

# Ambulatory Management of Severe Acute Malnutrition in Banikoara (Northern Benin)

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## Abstract

**Background:** Acute malnutrition is still a public health issue in Benin. The poor results achieved in in-patient care management of severe acute malnutrition (SAM) cases led to adopt ambulatory approach. The aim of this study was to assess the efficiency of ambulatory management of severe acute malnutrition.

**Patients and methods:** It was a prospective descriptive study performed on children aged 6 to 59 months. This study had been conducted from September 2008 to March 2009 in Alibori Region in the north of Benin. Recruitment had been done by door-to-door strategy using mid upper arm circumference (MUAC) and Weight for Height. The management of SAM cases was based on WHO protocol.

**Results:** 247 children suffering from severe acute malnutrition (SAM) were recruited out of the 266 targeted (92.8% coverage). The sex ratio was 1 and the mean age was 17.12 months. Among the 247 cases of SAM, 92% had no complication and then had been cared for on ambulatory regime. The lethality rate was 1.61% and the defaulting rate was 5.26%.

As regards cases cured, the average weight gain was 12.87 g/kg/day and the average time of treatment was 31.32 days. The average cost per case was 30 \$US.

**Conclusion:** Community-based management of SAM is feasible, efficient and with a relatively low cost.

**Keywords:** Severe acute malnutrition; Community-based management; Benin

## Introduction

According to the United Nations, the prevalence of severe acute malnutrition is estimated to 2% in the underdeveloped countries and 1% in the developing countries; this brings up to 10 million the number of children suffering from severe acute malnutrition in the world every time [1].

Fifty percent of the 6 million of annual deaths of children aged 1 month to 5 years in the world are directly or indirectly related to malnutrition [2,3]. About one million of children die every year due to severe acute malnutrition [1].

The heavy contribution of severe acute malnutrition to infant and young child mortality is still out of the health concerns of the international community. And even in the areas where malnutrition is highly widespread, few are the countries that have specific national strategies which aim to fight it systematically. From now on, the conjunction of community-based management with treatments currently available in child hospitalization facilities makes it possible to fight more efficiently this major cause of child mortality.

In Benin, acute malnutrition is a public health issue. According to the findings of the Benin 2006 Demographic and Health Survey (EDS BENIN 2006), it affects 8.4% of the children under 5 years of age with 3% of severe form. According to the same source, acute malnutrition affects 11.4% of the children under 5 years in the Alibori Region with 4.4% of severe form [4]. The findings of the Anthropometric survey conducted in Alibori in April 2006 suggested that acute malnutrition prevalence was 10.1% in the District of Banikoara with 1% of severe form [5]. In the country, till 2006 severe acute malnutrition cases were managed in hospitals exclusively, in accordance with the WHO 1999 guidelines [6]. This strategy resulted in a very high lethality (between 20 and 30%) and a long stay of families at hospital with frequent escapes.

Since 2006, on the occasion of food crisis in Niger, UNICEF facilitated the introduction of ambulatory approach of management of severe acute malnutrition in Alibori Region which has borders with Niger. For this purpose, many experiences had been implemented in the region. The objective of the authors is to report the specific case of the District of Banikoara.

The study aimed to describe the screening mode of severe acute malnutrition cases and progress in the ambulatory management of severe acute malnutrition cases as well as to determine the cost of the ambulatory management per severe acute malnutrition case.

## Patients and Method

It is a prospective and descriptive study conducted in the District of Banikoara from September 2008 to March 2009. The target population of this study was the children aged 6 to 59 months (i.e. 26605 children) representing 17% of the total population according to national statistics [4].

The District of Banikoara is located in the North of Benin. Its surface area is 4383 km<sup>2</sup> and its total population estimated at 156,505 inhabitants. The climate prevailing there enables an agricultural production season dominated by cotton cultivation. As far as

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administrative organization is concerned, it is divided into 11 boroughs; each of them hosts at least one health centre that also serves as place for ambulatory management of malnutrition cases. In addition to borough health centres, the District has been given the status of health district and has a district hospital where a Therapeutic Nutritional Centre (TNC) is set up.

The study setting comprises the Ambulatory Nutritional Centres (ANCs) installed in borough health centres and the Therapeutic Nutritional Centre (TNC).

The management strategy designed by the authors was based on the 2004 WHO Directives for the hospital-based treatment of severely malnourished children and on the concept of community-based management of acute malnutrition cases developed by Valid International in 2006 [7,8]. This strategy, adapted to our realities, consisted of the following three steps:

**1<sup>st</sup> Step:** Social mobilization helped to arouse support among population and opinion leaders. It preceded all the other steps, particularly the one of selection and training of the community volunteers elected by the communities themselves.

#### **2<sup>nd</sup> Step:** Case screening

It consisted in a mass screening campaign followed by continuous screening during community-based activities conducted by community volunteers. So, community volunteers took a census of all the children aged 6 to 59 months using door-to-door strategy, followed by malnutrition screening using 3-color Shakir strip to measure mid-upper arm circumference. Children presenting oedema or whose mid-upper arm circumference was in the red part of the test strip were directed to the nurse in charge of the health area for triage and management. The threshold of selection by community volunteers using 3-color test strip was fixed at 125 mm (red strip) to enable a large recruitment of cases.

The triage of cases recruited by the community volunteers was done by nurses on the basis of search or confirmation of symmetrical oedemas. It was also done on the basis of determination of weight-for-height ratio by means of tables made available, or of mid-upper arm circumference. At this stage, all the oedema cases were directed to the TNC. In the absence of oedema, children whose weight-for-height was lower than 70% or mid-upper arm circumference lower than 110 mm experienced stratification depending on the prevalence in them of medical complication (pneumonia, diarrhoea, dermatitis, eye problem, anaemia) or of poor appetite.

The appetite test was carried out by means of ready-to-use therapeutic foods (RUTFs) bags, in accordance with Valid International approach [7,8].

At the end of this clinical test conducted by nurses under the supervision of physicians, severe acute malnutrition cases were oriented as follows:

Children suffering from severe acute malnutrition without complication, defined by weight-for-height below 70% of the median or mid-upper arm circumference lower than 110 mm without neither oedemas nor medical complication but with positive appetite test, were directed to the ANC for ambulatory management;

Severe acute malnutrition cases with complication defined by the presence of oedemas with or without medical complication, or by weight-for-height lower than 70% or a mid-upper arm circumference

lower than 110 mm with medical complication or negative appetite test, first benefitted from an in-patient management till disappearance of complication signs and oedemas as well as restoration of good appetite. After this, management continued in an ambulatory manner.

#### **3<sup>rd</sup> Step:** management and follow up

- Severe acute malnutrition cases without complication were managed in an ambulatory manner using ready-to-use therapeutic foods (RUTFs) and systematic medicated therapy on the basis of posological tables taken from Valid International manual [8].
- In case of severe acute malnutrition with complication, management was partially carried out at the TNC using therapeutic milks (initial phase and transitional phase). Nutrition rehabilitation phase was continued in an ambulatory manner [7,8].
- Follow up of cases treated in an ambulatory manner was done based on advanced strategy (by nurses supported by community volunteers) at the rate of one visit per week until recovery defined by a weight-for-height higher or equal to 85% of the median to two successive visits and absence of oedemas since at least 14 days. Apart from recovery, two other types of progress have been considered: deaths and defaulting. Death was considered when a child diagnosed as "severe acute malnutrition case" and enrolled into the programme died in the community or at hospital before being declared "cured". In the "defaulting" category are classified the children enrolled into the programme and who escaped from hospital, or whom the programme stakeholders have not found during more than two weekly visits [8].
- The average weight gain and the average length of stay were calculated in the cases cured. The average weight gain was defined as the arithmetic average of mean weight gains per case cured. The latter were determined using the formula "weight at recovery minus minimum weight" divided by time (in days) between date of discharge from hospital and minimum weight date. The length of stay was determined in the cases cured, by time between admission date and recovery date [9].
- The calculation of costs was based on determination by arithmetic sum of the costs of different therapeutic inputs used (RUTF, Amoxicillin, Artemether-Lumefantrine, Folic acid, Vitamin A, Mebendazole).
- Management was made free of charge for families thanks to the assistance of UNICEF Benin and community-based funding of health centers.

The variables studied were age, sex, coverage level of severe acute malnutrition cases, socioeconomic level of parents, mid-upper arm circumference, weight-for-height, form of severe acute malnutrition, average or mean weight gain, average length of stay (ALOS), evolution and average cost per case. The coverage level of severe acute malnutrition cases was determined by division of the number of severe acute malnutrition cases screened by the number of severe acute malnutrition cases expected.

The data collected on individual monitoring sheets were captured and analyzed using the Epi Info version 3.5.1 software. The quantitative variables were described by calculation of averages with their standard deviations, and qualitative variables by ratios.

## Ethical Concerns

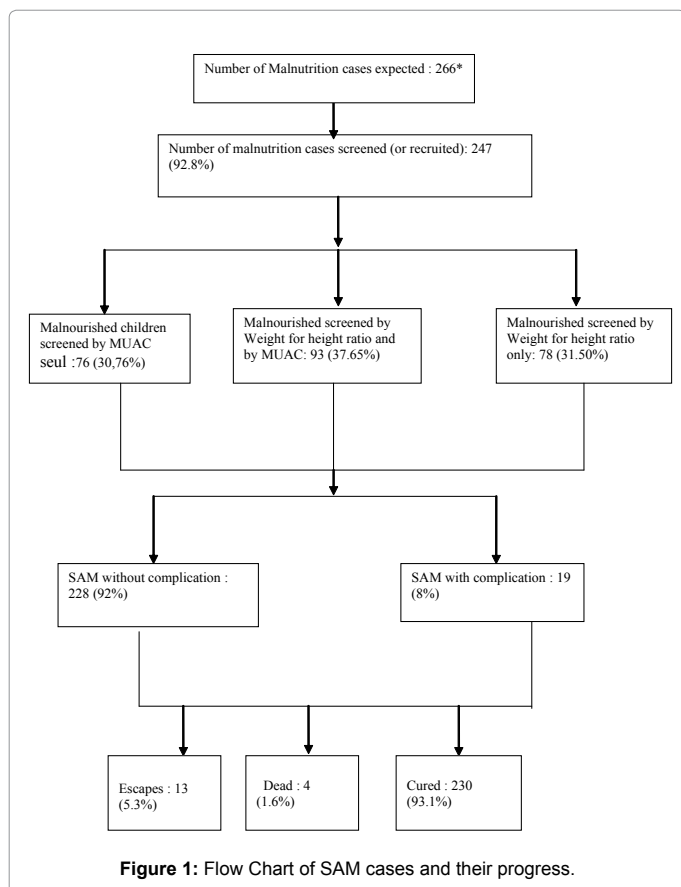
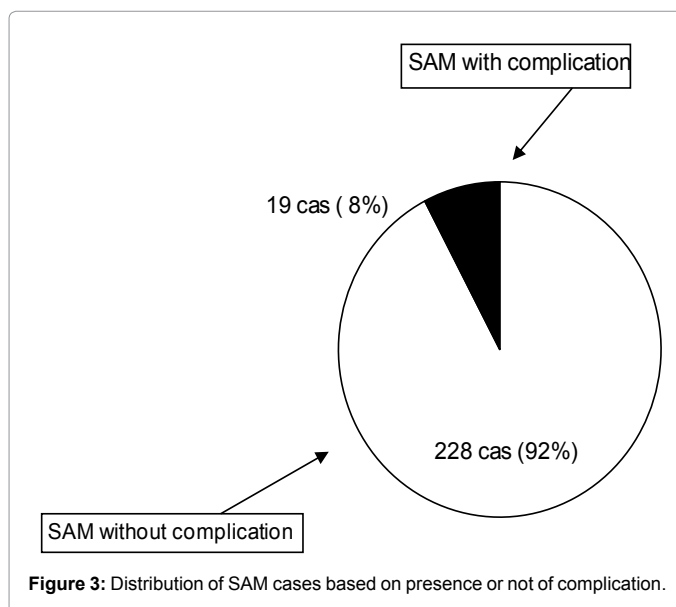
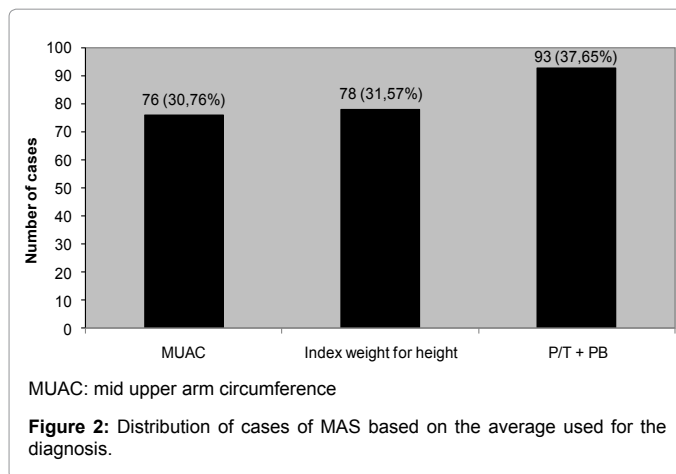
This research work had been initiated by the health authorities of the District with the consent of the local councilors. People were provided full information about the process and stages of the operation before it starts. The parents of the target children gave their informed consent. Besides, management was absolutely free of charge for parents and a seven days' provision of RUTF was given to the children who did not meet severe acute Malnutrition criteria during sorting.

## Findings

Out of the 266 cases of severe acute malnutrition expected, (1% of children from 6 to 59 months), 247 children suffering from severe acute malnutrition were enrolled, i.e. a coverage rate of 92.8% (247/266). The graph of the figure 1 below summarizes the cases enrolled and their future in the programme. The sex ratio (Male/Female) was 1 (124/123) and the mean age 17.12 months  $\pm$  9.35. Children aged 6 to 24 months were the majority, i.e. 77.3%.

Most children suffering from severe acute malnutrition were born from parents with a low socioeconomic level (farmers, nomadic livestock farmers and craftsmen): 243 out of 247 cases (98.4%). The average weight of the children at their admission into the programme was 5.74  $\pm$  1.26 kg. The severely malnourished children were recently disinfected, i.e. 26.36% of the cases (N=201).

Adequate vitamin A supplementation was done in 76 children out of 247 (30.8%). The part of each method used in the diagnosis of severe acute malnutrition cases is described in figure 2. Figure 3 shows distribution of severe acute malnutrition cases on the basis of presence or not of complications. Follow up was regular in 87.7% of the cases.

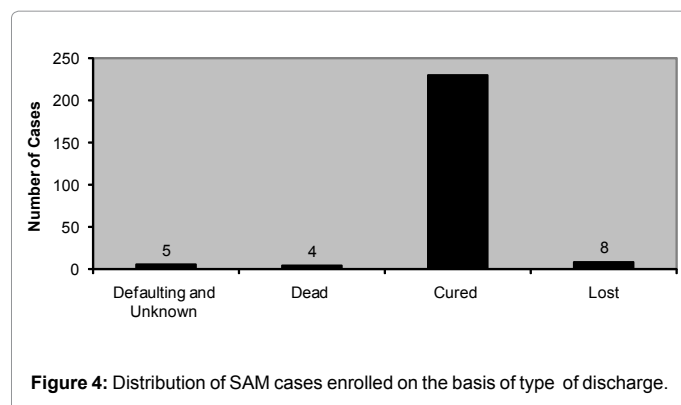


The average cost per case was 14015 F CFA  $\pm$  3210 (30 US Dollars  $\pm$  6.2). Figure 4 sets out the different types of discharge of children enrolled in the programme. As regards the cases cured, calculated performance indicators were the average weight gain which was 12.87 g/kg/day and average length of stay (ALOS) was 31.32 days.

## Discussion

The outcomes achieved have allowed to attain the objectives set at the beginning of the research work. The few deficiencies noted during the study are not in any way detrimental to the quality of the results achieved. Actually, paramedical workers trained under the supervision of physicians had carried out screening, care, follow up and above all filling of individual follow up and care sheets used for data collection.

Cases were essentially screened through door-to-door approach the authentic stakeholders of which were community volunteers. This particular mode of screening of severe acute malnutrition cases enabled to get a very high coverage rate (92.87%). According to Collins et al. [9], the best rates recorded in literature do not exceed 82%. It is actually a strategy fit to our context for most of these children would not be brought to health centers for care as their parents consider them as "only thin" and not sick.



The use of only mid-upper arm circumference (MUAC) allowed diagnosing 76 cases (30.7%). As a result, more than one third of the target children would have not been screened without this easy-to-use method. Myatt et al. have reported a screening rate with mid-upper arm circumference a little higher of 37.31% [10]. The difference noted could be related to the screening method used. In fact, in this research work, two levels of triage with Shakir test strip were used: one, colorimetric, was used during the large recruitment done by community volunteers and the other by nurses. Moreover, as mid-upper arm circumference is regarded as a good indicator of child survival [9], its measurement should be promoted in the households and communities.

The archetypal age group of malnutrition occurrence found in this research work is similar to the one reported by other authors: Madzou et al. [11] as well as Ake-Tano et al. [12]. The children of this age group should indeed benefit from a systematic screening of acute malnutrition at every contact with the health system.

As far as parents' income is concerned, hardly all the cases of severe acute malnutrition are born from poor parents; this shows the close relation existing between child malnutrition and families low purchasing power. Ake-Tano [12] has also encountered this situation in Côte d'Ivoire.

The low rate of acute malnutrition cases with complication found in this study (8%), proves that from now on it is necessary to support SAM case management with community-based strategy. Even in circumstances where SAM cases with complication are much more numerous as in Niger in 2006, according to research works done by Tectonidis [13] this strategy has yielded very good results.

In accordance with the WHO guidelines (>5 g/kg/day and <42 days respectively) [6] the daily average weight gain (12.87 g/kg/day) and the average length of stay in the programme (31.32 days) are acceptable.

Lethality was 1.61% lower than the threshold recommended by WHO [6]. This low rate reflects the ambulatory strategy which simplifies management and reduces nosocomial infection risk.

As a result of advanced strategy follow up, the defaulting rate is lower than the threshold of 15% recommended by WHO [6]. It is an approach designed and implemented due to parents' compliance with follow up.

Such rates of lethality, cure and defaulting had been reported by Tectonidis in 2006 during food crisis in Niger [13].

The average cost found in this study is similar to those reported by Sandige et al. in 2004 [14]. Actually, in their research works done

in Malawi, 55 US Dollars and 22 US Dollars had been necessary for the management of one case depending on whether RUTF has been imported or produced locally. This raises the critical problem of RUTF source of supply. In Benin, to date, RUTF is imported with the assistance of development partners, particularly UNICEF. However, to enable a sustainable management of SAM cases, local production of RUTF would help solve cost and availability related difficulties.

## Conclusion

The ambulatory approach of management of severe acute malnutrition cases is possible and at a relatively low cost. It enables an adequate coverage of cases based on a simple and easy of access screening. It allows to get satisfactory rates of recovery, lethality and defaulting in accordance with the WHO guidelines.

## References

1. WHO (2009) WHO child growth standards and the identification of severe acute malnutrition in infants and children.
2. Black RE, Morris SS, Bryce J (2003) Where and why are 10 million children dying every year? *Lancet* 361: 2226-2234.
3. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS; Bellagio Child Survival Study Group (2003) How many child deaths can we prevent this year? *Lancet* 362: 65-71.
4. Demographic and Health Survey, Benin (2006) National Institute of Statistics and Economic Analysis (INSAE) [Benin] and Macro International Inc. Synthesis report. Calverton, Maryland, USA.
5. Dosa RA, UNICEF Benin (2006) Anthropometric survey in three areas of health department Alibori northeast of Benin, Final Report.
6. [http://www.who.int/nutrition/publications/en/manage\\_severe\\_malnutrition\\_eng.pdf](http://www.who.int/nutrition/publications/en/manage_severe_malnutrition_eng.pdf)
7. Paluku B, Paul B, Steve C, Nicky D, Saul G, et al. (2006) Community-based Therapeutic Care (CTC). A Field Manual. (1stedn), Valid International.
8. Ann A, Sultana K, Alan J, Claire S (2004) Guidelines for the inpatient treatment of severely malnourished children. WHO Library.
9. Collins S, Sadler K, Dent N, Khara T, Guerrero S, et al. (2006) Key issues in the success of community-based management of severe malnutrition. *Food Nutr Bull* 27: S49-82.
10. Mark Myatt, Tanya Khara, and Steve Collins (2005) A review of methods to detect cases of severely malnourished children in the community for their admission into community-based therapeutic care programs. *Food and Nutrition Bulletin* 27: 7-23.
11. Madzou G, Middle G, Gouolali-Onka C (1993) Role of socio-cultural and economic factors in the development of protein-energy malnutrition in Brazzaville. *Pedi Afr* 11-4.
12. Ake-Tano O, Ekou FK, Konan YE, Tetchi EO, Kofi KF, et al. (2011) Determinants of malnutrition among children under five years followed at the National Institute of Public Health Côte d'Ivoire. *Med Afr Noire* 2: 93-99.
13. Tectonidis M (2006) Crisis in Niger—outpatient care for severe acute malnutrition. *N Engl J Med* 354: 224-227.
14. Sandige H, Ndekha MJ, Briend A, Ashorn P, Manary MJ (2004) Home-based treatment of malnourished Malawian children with locally produced or imported ready-to-use food. *J Pediatr Gastroenterol Nutr* 39: 141-146.