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# Quality Assessment of Management of Severe Acute Malnutrition with Complications at the URENI of Kati Reference Health Center 2022

**Ousmane SY[1], Fatoumata TRAORE[2], Ghislain PODA[3], Drissa BOUARE[4], Ismael SIMAGA[5], Souleymane Bingué DEMBELE[6], Karamoko DJIGUIBA[7], Aliou BAGAYOGO[1]**

[1]General Directorate of Health and Public Hygiene, Bamako, Mali
[2]National Institute of Youth and Sports, Bamako, Mali
[3,4]Private Higher Institute of Public Health, Bamako, Mali
[5]Kati Reference Health Center, Koulikoro Region, Mali
[6]Commune IV District Hospital, Bamako, Mali
[7]Luxembourg Mother and Child Hospital, Bamako, Mali

**ABSTRACT**

**Introduction:** Child malnutrition is a major public health problem in low- and middle-income countries. Mali, like its Sahelian neighbors, is structurally exposed to food and nutrition crises, aggravated by the security crisis.

**Methodology:** We conducted a cross-sectional, descriptive study from January 01 to December 31, 2022 at the URENI of the Kati referral health center. Data were analyzed using SPSS version 25.0 software.

**Results:** Ninety-four children aged 0-59 months participated in this study. The 6-11 months age group was the most affected by malnutrition with 37.2%. Females were the most dominant sex. Marasmus was the clinical form most frequently encountered in these children, with 69.1%. Diluted F-75 and F100 milk were the nutritional inputs used in phase I of treatment, while Plumpy nut and F100 milk were used in phase II. Amoxicillin was the most widely used antibiotic. Malaria was the pathology most associated with severe acute malnutrition. Diarrhea due to dehydration was the main cause of death among children, accounting for 53.2%.

**Conclusion:** The results obtained in relation to the management of severely malnourished children with complications hospitalized at the URENI of the CSRef of Kati are satisfactory according to the standards of the National Protocol for the management of acute malnutrition in Mali.

**KEYWORDS:** evaluation, malnutrition, URENI, Kati.

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## 1. INTRODUCTION

Child malnutrition remains a real public health problem in developing countries, including Mali. Every country in the world is affected by some form of malnutrition. Combating malnutrition in all its forms is one of the most important challenges to global health (WHO, 2020). According to the latest UNICEF reports, the regions most affected by child malnutrition are South Asia and Sub-Saharan Africa (UNICEF/WHO, World Bank, 2020).

Malnutrition, in all its forms, includes undernutrition (wasting, stunting, underweight), vitamin or mineral deficiency, overweight, obesity and the resulting diet-related non-communicable diseases.

Around 1.9 billion adults are overweight or obese, while 462 million are underweight.

Worldwide in 2020, 149 million children under the age of 5 were stunted (too small for their age), 45 million were wasted (too thin for their height) and 38.9 million were overweight or obese. Around 45% of deaths in children under 5 are linked to undernutrition. These occur mainly in low- and middle-income countries. At the same time, in these same countries, rates of overweight and obesity among children are rising (WHO, 2020).

In Mali, as in most sub-Saharan African countries, malnutrition is a public health problem. It is one of the major causes of morbidity and mortality in children under the age of five. It is a health problem with a multifactorial and multisectoral dimension, whose underlying causes are insufficient access to quality food, inappropriate infant and young child feeding care and practices, poor hygiene and sanitation practices, and inadequate access to drinking water and health services. According to the results of the SMART 2022 survey, 9.9% of children aged between 6 and 59 months suffer from acute malnutrition in the Koulikoro region, including 1.5% in the severe form. The national prevalence of global acute malnutrition has fallen below 10%, but the situation is still precarious, as it could increase with any deteriorating economic situation. This survey was also carried out during the harvest period, a period of food abundance which would certainly have played in favor of a reduction in the scale of acute malnutrition. Despite the influence of the harvest period on the results, this GAM prevalence (10.8%) is still a long way from the objective of reducing it to below 5% of global nutrition targets by 2025. Hence the need to maintain efforts to encourage not only a continued fall in prevalence but also its maintenance over time." (SMART, 2022).

Several studies have been carried out to assess the prevalence of malnutrition nationwide, but few have focused on evaluating the quality of malnutrition management in children aged 0-5 years. We therefore set ourselves the objective of evaluating the quality of management of severe acute malnutrition with complications at the URENI of the CSRéf of Kati, in accordance with national guidelines for the management of acute malnutrition in Mali.

## 2. METHODOLOGY

### 2.1 Type of study

We conducted a cross-sectional, descriptive and quantitative study.

### 2.2 Study setting:

This study took place in the town of Kati at the reference health center. Kati Health District is bounded by : the circle of Kolokani to the north, the circle of Dioila and Koulikoro to the east, Ouéléssébougou health zone to the south, Kangaba circle to the south east and Kita circle to the west


**Figure 1: Health map of Kati**

**2. 3. Location and period**

The study was conducted at the Intensive Nutritional Recovery Unit (URENI) of the Kati reference health centre (CSRéf) from 1 January to 31 December 2022.

The URENI is organised as follows:

- Infrastructures

The URENI was set up in May 2012 and comprises

- A room where activities take place (registrations, consultations, anthropometric measurements).
- A room for nutritional advice, preparation and distribution of therapeutic foods) .
- A games room.
- Two (02) hospital wards, one for Phase I and a second for Phase II treatment.
- A resuscitation room
- A warehouse for storing kitchen equipment and inputs
- A room for storing medicines and treatment inputs.
- Two toilets for accompanying persons.

- **URENI materials and inputs**

URENI has an anthropometric measurement kit (height gauge, mother-child scale, Shakir band, Hemocue, blood glucose meter, oxygenator, thermometer), kitchen equipment for preparing milk and management aids, which are: registers and files, transfer forms, anthropometric measurement tables and monthly report forms. Therapeutic food, RéSoMal and medicines for systematic treatment are provided by UNICEF. Food assistance for mothers/carers is provided by the World Food Programme (WFP) and monitored by the social development department.

- **URENI Human Resources**

The URENI staff consists of :

- A specialist doctor (Paediatrician)
- A general practitioner (District Nutrition Officer)
- Five (5) nurses (two state nurses and three health technicians)
- Three nutritional assistants (two nurses and one care assistant)
- Two surface technicians

- **URENI activities**

URENI provides care for severe acute malnutrition with complications in accordance with the recommendations of the national protocol. The URENI's main activities are as follows:

- Welcoming patients to the URENI (treating them with respect and kindness)
- Clinical assessment of malnutrition
- Guidance on treatment (hospitalisation at the URENI)
- Care and monitoring of malnourished children (daily medical visits to hospitalised children)
- Monitoring of inputs and medicines for treatment (Plumpy Nut, F75, F100 and medicines)
- Monitoring the preparation and administration of therapeutic milks and treatments at the times indicated on the URENI monitoring form.
- Guidance/coaching for mothers/carers on screening techniques
- Follow-up of referrals/transfers from URENAS to URENI and from URENI to URENAS once the child has stabilised clinically
- Follow-up of hygiene kits distributed to carers during their stay at URENI
- Raising awareness among mothers/carers about basic hygiene and sanitation measures.
- Morning staff meetings (meeting between URENI staff and the URENI manager to discuss problems encountered during the shift, proposed solutions and support measures).
- Audit of deaths in the URENI and share the report with the key players involved in care.
- Monitoring the quality of meals for mothers/carers
- Monitoring changes in treatment phase

The nutritional status of each patient is assessed by :

- measurement of anthropometric parameters ;
- the various ratios (P/T, P/A, T/A) ;
- looking for nutritional oedema
- physical examination and additional tests.

Weight is taken using a mother-child scale with a minimum accuracy of 100g.

Height is measured with a height gauge and read to the nearest 0.1cm. It is taken lying down when the child is under 2 years old (<87cm) and standing up when the child is over 2 years old (≥87cm). The brachial perimeter is measured using the Shakir band in the middle of the left arm and is read to the nearest 0.1cm. The BP is used from 6 months of age.

If the weight/height ratio is <-3z score or PB<115mm with or without nutritional oedema, we are talking about severe acute malnutrition. Medical management is based on the recommendations of the national protocol for the management of acute malnutrition.

**2.4. Study population**

Our population consisted of :

- All malnourished children aged 0-59 months admitted to URENI.
- Mothers/carers of admitted children
- Care providers

**Inclusion criteria:**

- For children : All children admitted to the URENI in Kati during the study period (01 January to 31 December 2022).
- For mothers/carers: mothers of children admitted during the study period
- For providers: providers in charge of ECP with at least 1 year of experience.

**Criteria for non-inclusion :**

- For children: in the event of refusal by parents or guardians or absence, children whose files are incomplete.
- For mothers/carers: cases of refusal or absence
- For providers: refusal, absence or less than 1 year's experience in ECP.

**2.5. Sampling methods**

The sample size was calculated using Raosoft software and the following parameters: 95% CI, 5% margin of error and a normal distribution. The sample size with a population of 92362 children under the age of five gives a sample of 383.

**2.6. Data collection techniques and tools**

In this study we used a questionnaire to collect information from the children, the children's mothers and the care providers in the URENI. Data on hospitalised children were collected using hospitalisation records and individual child follow-up treatment sheets at the URENI. For parents/carers of hospitalised children and URENI staff, individual interviews were conducted using interview guides administered to them.

The data collected through the use of files and follow-up forms concerned :

- Hospital records.
- Reasons for referral,
- Family and personal history,
- History of the disease,
- Clinical examination,
- Diagnostic hypotheses,
- Complementary examination

This data was recorded in the interview guide sent to parents/carers to facilitate data entry.

The URENI therapeutic follow-up form

- Patient identification, type of referral and reasons for admission.
- Data on the child (date of birth; age, sex, type of feeding).
- Dates and types of admission and discharge.
- Anthropometric parameters.
- Complementary examinations.
- Treatment (dietary, systematic and specific).
- Monitoring (associated diagnoses, complications).
- Vaccination status.
- Discharge education.

**2.7. Data entry and analysis**

The data were entered and analysed using SPSS 20 software. A descriptive analysis was carried out to calculate the mean, frequencies and percentages.

**2.8. Ethical aspects**

This study was validated by the management of the Institut Supérieur de Santé Publique in Bamako, Mali. Authorisation was received from the medical authorities of the Kati health district. A consent form was submitted to participants prior to data collection. Data were collected anonymously and are used only for this study.

## 3. RESULTS

Ninety-four malnourished children under five years of age participated in this study.

**Table I: Distribution of severely malnourished children according to socio-demographic characteristics**

| | Effectifs | Percentage |
|---|---|---|
| **Age range of children** | | |
| 0 - 5 months | 3 | 3,2 |
| 6 to 11 months | 35 | 37,2 |
| 12 to 23 months | 32 | 34 |
| 24 - 59 months | 24 | 25,5 |
| **Gender of children** | | |
| Male | 42 | 44,7 |
| Female | 52 | 55,3 |
| **Profession of mothers/carers** | | |
| Housewife | 82 | 87,2 |
| Shopkeeper | 4 | 4,3 |
| Student | 8 | 8,5 |
| **Level of education of mothers/ carers** | | |
| Illiterate | 70 | 74,5 |
| Primary | 17 | 18,1 |
| second cycle | 3 | 3,2 |
| Secondary | 4 | 4,3 |
| **Residence of mothers/carers** | | |
| Rural | 83 | 88,3 |
| Urban | 11 | 11,7 |

| | | |
|---|---|---|
| **Marital status of mothers/partners** | | |
| Married | 75 | 79,8 |
| Divorced | 2 | 2,1 |
| Single | 10 | 10,6 |
| Widowed | 7 | 7,4 |

**Table II: Distribution of severely malnourished children by reason for consultation, admission criteria and form of malnutrition**

| | Effectifs | Percentage |
|---|---|---|
| **Reason for consultation** | | |
| ill | 51 | 54,3 |
| lack of appetite | 20 | 21,3 |
| oedema | 19 | 20,2 |
| oral candidiasis | 1 | 1,1 |
| thin | 2 | 2,1 |
| other | 1 | 1,1 |
| **Type of admission** | | |
| spontaneous | 59 | 62,8 |
| referred | 35 | 37,2 |
| **Admission criteria** | | |
| Z - score < - 3 | 44 | 46,8 |
| BP < 115 mm | 8 | 8,5 |
| oedema | 17 | 18,1 |
| poor appetite associated with one of the criteria | 25 | 26,6 |
| **Form of malnutrition** | | |
| kwashiorkor | 19 | 20,2 |
| marasmus | 65 | 69,1 |
| mixed | 10 | 10,6 |

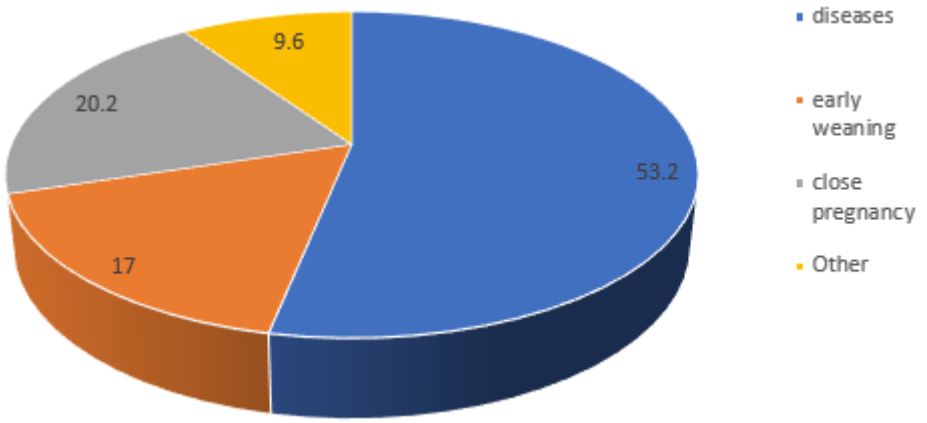


**Figure 2: Breakdown of malnourished children by cause of malnutrition**

**Table III: Distribution of severely malnourished children according to associated pathologies, treatment and outcome**

| | Effectifs | Percentage |
|---|---|---|
| **Associated diseases** | | |
| malaria | 37 | 39,4 |
| diarrhoea | 33 | 35,1 |
| pneumopathy | 20 | 21,3 |
| candidiasis | 3 | 3,2 |
| dermatitis | 1 | 1,1 |

| | | |
|---|---|---|
| **Treatment** | | |
| Nutritional phase I | 89 | 94,7 |
| F75 | 5 | 5,3 |
| Diluted F100 | | |
| Antibiotic therapy | 40 | 42,6 |
| Amoxicillin tablet | 16 | 17,1 |
| Ceftriaxone injection | 17 | 17,0 |
| Ceftriaxone + Gentamicin | 21 | 22,3 |
| Ceftriaxone + Metronidazole infusion | | |
| **Outcome of malnourished** children | 76 | 80,9 |
| successfully treated | 3 | 3,2 |
| abandoned | 6 | 6,4 |
| died | 6 | 6,4 |
| medical transfer | 3 | 3,2 |
| **cured** | | |
| Length of stay | 11 | 11,7 |
| 3 - 5 days | 20 | 21,3 |
| 6 - 7 days | 48 | 51,1 |
| 7 days or more | | |
| | | |
| Nutritional treatment | 5 | 5,3 |
| in transition phase | 1 | 1,1 |
| None | 59 | 62,8 |
| F100 | 24 | 25,5 |

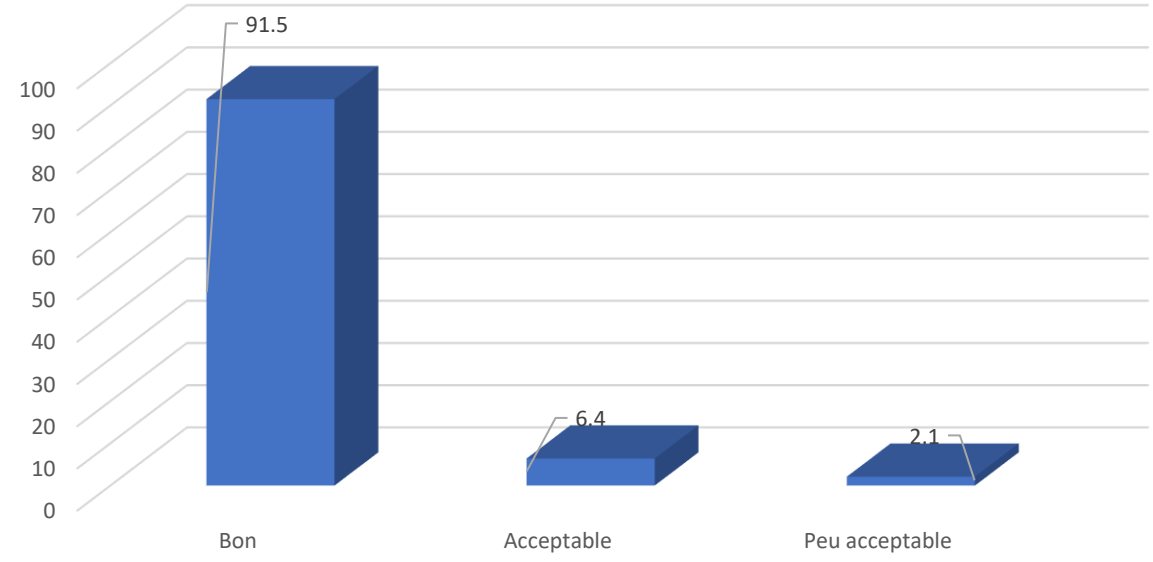


**Figure 3: Appreciation of the welcome given to malnourished children by their carers during their stay at URENI**

## 4. DISCUSSION

Our work enabled us to evaluate the quality of the management of severe acute malnutrition with complications at the URENI of the CSRéf of Kati during the period from 01 January to 31 December 2022, based on verification of the application of the National Protocol for the management of acute malnutrition in Mali. In total, we surveyed ninety-four (94) children under the age of five.

**Limitations of the study**: we were unable to carry out a qualitative study with the mothers/carers of malnourished children. Carrying out such a study could help to further improve the quality of our work.

### 4.1. Socio-demographic data

- **Age group:** The 6-11 month age group was the most affected by severe acute malnutrition with

complications (37.2%). There are a number of reasons for this, including an unbalanced diet, childhood illnesses and frequent pregnancies. Another study carried out in Mali in the Sikasso region more specifically in the Koutiala health district in 2014 revealed that malnutrition is more frequent in the 6 - 23 months age group (Diarra 2014).

- **Sex:** During our study the female sex was the most predominant with 55%. This result is similar to those obtained by Maimouna Sidibé in 2019 at the URENI of the CSRéf of Kalabancoro, who found a sex ratio of 0.90, and Issa Diarra at the CSRéf of Koutiala in 2014, who found a sex ratio of 0.79 in favour of girls (Sidibé 2019, Diarra 2014).

### 4.2. Clinical forms of severe acute malnutrition:

During our study marasmus was the most represented clinical form with 69, 1%. This result is higher than that reported by Issa Diarra, who found 50.5%.

### 4.3. Management of acute malnutrition at the URENI of the CSRef in Kati.

- Nutritional treatment: During our study 94.7% of children received F75 milk and 5.3% of children received diluted F100 milk in phase I. The children who received diluted F100 milk were all specific cases (children under six months and weighing less than 3 kg). In the transition phase, 66.5% of children received Plumpy nut (PPN) and 25.5% received PPN + F100 milk. These nutritional treatments received by children in phase I and in the transition phase meet the standards of the National Protocol for the Integrated Management of Acute Malnutrition in Mali (PCIMA) and are similar to several studies conducted by other actors in Mali (Sidibé 2019, Diarra 2014).
- Antibiotic treatment: In our study amoxicillin was the antibiotic most used in the treatment of severe acute malnutrition with complications with 42.6%. This result can be explained by the fact that amoxicillin plays a major role in eliminating bacterial proliferation in the intestine and is used as the first-line antibiotic for the treatment of severe acute malnutrition with complications in Mali (Protocol PCIMA Mali revised 2017). This result is close to that reported by Issa Diarra 2014 and Maimouna Sidibé 2019, who found that amoxicillin was the most commonly used antibiotic in their studies for the treatment of severe acute malnutrition with complications, with 48.9% and 49.20% respectively (Sidibé 2019, Diarra 2014). Metronidazole was the second most commonly used antibiotic in our study, with 22.3%. This can be explained by the fact that it is the antibiotic best indicated for the treatment of diarrhoea in severely malnourished children with complications according to the National Protocol for the Integrated Management of Acute Malnutrition in Mali (Protocol PCIMA Mali revised 2017).

### 4.4. Diseases associated with malnutrition in children aged 0-59 months

During our study, malaria was the condition most associated with malnutrition, accounting for 39.4% of cases. Most of these cases of malaria were recorded during the peak period (August, September and October). This can be explained by the fact that most children do not sleep under a mosquito net, or sleep outside for part of the night before going to bed under a mosquito net. During the winter, the presence of grass and stagnant water around houses encourages mosquitoes to multiply and increases the number of cases of malaria among children. This result differs from that reported by Sidibé in 2019, who found that diarrhoea was the pathology most associated with malnutrition at 35.34% (Sidibé in 2019).

### 4.5. The main causes of death in children aged 0-59 months.

In our study, diarrhea due to dehydration was the main cause of death among malnourished children, accounting for 50%. This result can be explained by the fact that dehydration is not easy to diagnose in malnourished children. The usual clinical signs of dehydration seen in holy children can appear in malnourished children without being dehydrated. This finding is different from that reported by Issa Diarra who finds that 73.3% of deaths in malnourished children are due to septic shock (Diarra 2014).

### 4.6. Outcome of hospitalised children according to sphere indicators :

In the course of this study we found a stabilisation rate of 84.1%, a drop-out rate of 3.2% and a death rate of 6.4%, with an average length of stay of more than 7 days, i.e. 51%. This result meets the standards of the indicators set by the National Protocol for the Integrated Management of Acute Malnutrition in Mali, with the exception of the average length of stay, which exceeded 7 days (Protocol PCIMA Mali revised 2017). This result is lower than that reported by Issa Diarra, who found a stabilisation rate of 94.4% (Diarra 2014).

## 5. CONCLUSION

This study was carried out from 01 January to 31 December 2022 at the Kati referral health centre and involved ninety-four children aged 0-59 months, all of whom were hospitalised at the URENI of the Kati CSRéf. The 6-11 month age group was the most affected by malnutrition (37.2%). Females were more prevalent. Marasmus was the clinical form most frequently seen in these children (69.1%). Diluted F-75 and F100 milk were the nutritional inputs used in phase I of the treatment, while Plumpy nut and F100 milk were used in phase II. Amoxicillin was the most commonly used antibiotic. Malaria was the condition most associated with severe acute malnutrition. Diarrhoea due to dehydration was the main cause of death in children (53.2%). The results

obtained in relation to the management of severely malnourished children with complications hospitalised at the URENI of the CSRéf of Kati are satisfactory according to the standards of the national protocol for the management of acute malnutrition in Mali. Better prevention of malaria and better management of cases of diarrhoea caused by dehydration could help to reduce the frequency of severe acute malnutrition with complications and the death rate among malnourished children with complications.

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