status [6]. The aim of this study is to contribute to the promotion of public health through the management of severe acute malnutrition in order to improve the nutritional status of children aged 6 - 59 months.

## 2. Materials and Methods

Study design: This is a descriptive cross-sectional study conducted over a 6-month period from February 10 to July 9. Our study took place in the SST

(Service de Stabilisation Thérapeutique) of the pediatrics department of Kayanza Hospital, one of the hospitals in the Kayanza Health Province in the north of the country, which provides stabilizing care to severely acutely malnourished children referred to it from health facilities and other hospitals in the region.

The population: A total of 120 children were enrolled, but 94 children took part in the study. Mothers were interviewed using a specially designed questionnaire. The children were examined face-to-face or, if necessary, we went to repeat the measurements.

Anthropometric measurements: these were carried out during consultations in the triage department, in order to identify severely malnourished children and hospitalize them.

The following equipment was used:

For weight, we used an electronic scale with a digital dial capable of weighing from 1 kg to 150 kg,

For height, a height gauge was used by two people, and the legibility of the graduations was regularly checked. Up to the age of 24 months, children's heights were measured lying down. For children over 24 months, height was measured in the standing position. For brachial perimeter, a Shakir tape with an accuracy of 1 millimeter was used. The data collection method consisted in determining the degree of malnutrition using the new standard WHO Z-score table.

Nutritional treatment: during the consultation, the child was given ready-to-use therapeutic food (RUTF) and an appetite test was carried out. This test determined the amount of RUTF consumed by a child, based on body weight. If the test was negative, the child was treated on an outpatient basis; if the test was positive, the child was treated for therapeutic stabilization, often in children suffering from severe malnutrition. Initial treatment with F75 milk begins on admission and lasts an average of 3 to 4 days, until the child's condition stabilizes and appetite returns. It provides 75 kcal in 100 ml of milk, or 100 kcal in 130 ml. The second phase of treatment consists of giving F100 milk, 8 meals a day, for 3 days. This phase prepares the patient for outpatient treatment. Once appetite has returned, oedema has disappeared and at least 90% of the ATPE has been consumed, the child is ready for outpatient treatment.

Systematic treatment: oral amoxicillin was systematically used for all severely malnourished patients, even if they had not presented any symptoms of infection for 7 to 10 days. Resomal (Rehydration solution for malnourished children) is used to treat dehydration in severely malnourished patients. Artesunate has been used to treat malaria. Ethical considerations: Free and informed consent was obtained orally before starting to administer the questionnaire, in compliance with hospital regulations and the staff working there.

Inclusion and non-inclusion criteria: the study included all hospitalized severely malnourished children aged 6 - 59 months with complete medical records. The study did not include children aged 6 - 59 months admitted to the pediatric

department's ESS whose records were correctly completed, but whose mothers did not consent to participate in the study, or children whose records were incorrectly completed, and were not included in the study.

Data collection: data were collected from the children's medical records and the questionnaire. We collected epidemiological variables (sex, age, place of residence, marital status, profession and level of education of the mothers), diagnostic variables (type of breastfeeding, associated pathologies, age of introduction of feeding, weaning, reason for consultation, clinical forms of malnutrition, complications), therapeutic variables (systematic treatment, therapeutic milk) and evolutionary variables were studied.

Statistical processing and analysis: the data obtained were recorded in the form of a questionnaire, then tabulated manually and entered into Excel. After exporting the data from Excel to SPSS version 25, the data were processed and analyzed, and the results presented in tables with calculated percentages and mean values.

Ethical considerations: Free and informed consent was obtained verbally before starting to administer the questionnaire, in accordance with hospital and staff regulations.

### **3. Results**

#### **3.1. Socio-Demographic Characteristics of Respondents**

During the study period, 94 hospitalized children aged 6 - 59 months suffered from severe acute malnutrition. Females predominated, with a rate of 55.31%, while children aged 12 - 23 months accounted for 42.55%, those aged 6 - 11 months for 17.02%, and those aged 24 - 59 months for 40.42%. Moreover, 91.49% of the children were from rural areas. The under-20 age group was the most representative, at 38.29%, 72.34% of mothers were not in school, 71.27% were married, 69.14% were housewives and 69.14% lived in agriculture as an income-generating activity (**Table 1**).

#### **3.2. Mothers' Knowledge and Feeding Practices for Children Aged 6 - 59 Months**

Of 94 severely malnourished children, 20.21% were exclusively breastfed, while 77.66% had benefited from mixed breastfeeding. Seventy-two percent had the parasitic form and Kwashiokor had 30.8%. Severe acute malnutrition with edema was the most common form observed in our series. The main pathologies associated with malnutrition were diarrhea (44.6%), vomiting (23.4%), fever (9.5%) and severe malaria (22.3%). Medical management was specific to each associated pathology. The majority of mothers had introduced food at 6 months (54.26%) and (53.2%) had weaned during the 12 - 23 month period (**Table 2**).

#### **3.3. Characteristics of Children's Health Severe Acute Malnutrition**

The study showed that at the time of consultation, the reasons were respectively:

edema at 29.78%, diarrhea at 26.59%, vomiting at 19.14%, and fever at 14.89%. Dehydration and hypothermia were the main complications observed at 45.74% and 22.34%. Medical treatment was provided by antibiotics 44.68%, artesunate 31.91% resomal 21.27%. Nutritional treatment consisted of F75 100% milk and F100 100% milk. Pathologies observed were: anemia 38.29%, malaria 37.23%, urinary tract infection 12.7%, measles 11.7%. The evolution of malnourished children showed that 72.3% were successfully treated, 9.5% dropped out and died, and 8.5% did not respond (**Table 3**).

**Table 1.** Socio-demographic characteristics of respondents.

Variables	Workforce	%
<b>Child: SEX:</b> Female	52	55.31
Male	42	44.69
<b>Age:</b> 6 - 11 months	16	17.02
12 - 23 months	40	42.55
24 - 59 months	38	40.42
<b>Residence:</b> urban	8	8.51
Rural	86	91.49
<b>Mothers Ages:</b> under 20	36	38.29
21 - 30 years	30	31.91
31 - 40 years	8	8.51
Over 40 years	10	10.63
<b>Marital status:</b> married	67	71.27
Divorced	20	21.27
Separate	8	8.51
<b>Profession:</b> housewife	65	69.14
Retailer	19	20.21
Civil servant	10	10.63
<b>Level of education:</b> no schooling	68	72.34
Primary	12	12.76
Secondary	13	13.82
Superior	1	1.06
<b>Income-generating activities</b>		
Agriculture	65	69.14
Trade	17	18.08
Crafts	12	12.76

**Table 2.** Knowledge and practice of feeding children aged 6 - 59 months.

Variables	(n = 94)	%
<b>Types of breastfeeding</b>		
Mixed breastfeeding	73	77.66
Exclusive breastfeeding	19	20.21
Breast-feeding	2	2.12
<b>Type of malnutrition</b>		
Marasmus	66	70.2
Kwashiokor	29	30.8
<b>Pathologies observed</b>		
Diarrhea	42	44.6
Vomiting	22	23.4
Fever	9	9.5
Severe malaria	21	22.3
<b>Knowledge of supplementary feeding</b>		
<b>Age of food introduction</b>		
Before six months	31	32.98
At six months	51	54.26
After six months	12	12.77
<b>Weaning the child:</b>		
before 11 months	20	21.2
12 - 23 months	50	53.2
24 and more	24	25.6

**Table 3.** Child health—severe acute malnutrition.

Variables	Workforce	%
<b>Reason for consultation: diarrhea</b>		
Edema	25	26.59
Fever	28	29.78
Vomiting	14	14.89
Cough	18	19.14
<b>Associated complications: dehydration</b>		
Hypothermia	14	14.89
Severe anemia	43	45.74
Hyperthermia	21	22.34
<b>Medical treatment: antibiotics</b>		
Artésunat	18	19.14
Resomal	12	12.76
<b>Medical treatment: antibiotics</b>		
Artésunat	42	44.68
Resomal	30	31.91
	20	21.27

**Continued**

<b>Nutritional treatment:</b> F75	94	100
F100	94	100
<b>Associated pathologies:</b> anemia	36	38.29
Malaria	35	37.23
Urinary tract infection	12	12.7
Measles	11	11.7
<b>Patient progress;</b> successfully treated	68	72.3
Abandon	9	9.5
Non-respondent	8	8.51
Deaths	9	9.5

**4. Discussion**

This study aims to contribute to the promotion of public health through the management of severe acute malnutrition to improve the nutritional status of children aged 6 - 59 months.

In our study, the predominant sex was female (55.31%). The same result was found in the study by Traoré *et al.* in Mali [4] and Dicko A [7] contrary to the results of the study by Mwanza *et al.*, who found a predominance of the male gender in the DRC [8] and Yalcouye in Mali [9].

The predominant age group of children was 12 - 23 months, 42.55%. Nevertheless, this result is much lower than the national value of 62.2% [6]. However, this predominance was also found in Traoré F [4] (58.50%). This could be justified by the fact that this age group corresponds to the period of rapid growth and weaning of children. The meals offered by mothers during this period could be sufficient in quantity and quality to cover the children's Growth needs.

In this study, the majority of mothers were housewives, uneducated, married, and from rural areas 69.14%, 72.34%, 71.27%, and 91.49%. These results were similar to those found by Camara *et al.* in their study with proportions of 65.22%, 69.57%, 91.30%, and 72.26% [10]. It was also found by de Dicko in Mali with 72.9% of mothers not attending school and Traoré *et al.* with 61.6% of housewives and a rate of married mothers well above 99% [4].

According to our study, most malnourished children were mixed breastfed (77.66%), compared with 20.21% exclusively breastfed. These results are similar to those of Kabore *et al.* 58.73% of malnourished children were mixed breastfed [11]. Cissouma *et al.*, who reported in their study that 17.46% of malnourished children were exclusively breastfed [1].

In our study, the majority of malnourished children had a marasmus form 70.21% and kwashiorkor 30.85%. Inadequate food intake (in terms of both quality and quantity) is at the root of development. This result is lower than those of Coulbaly M's 96.2% marasmus and 2.8% kwashiorkor [12] and Keita's 83% ma-

rasmus and 10% kwashiorkor [5]. Maiga *et al.*'s study found similar results: 73.74% marasmus and 11.87% kwashiorkor [13]. This situation could be explained by the fact that marasmus results from protein-energy deficiency, as the majority of children come from low-income families with a deficient diet.

In this study, the main pathologies associated with malnutrition were fever, vomiting, diarrhea, and malaria, with 70.21%, 69.14%, 65.95%, and 59.57% of cases respectively. These results had been found by other authors Camara *et al.* in a study of 64.13% diarrhea, 72.83% vomiting, and 78.26% fever [10]. This result is close to that of Santiago, who found 50.35% of cases associated with malaria [14]. Malnutrition is often associated with infections due to a weakened immune system, which can lead to fever and diarrhea.

In this study the majority of mothers had been introduced to food at six months 54.26% this rate was similar to that found by Mavuta *et al.* (63%) [15]. Diallo's study also found the result close to 60% [16] and the family dish before 12 months 60.64%. According to WHO and UNICEF recommendations, complementary foods should be introduced at 6 months with continued breastfeeding and one author Tafese found in his study results close to those of this study 52.6% [17]. Halima's study also found that 60.4% of mothers introduced family meals before 12 months [18]. This practice is no longer in line with WHO recommendations, as it does not provide children with all the nutrients they need for their growth and psychomotor development. The study showed that 61.70% of children had benefited from irregular meals. Nevertheless, this result was similar to that found by Loukoula *et al.* in their study 59.1% [19]. Gastroenteritis, malaria, and urinary tract infections were found to be the pathologies most frequently associated with malnutrition, respectively 38.29% 37.23% 12.7%. Our results are comparable to those of Sanaga in his study of 31.25%, and 50.35% [14] and higher than that of Ouermi in his study 1.3% [2]. However, infectious diseases are often accompanied by malnutrition, which can be explained by the fact that malnutrition can lead to a dysfunction in the patient's immune system, making him or her more vulnerable to infection. Thus, national protocol recommends systematic antibiotic therapy for SAM patients even if the patient shows no clinical signs of infection, as they may be suffering from an infection without clinical signs.

In our study, 100% of children took F75 during the acute phase and 100% took F100 during the transition phase. However, these results were in line with the recommendations of the Integrated Management of Acute Malnutrition in Burundi [20].

In our study, this 9.5% death rate is acceptable according to PCIMA performance criteria, which recommend a death rate of less than 10%. Deaths occurred much more frequently in patients with severely impaired anthropometric indices [21]. This result was similar to that of DICKO in Mali, which found 5.71% [7]. However, 9.5% of dropouts were found to be an acceptable rate according to PCIMA standards [20].



## 5. Limitations

The limitations of this study are the unavailability of ATPes, few F75 milk compared to malnourished children and poorly completed medical records. In addition, few nursing staff had received training in the integrated management of acute malnutrition.

## 6. Conclusion

At the end of this study, we note that malnutrition remains a public health problem affecting mainly children aged 12 to 24 months. The main complications or pathologies associated with malnutrition were anemia and malaria. The majority of children showed signs of marasmus. Most children were exclusively breastfed. Improving mothers' knowledge of weaning and food diversification will help to improve children's nutritional status.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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