

A short-term intervention for the treatment of severe malnutrition in a post-conflict country: results of a survey in Guinea Bissau

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Submitted 7 August 2007: Accepted 19 May 2008: First published online 24 July 2008

Abstract

Objectives: To determine (i) the extent of malnutrition and the risk factors for severe malnutrition in Guinea Bissau, a post-conflict country experiencing long-term consequences of civil war; and (ii) the feasibility and effectiveness of a short-term intervention characterized by outpatient treatment with locally produced food for the treatment of severe malnutrition during the rainy season.

Design and setting: Social, clinical, nutritional information were collected for children reaching the paediatric outpatient clinic of the Hospital 'Comunità di Sant'Egidio' in Bissau, Guinea Bissau, from 1 July to 12 August 2003. Severely malnourished children (weight-for-age < -3 SD) in poor health status were admitted for daily nutritional and pharmacological treatment until complete recovery. Social and health indicators were analysed to define risk factors of severe malnutrition.

Results: In total, 2642 children were visited (age range: 1 month–17 years). Fever, cough and dermatological problems were the main reasons for access. Social data outlined poor housing conditions: 86.4% used water from unprotected wells, 97.3% did not have a bathroom at home, 78.2% lived in a mud house. Weight-for-age was < -2 SD in 23.0% of the children and < -3 SD in 10.3%; thirty-seven children (1.4%) were severely malnourished and admitted for day care. All recovered with a weight gain of 4.45 g/kg per d, none died or relapsed after 1 year. Severely malnourished children were mainly infants, part of large families and had illiterate mothers.

Conclusion: Short-term interventions performed in post-conflict countries during seasons of high burden of disease and malnutrition are feasible and successful at low cost; day-care treatment of severe malnutrition with locally produced food is an option that can be tested in other settings.

Keywords
Malnutrition
Post-conflict
Outpatient treatment
Rainy season

Malnutrition in all its various forms (stunting, wasting and growth faltering) remains, with diarrhoea, malaria and respiratory infections, one of the most common causes of morbidity and mortality among children worldwide^(1–3). Approximately 54% of deaths in children less than 5 years of age are associated with malnutrition and mortality risk increases with severity of acute malnutrition.

International guidelines for the treatment of severe malnutrition^(4–6) indicate inpatient treatment with medical and supportive care as the preferred choice, at least in the first acute phase of treatment, if medical complications and/or anorexia are present. Most developing countries have limited inpatient facilities and scarce financial and

human resources to allocate for this purpose. Moreover, childhood malnutrition is widespread in post-conflict countries; these countries experience long-term impacts in the field of health^(7,8) that go beyond the acute effects of war, with difficulty in setting up stable health systems and specialized nutrition centres. The civilian population becomes exposed to a higher burden of diseases due to the lack of secure water supplies, sanitation, food and stable power plants, the destruction of health-care facilities and the emigration of trained health staff. These factors make it even more complex to address the issue of severe malnutrition with the standard inpatient approach^(5,6,9). Furthermore, in African countries, rainy

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season periods worsen the burden of malnutrition due to the variation in food availability and the increase of infections^(10,11). Therefore, effective intervention strategies should take this into account when addressing the problem of severe malnutrition and directing the resources of public health policies related to nutrition. More differentiated and targeted approaches are needed to treat severe malnutrition in various settings⁽¹²⁾.

An effective alternative to hospitalization for the treatment of severe malnutrition during the first acute phase has been searched for. Outpatient home care during complex emergencies with imported ready-to-use food in Ethiopia⁽¹³⁾ and standardized care at day-care clinics with locally produced food in Bangladesh⁽¹⁴⁾ were both successful and cheap in treating severe malnutrition in the first phase. Several studies have also shown home-based treatment with ready-to-use therapeutic food or locally produced food as effective and cheaper^(15–17) than inpatient treatment during the second rehabilitation phase of treatment. We hypothesized that day care with locally produced food might be an effective option also for the treatment of severely malnourished children with acute illness and/or anorexia.

Guinea Bissau, in West Africa, is one of the poorest countries in the world⁽¹⁸⁾. It suffered from a civil war in 1998–9 with heavy fighting in the urban area that destroyed wells, electric grids, hospitals and health centres. Seasonal climate variations worsen these effects, causing an increase in morbidity and mortality during the rainy season (June–October), especially among children. Childhood malnutrition was widespread before and during the civil war^(19–21), but information regarding children's nutritional status after the war is still lacking.

Bissau is a city with 300 000 inhabitants, only one general hospital, irregular power supply and an aqueduct providing water to a very limited part of the town. The Hospital 'Comunità di Sant'Egidio' was destroyed during the civil war; therefore facilities for inpatient care were not available until complete hospital reconstruction in 2004.

In order to deliver health care at least in a period of high burden of disease, a short-term intervention was performed for the treatment of paediatric infectious diseases and severe malnutrition during the rainy season. A general paediatric outpatient clinic (POC) was developed in the context of the Hospital 'Comunità di Sant'Egidio' during its reconstruction. The POC was managed by a group of local governmental health personnel and by experienced volunteers belonging to the Italian organization Comunità di Sant'Egidio.

The aim of the present study was to determine the feasibility and effectiveness of a short-term intervention performed during the rainy season for the treatment of severe malnutrition utilizing outpatient day care with locally produced food. The prevalence and type of malnutrition and patient outcomes are described. Individual, social and health indicators are analysed in order to define possible

risk factors for severe malnutrition. The identification of risk factors could guide targeted preventive strategies, necessary to optimize long-term interventions.

Materials and methods

Patient access and routes

The POC was developed in a newly rebuilt part of the Hospital 'Comunità di Sant'Egidio' and comprised a waiting-room with chairs and thatch mats; a reception for patient registration and collection of anthropometric measures; a physical examination room with three examination areas; a pharmacy for drug storage; and the nutritional outpatient unit (NOU) where malnourished or acutely ill children were admitted daily to receive nutritional and pharmacological treatment. The NOU was conceived to permit strict monitoring by the personnel. It is a big room with two windows and a window-pane door with mosquito nets. Mothers and children had access to a bathroom provided with toilet, wash-basin and shower with cold and hot water.

Children requesting medical examination were admitted every day to the POC. Personal, familial and social data were collected upon arrival on an individual patient's printed form by a local nurse able to speak Portuguese, Creole and local languages (Balanta, Fula, Manjacu, Mancanha, Pepel). The recording form was developed according to the social life and general health issues of Guinean people.

Weight and height (or length) were collected by properly trained local nurses and registered on the patient's form. Staff used a standardized 25 kg Salter spring balance and a clinical scale up to 130 kg to weigh patients and a locally built height board to measure them. Medical examination assessed nutritional and clinical status.

Nutritional status definition

Nutritional status was assessed according to weight-for-age, weight-for-height (or length) and height-for-age using the US National Center for Health Statistics/WHO international reference tables and charts^(22,23).

Wasting, stunting and underweight were defined as weight-for-height (or length), height-for-age and weight-for-age of 2SD or more below the corresponding median of the reference population, respectively; while severe wasting, severe stunting and marasmus were defined as weight-for-height (or length), height-for-age and weight-for-age of 3SD or more below the same median, respectively.

In the present study, children with weight-for-age < -3SD from the weight-for-age median value were considered severely malnourished and admitted to the NOU if in poor health status.

General and nutritional protocols

Well-nourished children were sent home with a proper therapy. Malnourished children in good health status were sent home with a supply of vitamins and a therapy for concomitant diseases. Severely malnourished children

in poor health status (i.e. with acute diseases or unable to eat) were admitted to the NOU and followed daily from 08.00 to 16.00 hours for five days a week, until stable and complete recovery. Pharmacological therapies were given upon need. However, all children above 1 year of age received an oral dose of albendazole (200 mg). If an infection was suspected and the child was able to swallow, amoxicillin oral suspension was administered at 50 mg/kg in three equally divided doses. If the child was not able to swallow, ceftriaxone intramuscular injection in a single daily dose of 100 mg/kg was started until the child was able to assume oral treatment. The first dose of medicines was administered by a trained nurse to allow proper understanding of treatment dosage and schedule by illiterate parents.

Nutritional therapy (enriched milk and/or locally prepared porridge and biscuits) was given according to age, degree of malnutrition and feeding capacity: children aged <5 months were given enriched milk according to body weight and mothers were encouraged to breast-feed; children aged >5 months were offered 150 ml of a semi-solid locally produced porridge (100 g plus water up to 150 ml total) twice daily and three locally cooked dry biscuits twice daily (each 247 kJ/59 kcal).

The semi-solid porridge was prepared according to local food recipes after being tested on a group of healthy children. It consisted of black millet, wheat, dry banana, cabaceira, powdered milk, dry egg yolk, sugar, salt and a vitamin mix (Table 1). It was cooked every day in water and oil was added to reach an energy density of 1808 kJ/100 g (432 kcal/100 g).

A bottle of drinkable water and 150 ml milk (or 150 ml of porridge) in waterproof containers were given to every child at the end of the day; mothers were advised to give the amounts and to administer the remaining medications at home.

Mothers received instructions and visual demonstrations on how to feed their children. Daily lessons were given on child hygiene, use of safe water and malaria prevention through graphic tools.

Toy therapy completed emotional recovery and helped children's development.

Children were considered recovered when health status returned to good (i.e. remission from acute illness and

disappearance of anorexia) and weight started to rise steadily for 7 d. Outcomes were recovery (disappearance of acute illness and weight gain), death, defaulting or transfer to hospital. All children were measured and controlled monthly at the POC, until July 2004. No charges were made to the families for any of the services provided.

Data collection

Personal, clinical and nutritional information were transferred from individual patient's cards to Microsoft® Access 2000 (Microsoft Corporation, Seattle, WA, USA). The χ^2 test was used to compare variables within groups.

Results

In total, 2642 children were examined at the POC from 1 July to 12 August 2003, of whom 1355 were males and 1287 were females. Nearly all (97.7%) lived in Bissau; all of the capital's suburbs were represented. Mean age was 4.3 years (range: 1 month–17 years). The main reasons for requesting a medical examination were fever, cough and dermatological problems (Fig. 1).

Social data showed that 70.7% of the examined children used water from unprotected wells dug near the house, 15.7% used water from a well located in the road of residence, 7.7% drank water from the city aqueduct and 5.9% obtained their water from an unspecified source.

Only 2.7% of the children had a bathroom in the house; the others used a latrine located outside, often shared with other families. Some 78.2% lived in mud houses, while 4.8% lived in houses built of brick.

Of the children, 2.7% were orphans. Information on birth conditions showed that 59.4% had been delivered in health centres and 37.6% at home without any assistance; data were not recorded for 3.0%. Over half (59.3%) of the mothers were illiterate while 34.7% of them had a certain degree of education; data were not recorded for 6.0%.

General anthropometry

Weight and height (or length) were recorded for all patients, revealing that 2272 (85.9%) of the examined

Table 1 Nutrient composition of the local porridge

Ingredient	Composition	Energy (kJ/100 g)	Energy (kcal/100 g)
Vegetable oil (g)	10	377	90
Sugar (g)	10	167	40
Black millet/wheat (g)	35	523	125
Dry banana (g)	10	121	29
Full-fat milk powder (g)	30	603	144
Dry egg yolk (g)	5	17	4
Water	Up to 150 ml		
Cabaceira powder	For flavour		
Total		1808	432

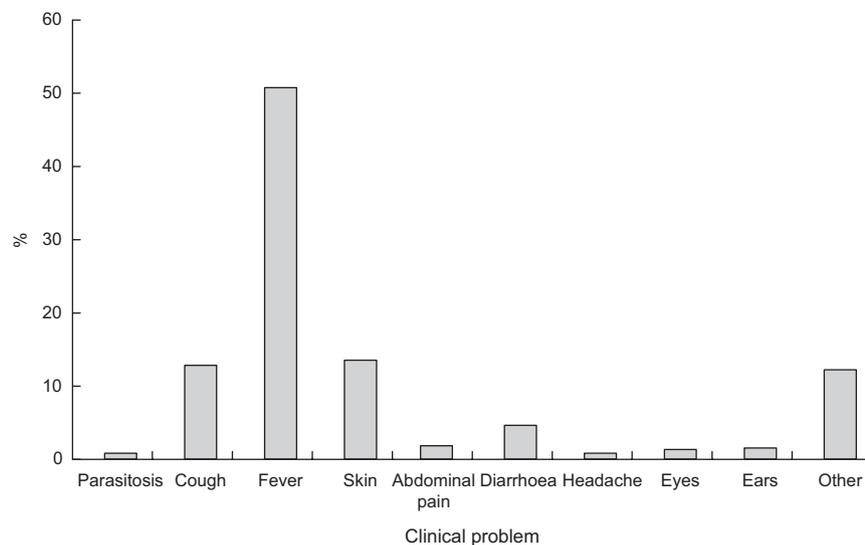


Fig. 1 Main reasons for accessing the paediatric outpatient clinic among the total child population attending: Bissau, Guinea Bissau, 1 July–12 August 2003

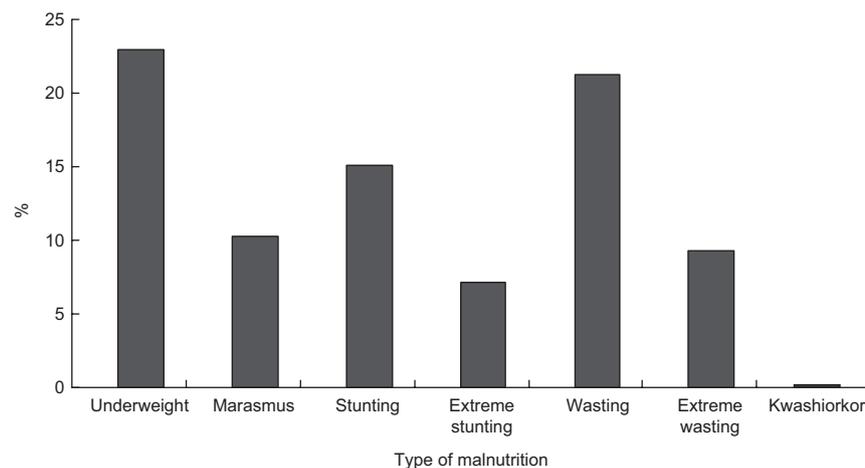


Fig. 2 Prevalence and type of malnutrition among the total child population attending the paediatric outpatient clinic: Bissau, Guinea Bissau, 1 July–12 August 2003

children had a certain degree of malnutrition (Fig. 2). Weight-for-age was $<-3SD$ in 10.3% of the children, of whom thirty-seven (1.4%) were severely malnourished and in poor health status at physical examination and therefore admitted to the NOU. Twenty-seven of these thirty-seven also had weight-for-height $<-3SD$.

Family and social characteristics of severely malnourished children in poor health status

There were twenty-one females and sixteen males among the severely malnourished children in poor health status admitted to the NOU. Mean age was 2.2 years (range: 5 months–13 years), with the majority (89.2%) being <2 years of age. All but two of the children had other diseases (Table 2): oral candidiasis, bronchitis/bronchopneumonia, malaria, gastrointestinal and parasitic infections were the

most common. All severely malnourished infants had various degrees of developmental delay.

Thirty-five of these thirty-seven children came from Bissau; two came from cities within an hour walking distance. All of them came with the mother or the step-mother. None of the children had a stable electricity supply at home; none had a bathroom, only a latrine used by at least three families; none had a water basin with a stable water supply, only a 4–6 m deep well. All came from families with more than eight cohabiting members living in mud houses.

Indicators and risk factors

Significant differences between the general population and the severely malnourished children were observed regarding age and social indicators (Table 3). Severely

malnourished children in poor health status were mainly infants ($P < 0.001$), part of large families ($P < 0.001$), did not have a bathroom at home ($P < 0.001$), did not use aqueduct water ($P < 0.001$) and lived in mud houses ($P < 0.001$). Mother's illiteracy was higher in the malnourished group ($P < 0.001$). No significant difference was observed regarding orphan status, even though the percentage was slightly different (2.7% *v.* 10.8%).

Table 2 Other diagnoses in severely malnourished children in poor health status admitted to the nutritional outpatient unit: Bissau, Guinea Bissau, 1 July–12 August 2003

Disease	<i>n</i>
Malnutrition	37
Dehydration	7
Gastroenteritis	7
Candidiasis/stomatitis	12
Upper respiratory tract infection	1
Lower respiratory tract infection	13
Parasitosis	6
Anaemia	2
Malaria	7
Dermatological conditions	1
Other	4

Outcome of admitted children

Mean length of stay in the NOU was 19 d (range: 2–33 d). All thirty-seven children (100%) recovered and survived; none required transfer to hospital or abandoned treatment. Rate of weight gain was 4.45 g/kg per d (range: 0.97–8.67 g/kg per d), with an overall weight increase that ranged from 1% to 25% of initial body weight (Fig. 3). Recovery from malnutrition and infections was coupled with recovery in psychosocial and neurological development.

At 1 year's follow-up, thirty-six children were alive, had maintained weight gain (with weight-for-height of 0 to +1SD and weight-for-age of 0 to +1SD) and avoided relapse; one child had died from HIV-related tuberculosis.

Costs

The overall cost of the intervention was €13 448. This figure includes foreign health personnel costs (€6219), local personnel salaries, medical supplies, drugs for 2642 children, health education materials for their mothers (€7229) and food for the thirty-seven acutely ill and severely malnourished children, with a mean cost of €5 per child.

Table 3 Comparison of clinical and social characteristics between the general population accessing the paediatric outpatient clinic and the severely malnourished children in poor health status admitted to the nutritional outpatient unit: Bissau, Guinea Bissau, 1 July–12 August 2003

Characteristic	General population		Severely malnourished		<i>P</i> value
	%	<i>n</i>	%	<i>n</i>	
Total		2642		37	
Sex					
Male	51.3	1355	43.3	16	NS
Female	48.7	1287	56.7	21	
Age (years)					
≤1	15.7	415	27.1	10	NS
1–2	14.4	380	62.1	23	<0.001
3–5	37.2	983	2.7	1	NS
≥5	31.6	835	8.1	3	NS
Not specified	1.1	29	–	0	
Origin					
Capital city	97.7	2581	94.6	35	NS
Other	2.3	61	5.4	5	
Mother's education					
Illiterate	59.3	1567	78.3	29	<0.001
Schooling	34.7	917	21.6	8	NS
Not specified	6.0	158	–	0	
Housing					
Mud	78.2	2066	100.0	37	<0.001
Brick	4.8	127	–	0	
Not specified	17.0	449	–	0	
Water source					
Unprotected well in house	70.7	1868	81.1	30	NS
Unprotected well in road	15.7	415	18.9	7	NS
Aqueduct	7.7	203	–	0	<0.001
Not specified	5.9	156	–	0	
Bathroom at home					
No	97.3	2571	100.0	37	<0.001
No. of cohabitants					
≥8	53.3	1408	100.0	37	<0.001
4–8	32.7	864	–	0	
≤4	5.8	153	–	0	
Not specified	8.2	217	–	0	
Orphan					
Yes	2.7	71	10.8	4	NS

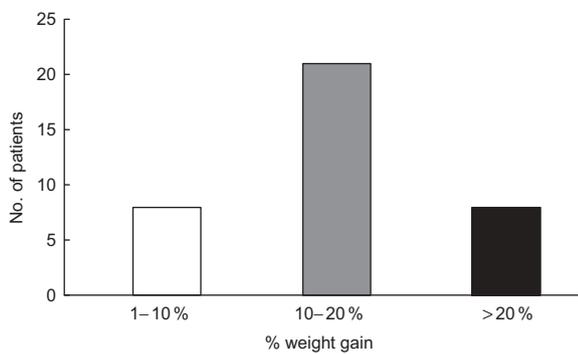


Fig. 3 Classes of percentage weight gain among severely malnourished children in poor health status admitted to the nutritional outpatient unit: Bissau, Guinea Bissau, 1 July–12 August 2003

Local personnel received a top-up salary while organization personnel operated on a voluntary basis.

Discussion

Our survey shows that short-term interventions in post-conflict countries can be successful in addressing priority health problems such as severe malnutrition. It suggests day-care treatment as an effective option even for acutely ill and/or anorexic children with malnutrition.

The overall population of children accessing the POC still live in a precarious situation concerning water supply and housing (86.4% use insecure water, 97.3% do not have a bathroom and 78.2% live in humid mud houses), even though 97.7% dwell in the capital city. These data show a quite lower percentage of the population with sustainable access to improved sanitation and stable water source than expected (according to previous reports)^(3,21,24). This could reflect the difficulty of rebuilding health services and making them accessible to the main part of the population after the war. These elements represent a major risk for spreading gastrointestinal and acute respiratory diseases^(3,25,26). During the period from June to October the increase in precipitation causes frequent contamination of wells and worsens the hygiene of houses and thus housing conditions.

The prevalence of malnutrition, classified through either weight-for-height (30.3% wasted) or weight-for-age (33.3% underweight), was higher than the value found in previous surveys carried out before and during the war in the capital city^(18–21). The rainy season with its high incidence and severity of infectious diseases could be taken into consideration as a partial explanation; moreover, our survey was done in a population of children brought to a POC for a medical visit (and therefore with a health problem). In any case, the rate of malnutrition is the highest reported to date and ranks with values usually seen during complex emergencies and not afterwards⁽⁷⁾.

A group of thirty-seven children (1.4%) was found to be severely malnourished and in poor health status with typical rainy-season diseases⁽¹¹⁾: lower respiratory tract infections, gastroenteritis, malaria and parasitosis.

Several social and health indicators were found to be different between well-nourished and malnourished children. The percentage who live in mud houses as well as the number who do not receive water from the public aqueduct was larger in the malnourished group (100.0% *v.* 78.2% and 7.7% *v.* 0.0%, respectively). The percentage living in overcrowded houses was higher in the group of malnourished children (100.0% *v.* 53.3%) and, overall, more than half of the population examined had more than eight cohabitants. Overcrowding is recognized as an important risk factor for spreading infectious diseases within the family and the residents^(26–28). In poor societies, a larger number of cohabitants reduces the average availability of food: the weaker and younger members of the household are particularly affected by this deficiency^(3,24).

Mean age was lower in the malnourished group (2.2 years *v.* 4.3 years) and the percentage of children under 3 years differed significantly among the two populations (89.2% *v.* 30.1%). The critical age for risk of severe malnutrition seems to be weaning age, when complementary foods are added to the child's diet. In fact, many of the children aged 12–24 months were only breast-fed upon arrival at the clinic and mothers had difficulty in finding appropriate food enjoyed by the children. The mother's illiteracy and ignorance of the basic concepts of child hygiene, nutrition and weaning practices, as well as poor complementary feeding practices, can surely play a role in the origin of malnutrition in this age^(25–27). Malnourished children's age (mainly 12–24 months), the lack of relapse after recovery and the mothers' training during their stay in the clinic show that intensive health and nutrition education for mothers and caregivers aids better results against malnutrition in the long term. The compliance to treatment and follow-up visits was 100% although mothers and children had to come every day. The practice of giving food at the end of the day might have helped compliance, as well as the daily lessons offered to the mothers. An additional element that aided compliance was that the only cost for the family was the transportation fee from home to the centre. Malnutrition prevention strategies could therefore focus on large families, with illiterate mothers caring for children in specific ages such as weaning age.

The rate of weight gain was high; clinical recovery was rapid and stable after 1 year. These data show that in Guinea Bissau severely malnourished children with acute illness and anorexia may benefit from day-care treatment and careful nutritional rehabilitation with locally prepared cheap food. Further prospective and larger studies could confirm our results obtained in field conditions.

The overall cost of the intervention appears to be cheaper than for similar sized published studies^(17,29). One of the elements that could explain this gap is the different social situation and price level of the countries where the studies have been conducted. A limit of our analysis is that it was not able to define the cost per child for children accessing the POC only, separate from the cost per child of those being admitted and treated in the NOU. In any case, the limited cost of the entire effective short-term intervention makes it an attractive model that could produce savings in the medium and long term, thereby releasing resources for other uses.

Conclusion

Addressing childhood malnutrition and the infections related to poor nutritional status is a priority for child health in countries with limited resources^(1,12). Post-conflict countries, experiencing long-term consequences of civil wars and lack of specialized facilities, could address the complex issue of severe malnutrition with day-care management using cheap locally produced food. The chronic lack of resources of these countries suggests intensifying strategies and interventions in seasons with a high burden of diseases and malnutrition, such as the rainy season.

Moreover, NOU could be starting points for rebuilding health networks and health capacities in these settings.

Acknowledgements

The authors declare no conflict of interest. The Veneto Region funded the project. All authors have seen and approved the content and contributed significantly to the work. R.C.: study design, data collection supervision, paper extension, manuscript revision; A.C.: study design, supervision of data collection, paper extension, manuscript revision; P.B.: study design, manuscript revision; C.S.V.: data collection, manuscript revision; L.S.: statistical analysis of data, manuscript revision; V.A.: statistical analysis of data, manuscript revision; L.B.: study design, manuscript revision; L.Z.: paper extension, nutritional supervision, manuscript revision; F.R.: study coordinator, study design, paper extension, manuscript revision.

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