



## **Assessment of the Performance of Out-patient Acute Malnutrition Management in Children under 5 Years in the Northern Benin Setting**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors MNP, KPA and MM did the study design and wrote the protocol. Authors VA and CSJ did the statistical analysis and literature searches while analyses of study was by authors CA and VMA. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aims:** To assess the performance of out-patient acute malnutrition management in children under 5 years.

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** Northern Benin, health district of Djougou-Ouake-Copargo, from 1<sup>st</sup>

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to 30<sup>th</sup> June, 2014.

**Methodology:** Fifteen functional out-patient malnutrition management centres (out the 27 existing) were included in the study. Data on acute malnutrition management were collected in thirty skilled health workers by using questionnaire and observation. Data were also collected in 296 children who suffered from acute malnutrition through medical records, reference documents and supervisions note books. The performance of out-patient acute malnutrition management was assessed through three components "input/resources", "process" and "results" using predetermined score of two scales seeking for achievement of criterions according to WHO reference for the evaluation of the performance of the health system.

**Results:** The performance of the out-patient management of acute malnutrition in the health district was rated low.

**Conclusion:** The performance of out-patient management of acute malnutrition in the health district was suboptimal. Adequate monitoring of malnourished treated child and a greater mobilization of community volunteers in the active search of drop out patients are required to improve the performance of out-patient management of acute malnutrition in health district of Djougou-Copargo-Ouaké in Benin.

*Keywords: Out-patients acute malnutrition management; performance; health district; Benin.*

## 1. INTRODUCTION

Malnutrition usually results in an imbalance between nutrient intakes and the needs of the body [1]. Malnutrition is the greatest nutritional challenge observed in developing countries, with the largest number of malnourished children less than five years. More than 90% of acute malnourished children in the world live in 36 countries in sub-Saharan Africa and South Asia. Malnutrition is one of the main causes of child under 5 year's mortality in these countries [2]. Children who survive from malnutrition have reduced learning capacity and low productivity when they reach adulthood [3-5]. "Tackling" malnutrition is a development objective and first contact health facilities must provide out-patient care for children with severe acute malnutrition [6]. Despite the existence of evidence-based effective malnutrition care [7-9], the death rate assigned to severe acute malnutrition (SAM) varies from 0.5 to 2 million per year [10].

In Benin, the Demographic and Health surveys (DHS) of 2001, 2006 and 2011-2012 reported high prevalence of malnutrition in children under 5 [11-13]. The first ones (2001 and 2006) [11,12] showed the persistence of stunting in northern departments including Donga where the health district of Djougou-Copargo-Ouaké was located. The prevalence of stunting ranged from 36.1% to 40.8% in children aged 0 to 59 months [11,12]. In 2012, the prevalence of stunting was estimated at 56.7%, underweight at (21.3%) and wasting at (16.7%) in the department of Donga [13]. This high prevalence has justified the implementation of appropriate management program for acute

malnutrition. Unfortunately, the low extension of the community-based management of acute malnutrition induces a late reference of severe malnutrition cases to out-patient health centers (OPHC) and then to the hospital if required (NTC), as recommended in the national protocol for the management of acute malnutrition.

The national protocol for the management of acute malnutrition was launched in June 2007 and has been revised in order to take into account the standards of WHO and the support of pilot experience in Alibori department. The new national guidelines for acute malnutrition are well developed and have been implemented since 2011 [14]. This reference document highlights the role to be played by the OPHC as part of fighting against children under five year's severe acute malnutrition. The main activities consist in screening for malnutrition among children 0-59 months; ensure care to children aged 6 to 59 months showing uncomplicated cases of severe acute malnutrition; keep track of the malnourished; ensure home visits and refer complicated cases to in-patient therapeutic nutrition centers (IPTNC) in hospitals.

For an adequate implementation of the national guidelines, health workers were trained on management of acute malnutrition. The OPHC were provided with anthropometric materials and inputs. The health district was supported by several partners in the management of malnutrition. The health district hospital contributed in active screening of child malnutrition in fifteen villages. The detected malnourished children receive the appropriate

care as outpatient or inpatient. The United Nations Children's Fund (UNICEF) has trained health workers and community volunteers in the prevention and management of acute malnutrition. Community activities started in 2010.

The convergence of all these actions should contribute to enhance the performance of OPHC in the children under 5 years' acute malnutrition management in the health district. Evaluate the performance of the management of malnutrition in OPHC in this health zone is timely. Low-resource methods like the semi-quantitative evaluation of access and coverage method and the simplified lot quality assurance sampling evaluation of access and coverage are available to investigate the effectiveness, coverage, ability to meet the needs and bottlenecks of the community-based management of acute malnutrition programs [15-17]. But the present study aims at describing availability of resources, the achievement of required activities and assessing the performance of OPHC in link with national recommendations.

### 1.1 Objective

To assess the performance of out-patient acute malnutrition management in children under 5 in the health district of Djougou-Copargo-Ouaké in the northern Benin.

## 2. SUBJECTS AND METHODS

### 2.1 Setting

The health district of Djougou -Copargo-Ouaké is one of the two health zones in the department of Donga in the western north of Benin. Its population was estimated at 397,942 inhabitants in 2013. The expected number of children under five in the same year was 79588. Agricultural and livestock activities were executed by about 80% of the workforce. Agricultural productions were based on maize, yam, beans and vegetables.

There were two IPTNC in the health district for management of severe acute malnutrition with complications. Fifteen provide treatment for severe acute malnutrition without complications and refer complicated cases to the IPTNC.

Community health workers were selected in villages and were responsible for screening malnourished children in the community in

collaboration with NGOs (Africare), to give advice to parents and refer children suffering from severe acute malnutrition to IPTNC. The health district including 27 health centers and 15 were functional as they ensured care to malnourished child.

### 2.2 Study Design and Subjects

It was a cross-sectional study conducted from 1<sup>st</sup> to 30<sup>th</sup> June, 2014.

Study subjects were out-patient health centres for child acute malnutrition management, skilled health workers, community health workers and malnourished children.

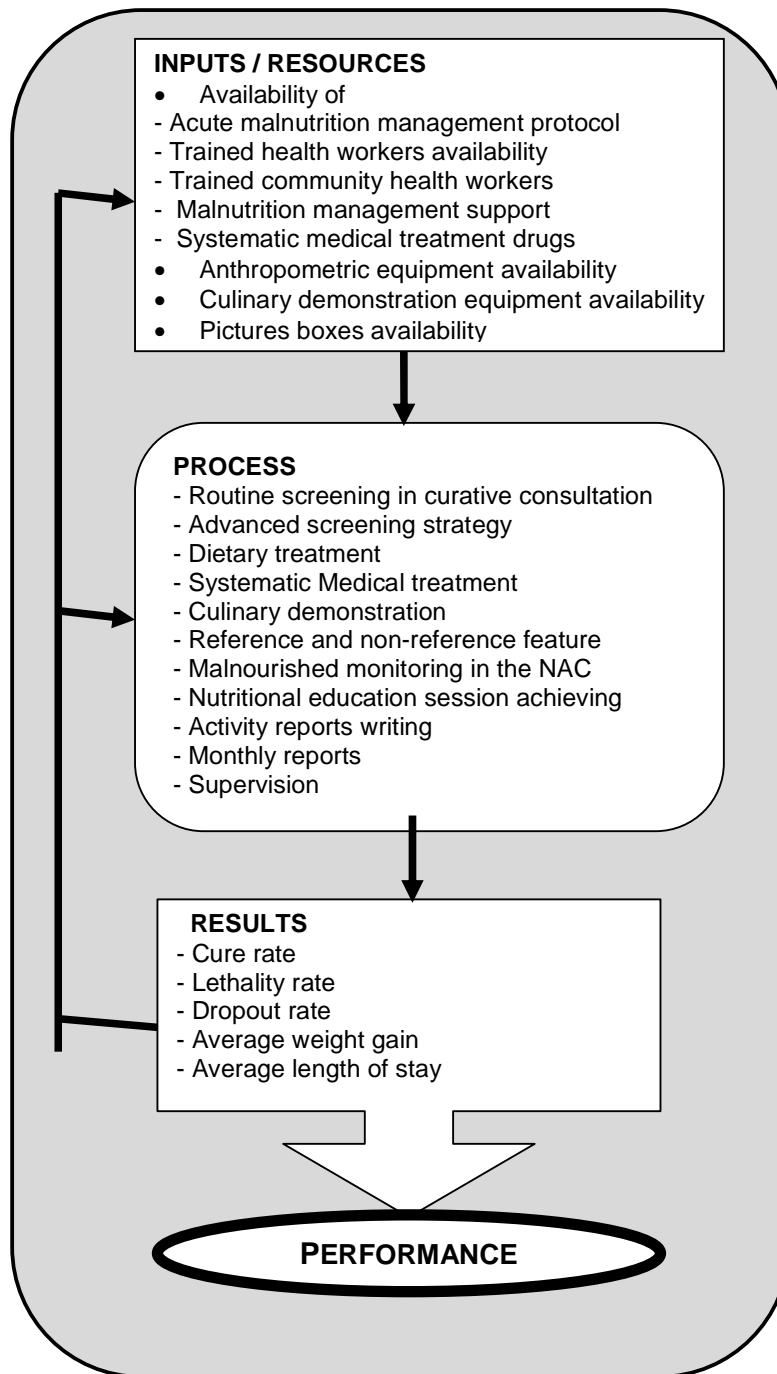
### 2.3 Sample Size and Subjects Selection

The sampling method was non-probability for all participants.

- 15 functional OPHC out the 27 existing were exhaustively included
- For convenience, health workers who gave care to malnourished children in the OPHC and who were present during the survey period were included. They were 02 doctors, 30 health workers, 01 social worker (who is responsible for Community activities)
- 14 community volunteers were selected particularly the first met in the villages located more than five kilometers from each selected OPHC (The community volunteers were 14 because we didn't meet one of them in one OPHC)
- 296 malnourished children under five followed from 1st January to 31th December 2013 have been exhaustively included in the study.

### 2.4 The Study Variables

The dependent variable of the study was the performance of out-patient malnutrition management in children under 5. This dependent variable was explained by the main independent variable "results" which is influenced by the components "input/resources" which referred to the availability of required resources, and the component "process" which included activities executed for health recovering according to national reference based on WHO standards for the evaluation of the performance of malnutrition management in children [14,18] (Fig. 1).



**Fig. 1. Conceptual framework of the performance of the management of malnutrition among children under 5 in out-patient malnutrition management in health centre, Benin, 2014**  
(Adapted from Contadiopoulos)

**2.4.1 Appreciation of variables “input/resources” and “results”**

For each element included in the components (Fig. 1), the score was determined by the

proportion of OPHC that met it. The score was ranked "Good" if the proportion of centres that met one considered criterion was greater than or equal to 85% and this is equivalent to 2 points. It was "acceptable" if the score was between 60%

and 85%, this was equivalent to 1 point. Finally, it was "Low" if the score was less than or equal to 60% which is worth 0 point [19].

Some elements were subdivided due to their complexity in the malnutrition management. The score of these elements was determined by the sum of each sub-component. For example:

- "Availability of monitoring and evaluation tools" in the component "input/resources" included records books, individual monitoring sheet, reference card and inventory records.
- "Routine screening in curative consultation" in the component "process" included several steps mainly measuring weight and height and estimating Z-score,
- "Systematic medical treatment drugs availability" in the component "process" included six drugs (Amoxycillin, artemisinin combination therapy, folic acid, albendazol or mebendazol, Vitamin A and anti-amaril vaccine)

The total score ranged from 0 to 34 for "input/resource", 0 to 27 for "process" and 0 to 10 for "results".

#### **2.4.2 Appreciation of variable "performance of out-patient malnutrition management in children"**

The overall performance score was based on the main independent variable "results". The overall performance was "Good" if the overall score of "results" was at least 85% of maximal expected, "Acceptable" if it was between 60% and 85% and "Low" if it was below 60%.

#### **2.5 Data Collection Procedures**

Health workers were observed during their work (child care). Availability and functionality of anthropometric equipment, educational materials and culinary demonstration equipments were also observed. A questionnaire was used to gather information in health workers and community volunteers on their profile, the active screening and the monitoring of malnourished children in the community. Interviews had been held with the doctors, the management team of the health district on the supervision, monitoring nutrition activities. Documents' exploitation focused on medical records, reference sheets and supervision notebooks.

#### **2.6 Data Analysis**

Data were analysed with STATA software (version 11.0). Scores of performance and its components were calculated based on proportion of OPHC that met the criterions. Clinical indicators were also calculated.

#### **2.7 Ethical Considerations**

The objectives of the study were explained to participants and health authorities. Oral permission to collect data from medical records of children under 5 treated for malnutrition was obtained. Voluntary free and informed consent was obtained from health workers before starting the interview. This consent claims that participants are not at risk by refusing to participate in the survey or stopping their collaboration during the study. The confidentiality and anonymity of the information collected were ensured.

### **3. RESULTS**

#### **3.1 Characteristics of Participants**

A total of 47 health workers were involved in the study. The age ranged from 26 years to 55 years, with an average of 38 years  $\pm$  6.5 years, and 66% (31) of included health workers were men. The categories of included health workers were 02 physicians, 15 nurses, 2 midwives, 13 nursing-assistants, 01 social worker and 14 community health workers. The working experience of health workers ranged from one to 26 years. The total number of malnourished children admitted in the 15 functional centers in 2013 was 296. They were aged 6 months to 59 months. The median age of the children at admission was 12 months. Girls accounted for 47.9%.

#### **3.2 The Component "Input/Resources"**

Of 27 OPHC planned, 15 were functional, and had assured the care for children suffering from acute malnutrition and were exhaustively included in the study. The national acute malnutrition management guidelines were available in 08 OPHC. There was low availability of standard documents. Table 1 shows that, all OPHC had at least one trained health worker for the management of acute malnutrition. All villages covered by OPHC had a trained community health worker. Availability of human resources was "good". The anthropometric

equipment was available in all OPHC. The stock of "ready to use therapeutic food" (RUTF), mainly Plumpynut, was sufficient in 12 OPHC. Drugs shortage occurred in RUTF. The availability of monitoring and evaluation tools was fair. The picture boxes were not sufficient. OPHCs had no culinary demonstration equipment. Overall, the component "resources" was considered « acceptable ».

### 3.3 Acute Malnutrition Management Process

Children under 5 curative consultations allowed to observe the use of anthropometric equipment for measuring the height and the weight, and the comparison of the value of Z score weight-to-height in diagnosing malnutrition. In Table 2, among the 15 OPHC, 11 have organised outreach malnutrition screening. Regarding dietary treatment, all malnourished children received RUTF (Plumpynut) as recommended by the national protocol. The treatment of moderate acute malnutrition based on food supplements was not implemented in any OPHC. The respect of the national guidelines of management of acute malnutrition regarding systematic medical treatment was observed only in the two OPHC. Monitoring of malnourished child was effective in one OPHC. This monitoring included the following parameters: appetite test once a week, weighing and weight appreciation once a week, mid arm circumference weekly, control of the presence of oedema every week, body temperature checking every days, weekly nutrition education, calculation of weight gain, home visits if necessary. The weekly visits recommended by the national protocol were not respected by the parents. Overall, the "process" component was therefore rated "low".

### 3.4 Result of the Management of Malnutrition

The appreciation of the component "Result" (Table 3) in the treatment of malnutrition in the OPHC was "weak". The results of the management were below national standards according to the criteria. Three centres (Djakpingou, Komdè, Pabègou) of the 15 selected OPHC had good indicators that meet the national protocol standard.

Only three OPHC out of 15 (Djakpingou, Komdè and Pabègou) met the five recommendations. The overall score of results was 2/10 (20%). This was rated low.

Overall, only two recommendations out of five were met in the health district.

### 3.5 Overall Performance Acute Malnutrition Management

The overall score of performance of the management of malnutrition among children under 5 in out-patient health centres was 20% and was rated low.

## 4. DISCUSSION

The study described the availability of resources and effectivity of processes and assessed the performance of out-patient malnutrition management in children under 5 in a health district in northern Benin. Overall, the performance was low. Data used to appreciate the variables "input/resources" and process" were collected through interviews and direct observations while data on children treated were collected through records.

**Table 1. Overall scores of the component « structure » in children acute malnutrition management in fifteen OPHC; Benin 2014**

Criteria of component « structure »	Maximum expected score, all OPHC	Observed score, all OPHC	Appreciation
Availability of national acute malnutrition management guide	2	0	Low
Availability of human resources availability	4	4	Good
Availability of anthropometric equipment	2	2	Good
Availability of RUTF	2	1	Acceptable
Availability of systematic medical treatment drugs	12	12	Good
Availability of monitoring and evaluation tools	8	6	Acceptable
Availability of pictures boxes	2	0	Low
Availability of culinary demonstration equipment	2	0	Low
<b>Total</b>	<b>34</b>	<b>25</b>	<b>Acceptable</b>

RUTF: Ready to use therapeutic food

**Table 2. Overall scores of the component « process » of children acute malnutrition management in fifteen out-patient health centres, Benin, 2014**

Criteria of component « process »	Maximum expected score, all OPHC	Observed score, all OPHC	Appreciation
Systematic malnutrition screening in curative consultation	6	6	Good
Advanced screening strategy	2	1	Acceptable
Dietary treatment	2	2	Good
Systematic medical treatment	2	0	Low
Malnourished monitoring in the NAC	2	0	Low
Completion of monitoring and evaluation tools	4	2	Acceptable
Reference and non-reference feature	2	0	Low
Nutritional education session achieved	2	0	Low
Culinary demonstration session achieved	1	0	Low
Activity reports writing	2	1	Acceptable
Supervision	2	0	Low
<b>Total</b>	<b>27</b>	<b>12</b>	<b>Low</b>

**Table 3. Assessment of component “result” of children acute malnutrition management in each out-patient health centres, Benin, 2014**

Out patient health centers	Results					Total
	Cure rate (%)	Lethality (%)	Dropout rate (%)	Average weight gain (g/kg/j)*	Average length of stay (days)	
Awotobi	56.2	0	43.7	12.9	27	-
Badjoudè	72	0	28	6.4	51	-
Bougou	12.5	0	87.5	1.6	112	-
Copargo centre	100	0	0	8.5	47	-
<b>Djakpingou</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>12.8</b>	<b>20</b>	-
Kolokondè	51.6	0	48.4	4.2	59	-
<b>Komdè</b>	<b>92.8</b>	<b>0</b>	<b>7.1</b>	<b>6.8</b>	<b>30</b>	-
Kpassabia	100	0	0	8.4	52	-
Ouaké centre	96	0	4.1	5.7	38	-
Onklou	66.7	0	33.4	4.7	74	-
Ordre de Malte	61.7	5.3	32.9	5.9	71	-
<b>Pabègou</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>10.3</b>	<b>28</b>	-
Pélébina	12.5	0	87.5	4.7	77	-
Sémèrè	88	0	12	5.4	38	-
Tchalinga	76.9	0	23	3	52	-
National recommendations	> 75	< 10	< 15	> 6	< 42	-
Proportion of centers that met national recommendations	7/15(45%)	15/15(100%)	7/15(47%)	7/15(47%)	6/15(40%)	-
Observed score	0	2	0	0	0	2
Maximum expected score	2	2	2	2	2	10

#### 4.1 The Input/Resources for Acute Malnutrition Management

The low availability of national guidelines of acute malnutrition management observed in OPHC was also reported in the Democratic Republic of Congo, where three of 17 centres

had this guideline document [20]. In contrast, the anthropometric equipment was available in all the centres surveyed during the study period as it has been observed elsewhere in Benin [21] and in Chad [22]. The adequate availability of this material may be explained by the fact that, more technical and financial partners are involved in

**Table 4. Results of children followed for acute malnutrition in fifteen out-patient health centres (N=296), Benin 2014**

Criteria of component « results »	Performance of all OPHC	National recommendations
Cure rate (%) (n = 203)	68.6	> 75
Lethality (n=5)	<b>1.68</b>	< 10
Dropout rate (%) (n = 88)	29.7	< 15
Average weight gain (g/kg/j) (n = 203)	<b>6.91</b>	> 6
Average length of stay (days) (n = 203)	52	< 42

*N = number of malnourished children concerned*

the field of children nutritional care, particularly UNICEF in the developing countries. RUTF shortage was observed in three OPHC for two to three months. Similar result was observed in the Democratic Republic of Congo [20]. During these times without RUTF, children screened were treated with the collaboration of other OPHC. The causes of these RUTF shortages of RUTF stock could be explained by the dependence to partners who provide the supply.

#### 4.2 Malnutrition Management Process

In the present study, children screened in outreach villages were supported with distribution of RUTF. The community health workers were responsible for making the weekly visits. Monitoring by health workers took place in the following month. This management strategy conducted weekly by the community health workers was observed by Schwartz in the evaluation of the management of acute malnutrition in Benin [23].

Systematic medical treatment drugs (Amoxicillin, artemisinin based therapeutic combination and albendazol or mebendazol) for the malnourished children was not free of charge. They paid this treatment unless in one OPHC where there is a NGO support. This is in concordance with results observed in Cameroon [24], in Mali [25] and in the Democratic Republic of Congo [20]. The treatment was uncomplete according to Yeboyo in Tigray in Ethiopia where the application of the recommendations by the agents was not rigorous [26].

The malnourished children care monitoring has been uneven because its frequency was not weekly as recommended in the national guidelines. The visits were sometimes separated with an interval of two to three weeks. Appointments were not respected by the parents. This made the treatment discontinuous and could explain the long average length of stay and low average weight gains [23]. In Ivory Coast,

advanced strategies had been organized in collaboration with the community health workers in the villages to follow malnourished children screened. The community was mobilized and the local radio [27] was used for communication. This was done in a context where the health district manager was very motivated after receiving support from the NGO "Action Contre la Faim".

Supervision was irregular although it was scheduled. Other activities frequently disrupted the execution of supervision. This irregularity has been noted by Katumwa [28]. It may reflect a low integration of management of childhood illness into the routine system.

#### 4.3 Acute Malnutrition Management "Results"

The overall recovering rate was 68.6%. This is lower than the national standard of Benin whose threshold is higher than 75%. The present result is lower than those reported by Baldé (89.7%) in Guinea Conakry [21].

The lethality rate in the study was similar to that observed by Baldé (1.6%) [21]. According to the author, there was a strong community mobilization and some of the health workers have received more than three supervisions and fee exemption malnutrition treatment management was implemented.

The overall dropout rate was above the norm. The high dropout rate could be explained by long distance between health facilities and obstacles such as (river crossing, overload of work for health workers). It may be due also to travel time because some villages in which live some children are located more than five kilometers from OPHC and mothers have not sufficient money to feed themselves during the hospitalization. It is also possible that the low weight gain plays some role as well as the belief



that the diseases are due to the wizards and not to poor diet [29]. This reinforces the need of extension of the community-based approach of management of acute malnutrition in children.

The average length of stay was higher than the international standard (<28 days) [23]. But it could be right in the Benin's standard protocol that considers that children could stay in health centres until six weeks in OPHC. This period ranged from 36 to 45 days in OPHC in another study [21]. The average weight gain was in accordance with the standard range.

These performance indicators were comparable with the results found by Harris in Cambodia where the cure rate, lethality, the average weight gain and length of stay were 55%, 5.6%, 4 g/kg/day and 14 weeks respectively [30]. In Burkina Faso, Dembélé had found alarming indicators compared to the references [31]. The author reported an average weight gain and length of stay for respectively 4.05g/ kg/day and 55 days [31]. According to this, the poor performance could be explained by the use of inadequate local foods that would give less satisfactory results instead of RUTF for nutritional recovery. This need the improvement of nutritional formulation of local foods used in acute malnutrition management.

The limitations of this study concern its geographic scope limited to a health district. The sampling techniques were not at random. This may include some possible selection biases. Further, data on children who suffered from malnutrition were collected through records. However, the study shows interest results in terms of how to improve the performance of out-patient malnutrition management in children under 5 in the northern Benin setting.

## 5. CONCLUSION

The availability of resources was acceptable, the effectivity of processes was low as well the performance of out-patient acute malnutrition management in children under 5 in the health district of Djougou-Copargo-Ouaké in Benin. Key factors that negatively impacted the performance were high dropout rate and high average length of stay. Improving the management of acute malnutrition by health system requires adequate monitoring of treated malnourished children, reinforcement of the effectivity of required activities and active search of dropout children in a community-based approach.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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