

Socio-cultural, educational, and behavioral determinants of severe acute malnutrition among children aged 6 to 59 months: a study at the Ati Nord Health Center, Chad

Abel Dafogo Djibagaou,^{1,3} Noubaramadji Yamti Suitombaye,^{1,2} Koutaya Dezoumbe,^{1,3} Tafarel Bagio Fofack Lekelem,⁴ Amine Akouya,^{1,2} Aime Simeni Kagus,⁵ Giulia Cappelli,^{2,6} Vittorio Colizzi,^{2,3} Omer Njajou⁷

¹Doctoral School of Advanced Sciences for Sustainable Development, Mbouo-Bandjoun, Cameroon; ²Laboratoire des Grandes Épidémies Tropicales, University Hospital Complex “Bon Samaritain”, N’Djamena, Chad; ³Faculty of Medicine, University Hospital Complex “Bon Samaritain”, N’Djamena, Chad; ⁴Christian Health Association, Cameroon; ⁵Faculty of Health Sciences, University of Buea, Cameroon; ⁶Institute for Biological Systems, National Research Council, Rome, Italy; ⁷Department of Epidemiology, University of Minnesota, USA

Abstract

Child malnutrition remains a major public health challenge in low-income countries. In Chad, nearly 2.2 million people were affected by acute malnutrition in 2021, mainly children, making it the leading cause of child mortality. In the Batha province, the prevalence reached 2.4%. This study aimed to identify the socio-cultural, educational, and behavioral factors associated with severe acute malnutrition (SAM) among children aged 6 to 59 months attending the Ati Nord Health Center (Batha region,

Chad). A descriptive cross-sectional study was conducted from April 18 to June 10, 2022, involving 120 malnourished children and their mothers, selected using a four-stage cluster sampling method. Data were collected through questionnaires and analyzed using Excel 2013 and SPSS 21.0 software. A child was classified as suffering from SAM when their weight-for-age Z-score was below -3 standard deviation (SD). Marasmus accounted for 81.7% of cases, affecting mostly girls, while kwashiorkor was more frequent among boys. Early weaning (65.8%), mostly occurring between 6 and 11 months, was mainly driven by closely spaced pregnancies (38.3%). The introduction of complementary foods before the age of 6 months was observed in 70% of children. Although 74.2% of mothers provided colostrum, most were unaware of its nutritional importance. Drinking water mainly came from boreholes (75.8%), but remained untreated in 80% of households. Moreover, more than half of the mothers (52.5%) first consulted a traditional healer; in 85% of families, health decisions were made exclusively by fathers. Efforts to combat SAM in Ati Nord should focus on community-based awareness strategies that actively involve healthcare workers, traditional leaders, healers, and families. A multisectoral approach is crucial for promoting sustainable changes in nutritional practices.

Correspondence: Abel Dafogo Djibagaou, Laboratoire des Grandes Épidémies Tropicales, University Hospital Complex “Bon Samaritain”, N’Djamena, Chad.
E-mail: dafogodjibagaouabel@gmail.com

Key words: Chad, children, associated factors, severe acute malnutrition.

Conflict of interest: the authors have no conflict of interest to declare.

Ethics approval and consent to participate: the study received approval from local health authorities. Written informed consent was obtained from participants, ensuring confidentiality, anonymity, voluntary participation, and the right to withdraw at any time.

Availability of data and materials: all data generated or analyzed during this study are included in this published article.

Received: 23 September 2025.

Accepted: 30 September 2025.

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0).

©Copyright: the Author(s), 2025

Licensee PAGEPress, Italy

Sahelian Journal of Responsible One Health 2025; 1:574

doi:10.4081/sjroh.574

Publisher's note: all claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.

Introduction

Child malnutrition is one of the most pressing public health problems in low- and middle-income countries, particularly in Sub-Saharan Africa. Globally, it is estimated to be responsible for nearly 45% of deaths among children under five years of age.¹ Among the different forms of malnutrition, severe acute malnutrition (SAM) represents the most serious condition, exposing children to a high risk of morbidity and mortality.²

SAM is characterized by significant weight loss (weight-for-height <-3 z-scores), severe wasting, a mid-upper arm circumference (MUAC) <115 mm, and/or the presence of nutritional edema. Its causes are multifactorial, involving not only poverty, food insecurity, and infectious diseases, but also family, educational, cultural, and behavioral factors.^{3,4} Mothers play a central role in the prevention and early detection of malnutrition. Their educational level and infant feeding practices, as well as their beliefs and attitudes, strongly influence the nutritional status of children.^{5,6}

In Chad, malnutrition remains a major health concern. According to the Demographic and Health Survey,⁷ nearly 13% of children under five suffer from acute malnutrition, including 3% with SAM. In the Batha region, where the Ati Nord Health Center is located, nutritional indicators are particularly alarming, linked to

socio-economic vulnerability, low coverage of health services, and inadequate traditional feeding practices. Despite the implementation of national programs for integrated management of malnutrition, local data on the socio-educational, cultural, and behavioral determinants of SAM remain limited, especially in rural areas. The present study aims to fill this gap by examining the prevalence of SAM among children aged 6 to 59 months at the Ati Nord Health Center, as well as the socio-demographic profiles and the knowledge, attitudes, and practices of mothers regarding child nutrition.

Materials and Methods

Study design, setting, and period

This was a descriptive cross-sectional study aimed at estimating the frequency of SAM and identifying its associated factors among children aged 6 to 59 months attending the Ati Nord Health Center. Data collection took place over a two-month period, from April 18 to June 10, 2022.

Study population and inclusion/exclusion criteria

The target population consisted of mother-child pairs (children aged 6-59 months) consulting the Ati Nord Health Center for conditions related to malnutrition. Children were included if they met the following criteria: aged 6-59 months with clinically diagnosed severe acute malnutrition, defined as a weight-for-height Z-score < -3 standard deviation (SD) according to WHO (2006) standards; parents or legal guardians provided written informed consent. Exclusion criteria comprised children whose mothers either incompletely filled out the questionnaire or withdrew from the study and cases with incomplete data or refusal to participate.

Sample size

A non-probabilistic convenience sampling method was used. The minimum sample size was determined using Lorentz's formula, based on the prevalence of malnutrition in Batha province (2.4%), as reported in the 2021 SMART survey. The minimum required sample size was 36 children.

Data collection

Data were collected using a structured questionnaire administered to mothers, complemented by anthropometric measurements of the children (weight, height, mid-upper arm circumference, and presence of edema). Variables included socio-demographic characteristics (child's age and sex, mother's age and education level, marital status, occupation, religion, and dietary habits). Measurements were performed with standard tools (scale, stadiometer, MUAC tape) and classified according to the WHO (2006) reference charts. Data entry was performed using Microsoft Excel, and statistical analyses were conducted with SPSS version 21.0, utilizing descriptive statistics.

Results

A very low level of maternal education was observed, with 91.7% of mothers having no formal education. The majority were housewives (92.5%), and 57% lived in polygamous households (Table 1).

The most represented age group of children was between 6 and 11 months (Figure 1). The predominant form of SAM was marasmus, accounting for 81.66% of cases, with girls (50.83%)

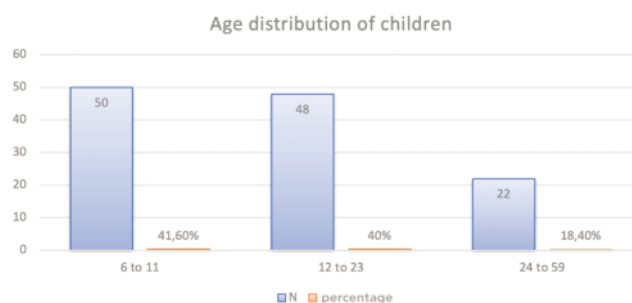


Figure 1. Children's age distribution.

Table 1. Parents' socio-demographic data.

Socio-demographic data		Frequency (n=120)	Percentage (%)
Maternal education level	None	110	91.7
	Koranic school	10	8.3
Maternal occupation	Trader	9	7.5
	Housewife	111	92.5
Marital status	Married	120	100.0
Household type	Polygamous	69	57.5
	Monogamous	51	42.5

Table 2. Distribution of severe acute malnutrition forms by sex among children.

	Kwashiorkor	Marasmus	Total (n=120)	Percentage (%)
Female	9	52	61	50.83
Male	13	46	59	49.16
Total	22 (18.33%)	98 (81.66%)	120	100

representing the most affected group (Table 2). Early weaning was observed in 65.8% of children. This practice was often associated with closely spaced pregnancies (38.3%). Furthermore, 70% of children received complementary foods before the age of 6 months. Regarding breastfeeding, 74.2% of mothers gave colostrum to their child, but the majority were unaware of its nutritional importance (74.2%). From an obstetrical perspective, nearly half of the deliveries (46.7%) took place at home (Table 3).

The analysis of hygiene practices reveals that 80% of households do not treat their drinking water, although boreholes (75.8%) are the main source of supply. From a sociocultural perspective, in 85% of households, health-related decisions are made by fathers. Furthermore, 52.5% of mothers reported relying primarily on traditional medicine as the first option for treating their children (Table 4).

Discussion

This study indicates a predominance of marasmus among the clinical presentations of SAM, corroborating various data reported in Sub-Saharan Africa. For instance, a study conducted in Burkina Faso by Ouedraogo *et al.* documented a comparable finding, with a prevalence rate of 76%.⁸ Marasmus, defined as a form of malnutrition characterized by extreme wasting due to prolonged energy deficiency, is often associated with chronic infections and early weaning. These factors also appeared relevant in our context.

Kwashiorkor, though less frequent, appeared more common in boys. This observation aligns with the findings by Wells *et al.*,⁹ who suggest that pathophysiological differences, particularly in oxidative stress responses and protein metabolism, may explain

Table 3. Mothers' practices and attitudes.

Variable	Category	Frequency (n=120)	Percentage (%)
Administration of colostrum to the child	No	31	25.8
	Yes	89	74.2
If no, why?	Forbidden	10	8.3
	Nothing to report	89	74.2
	Considered dirty	21	17.5
Place of delivery	Health center	43	35.8
	Hospital	21	17.5
	Home	56	46.7
Weaning	No	41	34.2
	Yes	79	65.8
If yes, why?	Milk no longer flowing	32	26.7
	Nothing to report	42	35.0
	Pregnant again	46	38.3
Number of meals per day	Twice	25	20.8
	Three times	38	31.7
	More than three	57	47.5
Is the number of meals sufficient?	No	54	45.0
	Yes	66	55.0
Age at introduction of complementary foods	<6 months	84	70.0
	≥6 months	36	30.0

Table 4. Hygiene and sociocultural results.

Variable	Category	Frequency (n=120)	Percentage (%)
Hand hygiene before meals	Yes	63	52.5
	Sometimes	57	47.5
Source of drinking water	Well	29	24.2
	Borehole	91	75.8
Water treatment before consumption	No	96	80.0
	Yes	24	20.0
If yes, which method?	Boiling	15	12.5
	Bleach	9	7.5
	Nothing to report	96	80.0
Do you visit a traditional healer before going to the hospital?	No	57	47.5
	Yes	63	52.5
What do you do when your child is sick?	Go to the pharmacy	31	25.8
	Self-medication	36	30.0
	Consult a marabout	53	44.2
Who decides on the child's care?	Mother	7	5.8
	Father	102	85.0
	Both parents	11	9.2
Do your children eat from the same plate?	No	39	32.5
	Yes	81	67.5

the sex-based distribution. The issue of early weaning remains a central factor in the deterioration of nutritional status. In our setting, it is often driven by closely spaced pregnancies, reflecting inadequate family planning and limited access to postnatal contraception. Yet, exclusive breastfeeding is recognized as a major strategy for preventing child malnutrition and could alone reduce infant mortality by 13%, according to Victora *et al.*¹⁰

Alarming, a large proportion of children received complementary foods before six months of age, contrary to WHO and UNICEF recommendations. These practices, often involving nutrient-poor foods prepared under precarious hygienic conditions, expose children to diarrhea and enteric infections.¹¹

The lack of water treatment in most households further compounds this risk, potentially leading to environmental enteropathy, as described by Humphrey,¹² and may partly explain the persistent stunting observed in the study population.

Moreover, although the majority of mothers provided colostrum, they were unaware of its importance. This knowledge gap highlights a lack of nutritional education, despite colostrum being rich in immunoglobulins, leukocytes, and growth factors, which play a crucial role in neonatal protection.¹³ This lack of awareness has also been reported before: in Nigeria, only a minority of mothers (35%) recognized its importance.¹⁴

The study also revealed that many women delivered at home, depriving them of essential postnatal counseling on infant nutrition. It is well established that facility-based deliveries promote guidance and support for mothers regarding appropriate feeding practices.¹⁵

Social norms play a major role: the predominance of health decisions made by fathers reflects a lack of women's autonomy. Yet, maternal empowerment is strongly associated with improved child nutritional outcomes, as shown by Smith *et al.*¹⁶

Finally, the frequent reliance on traditional medicine reflects a deep cultural anchoring and mistrust toward formal health services. While this practice is understandable within a given socio-cultural context, it nevertheless hampers early management of malnutrition. To be effective, malnutrition-control programs must therefore adopt a community-based approach, involving not only health workers but also traditional leaders and healers to strengthen family adherence.¹⁷

Conclusions

SAM among children aged 6 to 59 months at Ati Nord Primary Health Center is mostly marasmic (81.7%) and stems from numerous reasons. The study findings underscore the necessity of a multisectoral strategy that incorporates nutrition, reproductive health, education, sanitation, maternal empowerment, and community involvement to prevent SAM, diminish associated morbidity, and foster optimum child development.

References

1. United Nations Children's Fund (UNICEF). Nutrition, for Every Child: UNICEF Nutrition Strategy 2020-2030. UNICEF; 2020. Available from: <https://www.unicef.org/media/92031/file/UNICEF%20Nutrition%20Strategy%202020-2030.pdf>
2. World Health Organization. Guideline: updates on the management of severe acute malnutrition in infants and children. WHO; 2013. Available from: <https://www.who.int/publications/i/item/9789241506328>
3. Black RE, Victora CG, Walker SP, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 2013;382:427-51.
4. Victora CG, Christian P, Vdaletti LP, et al. Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. *Lancet* 2021;397:1388-99.
5. Gebre A, Reddy PS, Mulugeta A, et al. Prevalence of Malnutrition and Associated Factors among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia: A Community-Based Cross-Sectional Study. *J Nutr Metab* 2019;2019:9187609.
6. Gemede HF, Ayele K, Demisew M. Maternal Knowledge and Practices on Complementary Feeding and Associated Factors in Sedal District, Western Ethiopia. *Food Sci Nutr* 2025;13:e70286.
7. UNICEF/MICS. Tchad: résultats de l'enquête MICS 2019 [Chad: 2019 MICS Survey Findings Report]. New York (NY): UNICEF; 2019. Available from: https://mics.unicef.org/sites/mics/files/Chad%202019%20MICS%20Survey%20Findings%20Report_French.pdf
8. Kalmogho A, Dahourou DL, Zoungrana C, et al. Prevalence and factors associated with malnutrition in infants aged 6 to 23 months admitted to paediatric emergencies department at the Yalgado Ouédraogo University Hospital in Burkina Faso. *Mali Med* 2020;35:45-50.
9. Wells JCK. Body composition of children with moderate and severe undernutrition and after treatment: a narrative review. *BMC Med* 2019;17:215.
10. Victora CG, Bahl R, Barros AJ, et al.; Lancet Breastfeeding Series Group. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016;387:475-90.
11. Kosek M, Guerrant RL, Kang G, et al. Environmental Enteric Dysfunction: Pathogenesis, Diagnosis, and Clinical Consequences. *Clin Infect Dis* 2014;59:S207-12.
12. Prendergast AJ, Humphrey JH. The syndrome of environmental enteropathy and growth failure in developing countries. *Paediatr Int Child Health* 2014;34:250-65.
13. Andreas NJ, Kampmann B, Le-Doare KM. Human milk composition: nutrients and bioactive factors. *Pediatr Clin North Am* 2015;62:49-74.
14. Yeshambel Wassie A, Atnafu Gebeyehu N, Abebe Gelaw K. Knowledge, Attitude, and Associated Factors towards Colostrum Feeding among Antenatal Care Attendant Mothers in Gununo Health Centre, Wolaita Zone, Ethiopia 2019: Cross-Sectional Study. *Int J Pediatr* 2020;2020:3453502.
15. Lassi ZS, Haider BA, Bhutta ZA. Community-based care to improve maternal, newborn, and child health. *Int J Gynaecol Obstet* 2016;132:117-21.
16. Malapit HJL, Quisumbing AR. Women's empowerment and impact on child nutrition in sub-Saharan Africa. Manchester (UK): The University of Manchester; 2015.
17. United Nations Children's Fund (UNICEF). The State of the World's Children 2019. New York (NY): UNICEF; 2019. Available from: <https://www.unicef.org/reports/state-of-worlds-children-2019>