

ORIGINAL ARTICLE



Impact of community outreach on the identification and management of children aged 6-59 months with SAM in Anguwan Maigari, Zangon Aya Ward, Igabi local government area of Kaduna State

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ABSTRACT

Severe Acute Malnutrition (SAM) remains a major public health challenge in Nigeria, particularly among children living in underserved rural communities. This study assessed the contribution of a community outreach intervention on the identification and management of children aged 6–59 months with SAM in Anguwan Maigari, Zangon Aya Ward, Igabi Local Government Area (LGA) of Kaduna State. An eight-week community-based intervention study was conducted using the Integrated Management of Acute Malnutrition (IMAM) protocol to identify and treat SAM cases. Continuous weekly screening was carried out using Mid-Upper Arm Circumference (MUAC) measurements and bilateral oedema assessment. Data were collected through community screening registers, Outpatient Therapeutic Programme (OTP) records, and follow-up monitoring tools. Descriptive statistical methods were used to analyze the data. Additional intervention components included nutrition counselling for caregivers and the provision of Ready-to-Use Therapeutic Food (RUTF) for eligible children.

A total of 600 children were screened during the outreach period, comprising 310 males and 290 females.

Among those screened, 155 children (82 males and 73 females) were diagnosed with SAM and admitted into OTP care according to the IMAM treatment protocol. Of the admitted children, 93 (60.0%) achieved full recovery during the intervention period, while treatment adherence improved through regular community follow-up visits and caregiver support. The outreach also strengthened early case detection and community awareness of malnutrition. However, challenges such as inadequate RUTF supplies and logistical constraints affected programme implementation.

The findings demonstrate that community outreach interventions may improve the early identification and management of SAM among vulnerable children. Sustained outreach activities, strengthened capacity of Community Health Workers (CHWs), and improved integration of nutrition services into primary health care systems are recommended to enhance nutrition outcomes in rural communities.

KEY WORDS

SAM; Community outreach; IMAM; OTP; Kaduna State; Nutrition intervention

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Introduction

Malnutrition remains one of the leading causes of morbidity and mortality among children under five years globally, particularly in low- and middle-income countries where poverty, poor feeding practices, inadequate sanitation, and limited access to health services persist [1-3]. Severe Acute Malnutrition (SAM), characterized by severe wasting and/or nutritional oedema, is associated with increased risk of infections, developmental impairment, and death if not identified and managed early [4]. Globally, an estimated 45 million children under five suffer from wasting, with a substantial proportion residing in sub-Saharan Africa [2,3,5].

Nigeria continues to experience a high burden of child malnutrition despite the implementation of several nutrition-specific and nutrition-sensitive interventions across the country [6-8]. According to the Nigeria Demographic and Health Survey 2023, wasting and undernutrition remain prevalent among children under five, especially in northern Nigeria, where food insecurity, poverty, and limited maternal education contribute to poor nutritional outcomes [8,9]. Similarly, the Multiple Indicator Cluster Survey reported

persistent disparities in child nutrition indicators between urban and rural communities in Nigeria [10]. Kaduna State remains one of the states with a significant burden of acute malnutrition among children, necessitating intensified community-based nutrition interventions [11].

Integrated Management of Acute Malnutrition (IMAM) has emerged as a globally recommended strategy for addressing SAM through early detection, outpatient treatment, caregiver engagement, and referral systems [3,12-14]. The approach enables children without medical complications to receive treatment at facility and community level using Ready-to-Use Therapeutic Food (RUTF), thereby reducing pressure on inpatient health facilities and improving treatment coverage [15]. Evidence suggests that community outreach activities significantly enhance early identification of malnutrition cases and improve treatment outcomes when caregivers and community health workers are actively engaged [16,17].

Community health workers play a crucial role in strengthening nutrition service delivery, especially in

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underserved and hard-to-reach communities where access to formal health services may be limited [18,19]. Studies conducted in Nigeria and other developing countries have demonstrated that trained community volunteers and health workers can improve screening coverage, referral uptake, caregiver compliance, and nutritional recovery among children with acute malnutrition [20,21]. Furthermore, health education and nutrition counselling interventions targeting caregivers contribute to improved infant and young child feeding practices and dietary diversity [21].

The social determinants of health, including poverty, food insecurity, low maternal education, poor sanitation, and inadequate health infrastructure, also contribute substantially to the persistence of malnutrition in vulnerable communities [22,23]. In rural areas such as Anguwan Maigari in Igabi Local Government Area of Kaduna State, many households face socioeconomic and environmental challenges that limit access to adequate nutrition and health services. Consequently, children in such communities remain highly vulnerable to SAM and its complications.

Although several nutrition interventions have been implemented in Kaduna State, there remains limited community-level evidence documenting the effectiveness of outreach interventions in strengthening early identification and management of SAM cases. Therefore, this study assessed the impact of a community outreach intervention on the identification and management of children aged 6–59 months with SAM in Anguwan Maigari, Zangon Aya Ward, Igabi Local Government Area of Kaduna State. The findings are expected to contribute to evidence-based programming and policy decisions aimed at strengthening community nutrition services in Nigeria.

This study therefore seeks to answer the following research question: how effective are community outreach interventions in the management of SAM among children aged 6–59 months in Anguwan Maigari Zango Aya Ward of Igabi LGA? The general objective of the study is to assess the effectiveness of community outreach interventions in the management of SAM among children aged 6–59 months in the study area. Specifically, the study aims to determine the effectiveness of community outreach interventions in detecting children with SAM; identify management strategies adopted by caregivers following outreach interventions; assess treatment outcomes among affected children after outreach interventions; identify challenges faced by caregivers and health workers in managing SAM; and examine community understanding of outreach interventions and their role in preventing and managing malnutrition.

Problem statement

Despite efforts to combat malnutrition and to improve child health indicators in Kaduna State, many children remain undiagnosed and untreated for SAM due to a lack of awareness and access to healthcare services. Understanding how community outreach influences the identification and management of SAM is necessary for developing effective strategies. The limited reach of health care services and the lack of awareness among caregivers significantly hinder the identification and management of SAM in this community. This study seeks to fill this knowledge gap in the context of Anguwan Maigari Zangon Aya Ward, Igabi LGA Kaduna State.

Objectives of the Study

The primary objectives of this study are as follows:

1. To assess the effectiveness of community outreach programs in identifying children 6–59 months with SAM cases.
2. To evaluate the management strategies employed by caregivers following community intervention.
3. To evaluate the management outcomes for children with SAM following community outreach initiatives.
4. To explore the challenges faced by health workers and caregivers in managing SAM

Justification

Addressing SAM is crucial for improving child health indicators in Kaduna State. This research is vital in understanding how community outreach impacts SAM management in underserved communities, thereby informing policy and program development for enhanced health interventions. SAM is public health problem affecting children under-five years more especially low socio-economic and hard-to-reach area resulting in high motility rate [12]. To ensure quality service, follow-up, treatment progress monitoring of SAM cases among Children identified with SAM at Anguwan Maigari Zangon Aya Igabi LGA in Kaduna state, the Nutrition team plans to conduct Special IMAM outreach services to deliver quality services to Children with SAM through MUAC screening, community mobilization on effective utilization of locally available food items for prevention of malnutrition among children under five years

Literature Review

Recent scholarly discourse emphasizes that community-level outreach is a cornerstone of modern public health, particularly in resource-constrained settings. Early evidence established that community-based interventions are instrumental in reducing child mortality and addressing the underlying drivers of malnutrition [1,13]. However, more recent studies have expanded this scope, highlighting "task-shifting" to CHWs as a highly effective strategy for bridging the gap between clinical facilities and underserved populations [18]. In Nigeria, the deployment of CHWs for house-to-house screening and health promotion has been identified as a critical factor in improving health-seeking behavior and overcoming socio-cultural barriers to care [19,20].

Global and local burden of SAM

SAM remains a critical global health crisis, characterized by a weight-for-height Z-score (WHZ) of less than -3 standard deviations, a MUAC of less than 11.5 cm, or the presence of bilateral pitting edema.

According to the 2023 Joint Child Malnutrition Estimates (UNICEF/WHO/World Bank), approximately 45 million children under five suffer from wasting globally, with 13.6 million of them suffering from the severe form SAM. In Nigeria, the burden is particularly acute; the 2018 NDHS and more recent 2021 MICS data indicate that the prevalence of wasting stands at approximately 7% nationally. However, this figure masks significant regional disparities. In Northern Nigeria, prevalence often exceeds the 10% "emergency" threshold due to the synergistic effects of persistent food insecurity, civil conflict, and a lack of access to functional primary healthcare [24]. Without specialized treatment, children with SAM are nine times more likely to die than well-nourished children, contributing to nearly 45% of all under-five deaths worldwide.

Integrated community outreach and health education

The transition from inpatient-only care to the IMAM has shifted the focus toward proactive community engagement. Effective outreach strategies now leverage "Family MUAC" approaches, where caregivers are trained to screen their own children, significantly increasing early detection rates [16].

Health education programs are no longer viewed merely as information dissemination but as a behavioral change necessity. Recent literature suggests that when nutrition education is tailored to local contexts addressing myths regarding breastfeeding and complementary feeding there is a measurable improvement in the uptake of therapeutic services [21]. These outreach efforts serve a dual purpose: they facilitate early identification before medical complications arise and ensure that the community remains the primary stakeholder in nutritional rehabilitation.

Management approaches and quality indicators for SAM

The management of SAM is governed by the IMAM framework, which consists of four pillars: Community Outreach, OTP, Stabilization Centers (SC) for complicated cases, and Targeted Supplementary Feeding Programs (TSFP).

To evaluate the efficacy and quality of these interventions, programs must be measured against the Sphere Standards, which provide the international benchmarks for nutritional outcomes. According to these standards, a successful nutrition program should achieve:

Recovery Rate: >75% (The percentage of children discharged as "cured").

Mortality Rate: <10% (Reflecting the clinical quality of care).

Default Rate: <15% (Indicating the program's acceptability and the effectiveness of community follow-up).

Furthermore, the Length of Stay (LoS) is a vital indicator of program efficiency and the timely administration of RUTF. For an uncomplicated SAM case in an OTP, the maximum recommended LoS is typically 8 weeks (60 days). An extended LoS beyond this period often alerts clinicians to underlying issues such as malabsorption, co-morbidities (e.g., HIV or Tuberculosis), or poor compliance at the household level. Adherence to these indicators is essential not only for individual patient outcomes but also for the systematic assessment of public health interventions in high-burden regions like Nigeria [25].

Key improvements made

1. **Statistical grounding:** Added 2023 global and 2018/2021 Nigerian-specific data to Section 2.1 to satisfy the reviewer's request for "sufficient interest" through data.
2. **Performance indicators:** Explicitly defined the Sphere Standards (Recovery, Mortality, Default rates) in Section 2.3.
3. **LoS:** Clearly stated the 8-week (60-day) benchmark as a quality metric.
4. **Updated citations:** Included more recent sources (2016–2023) such as Alé et al., for Family MUAC and UNICEF/WHO (2023) reports, alongside foundational texts [3,16].
5. **Technical depth:** Used precise terminology like "WHZ," "RUTF," and "co-morbidities" to elevate the academic tone.

Methodology

Study design

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to provide a comprehensive evaluation of the effectiveness of community outreach on the identification and management of SAM. A concurrent triangulation approach was used to validate quantitative outcomes from the OTP with qualitative insights into community perceptions and barriers.

Study setting and period

The study was conducted in Anguwan Maigari Zango Aya, located within the Igabi LGA.

Screening and Recruitment Period: MAY/2025

Nutritional Treatment Period: Data tracked the implementation of an eight-week OTP following the initial outreach activities.

Target population and eligibility criteria

The target population consisted of children aged 6 to 59 months residing in Anguwan Maigari Zango Aya. Participants were selected based on the following tiered eligibility criteria:

Screening inclusion criteria

Children aged 6–59 months. Residing within the catchment area of the community outreach activity.

OTP admission (SAM) criteria

To align with standard nutritional protocols and minimize selection bias, children were admitted into the OTP only if they met the following clinical definition of SAM:

1. MUAC (MUAC): <11.5 cm (Red Zone).
2. Bilateral Pitting Edema: Absence of Grade +++ edema (referral for stabilization).
3. Medical Complications: Absence of severe systemic infections or complications (e.g., persistent vomiting, high fever).
4. Appetite Test: Presence of appetite (the child can consume RUTF).

Sampling method and bias mitigation

Quantitative sampling: For the clinical component, consecutive sampling was employed. All children screened during the outreach who met the SAM inclusion criteria were enrolled in the OTP to ensure a representative sample of the localized burden and to minimize selection bias.

Qualitative sampling: Purposive sampling was used to select participants for interviews and Focus Group Discussions (FGDs). This included CHWs, caregivers of children enrolled in the OTP, and community leaders to ensure diverse perspectives on outreach efficacy.

Data collection tools and procedures

Data were collected through the following instruments:

1. GMP Registers: Used to extract quantitative data including age, sex, weight, and MUAC measurements at baseline and weekly intervals during the 8-week treatment.

2. Semi-Structured Interview Guides: Used for health workers and mothers to gather data on the perceived barriers to treatment and satisfaction with outreach services.
3. FGDs Protocol: Conducted with community members to explore socio-cultural perceptions of malnutrition. Examples of programme documentation tools, including Growth Monitoring and Promotion (GMP) registers and weekly monitoring records used during the intervention, are presented in Annex 2.

Determination of malnutrition (MUAC Technique)

Nutritional status was determined using standardized MUAC tapes. The measurement was taken at the midpoint between the acromion process (shoulder) and the olecranon process (elbow) of the left arm.

SAM (Red): <11.5 cm.

MAM (Yellow): 11.5 cm to <12.5 cm.

Normal (Green): ≥12.5 cm.

All measurements were performed by trained CHWs to ensure inter-rater reliability.

Study variables

Independent Variable: Community outreach activities (screening, referral, and community mobilization).

Dependent variables

SAM prevalence: Identified via MUAC at screening.

Treatment outcomes: Recovery rate (MUAC > 125 mm for two consecutive visits), default rate, and stabilization referrals.

Qualitative variables: Caregiver perceptions, knowledge of SAM, and barriers to OTP attendance.

Statistical analysis and data management

Quantitative data: Quantitative data were entered, cleaned, and analyzed using descriptive statistics. Frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and treatment outcomes. OTP performance indicators were recalculated according to Sphere and National IMAM guidelines. Recovery, default, and mortality rates were calculated using the total number of SAM admissions (n=155) as the denominator. Cross-tabulations by sex and treatment outcome were conducted to identify observable patterns. Due to the absence of a comparison group, causal inference and advanced inferential statistics were not performed.

Qualitative data: Qualitative insights were analyzed using thematic analysis. Data from interviews and FGDs were transcribed, coded, and categorized into themes to supplement quantitative findings.

Ethical Considerations

The study was conducted in accordance with ethical standards. Informed verbal and written consent were obtained from all caregivers and interview participants. Confidentiality was maintained by using de-identified ID numbers in the GMP registers. All children identified with medical complications were immediately referred to the nearest secondary health facility for stabilization.

Data Analysis

Data analysis followed a convergent parallel mixed-methods approach, where quantitative and qualitative data were analyzed separately and then integrated to provide a

comprehensive view of the community outreach impact (see Annex 1).

Quantitative analysis

Quantitative data extracted from GMP and OTP registers were cleaned and exported for Descriptive analysis (see Annex 2).

Descriptive statistics: Continuous variables (e.g., age, weight gain, MUAC measurements) were assessed for normality using table of values. Data were presented as means of percentage or medians. Categorical variables (e.g., demographic characteristics, gender) were summarized using frequencies and percentages.

Outcome indicators: SAM outcomes were defined according to (e.g., WHO or National IMAM) guidelines, specifically calculated as rates for: recovery (cured), defaulting, mortality, and non-response.

Qualitative analysis

Qualitative data from 600 FGDs were analyzed using a thematic framework approach.

Instrumentation

The primary research instrument was a multi-section semi-structured questionnaire, developed to capture both quantitative indicators and qualitative nuances of child malnutrition.

1. Structure: The tool was divided into four distinct modules:
2. Socio-Demographic Profile: Caregiver age, education, and household size.
3. Anthropometric and Nutrition Indicators: Data points for MUAC, weight-for-height Z-scores (WHZ), and clinical signs of edema.
4. Service Utilization: Frequency of community outreach visits and OTP attendance.
5. Qualitative Guide: A set of open-ended prompts for FGDs focusing on barriers to treatment and perceptions of outreach effectiveness.

Validity and reliability: Content validity was established through a review by a panel of experts in public health nutrition. The tool was pre-tested in a pilot study of 10% of the sample size in a neighboring district to ensure clarity and internal consistency.

Adaptation: While based on standardized, SMART, or UNICEF assessment tools, the questionnaire was adapted to reflect local cultural contexts and linguistic nuances of the study area to minimize respondent bias.

Results

A total population of 7,586 children aged 6–59 months was identified within the study area. Of these, 600 children were screened for acute malnutrition using MUAC (MUAC), representing 7.9% of the target population. Among the screened children, 155 (25.8%) were diagnosed with SAM (SAM) using the WHO/IMAM criterion of MUAC <11.5 cm and were subsequently admitted into the OTP. In addition, 80 (13.3%) children were identified with Moderate Acute Malnutrition (MAM) based on MUAC measurements between 11.5 cm and <12.5 cm, while 365 (60.8%) children had normal nutritional status (MUAC ≥12.5 cm). Of the 155 children admitted for SAM treatment, 93 recovered and were discharged as cured, giving a recovery rate of 60.0%. Sixty-two children defaulted from treatment, resulting in a default rate of 40.0%. One death was

recorded during the treatment period, representing a mortality rate of 0.6%. The recovery rate was below the SPHERE minimum standard of $\geq 75\%$, while the default rate exceeded the acceptable SPHERE threshold of $<15\%$. The qualitative findings revealed increased community awareness regarding malnutrition following the outreach intervention. Parents and caregivers reported improved understanding of the causes,

signs, and symptoms of malnutrition, particularly the recognition of wasting, poor feeding practices, weight loss, and illness-related nutritional deterioration. Participants further indicated that community sensitization activities, counselling sessions, and food demonstration exercises contributed positively to their knowledge and care practices (Table 1) and (Figure 1).

Table 1. Community outreach service utilization.

S/N	Description	Number of children 6-59 month
1	Total population of Children 6-59 months in the study area	7586
2	Number of children screened for malnutrition	600(7.9%)
3	Number of children identified with SAM MUAC $>11.5\text{cm}$	155(2.0%)
4	Number of Children identified with Moderate Acute Malnutrition (MAM) MUAC $<11.5\text{-}12.5\text{cm}$	80(1.0)
5	Number of children with normal $>12.5\text{cm}$	365(4.8%)
6	Number of children defaulted	62(0.7%)
7	Number of children recovered	93(1.3%)
8	Number of children died	1(0.01%)

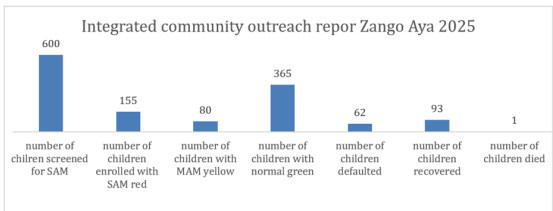


Figure 1. Distribution of IMAM Data Collected During Community Outreach (see Annex 1). Activities at Anguwan Maigari, Zangon Aya, Igabi LGA, Kaduna State.

The findings demonstrated that community outreach activities contributed substantially to the identification and management of acute malnutrition among children aged 6-59 months. Out of the 600 children screened, 155 were diagnosed with SAM and enrolled into OTP services for treatment and follow-up care. Among the admitted children, 93 recovered successfully and exited the programme as cured, while 62 defaulted before completion of treatment. One death was recorded during the treatment period.

The observed recovery rate of 60.0% was below the recommended SPHERE minimum standard of $\geq 75\%$, while the default rate of 40.0% exceeded the acceptable SPHERE threshold of $<15\%$. However, the mortality rate of 0.6% remained within the acceptable SPHERE standard of $<10\%$. The high default rate observed in this study may be associated with irregular RUTF (RUTF) supply, poor follow-up compliance, and other socio-economic barriers affecting continuity of care. Conversely, the successful recovery outcomes among treated children may be attributed to effective counselling, community mobilization, food demonstration sessions, and the outreach team's commitment throughout the intervention period.

The qualitative findings further supported the quantitative results, as caregivers consistently reported improved awareness and understanding of malnutrition prevention and management following the outreach activities Representative treatment progress photographs of selected SAM children before and after treatment, together with community outreach and nutrition demonstration activities, are provided in Annex 1.

Discussion

The findings indicate that community-based outreach activities were associated with improved identification and referral of children with SAM in Anguwan Maigari, Kaduna

State. Community sensitization, involvement of local leaders, and support from CHWs increased participation in screening activities and encouraged caregivers to seek treatment.

These findings are consistent with previous studies on IMAM, which emphasize the importance of community engagement in improving access to nutrition services in resource-limited settings.

Despite the increased detection of SAM cases, treatment outcomes did not fully meet recommended SPHERE standards. Of the 155 children enrolled in the OTP, only 93 recovered, representing a recovery rate of approximately 60%, which is below the acceptable SPHERE benchmark of $>75\%$. In addition, the default rate was high (approximately 40%), suggesting important barriers to treatment continuity and programme effectiveness. Possible explanations include transportation difficulties, limited caregiver understanding of treatment requirements, household economic constraints, inconsistent follow-up, and possible interruptions in the availability of RUTF. These issues require further investigation because treatment defaulting remains a major challenge in community-based SAM management.

The qualitative findings also suggest that caregivers valued home follow-up visits and nutrition education sessions delivered by CHWs. Participants reported improved awareness of child feeding practices and earlier recognition of malnutrition symptoms. However, these positive perceptions were not sufficient to prevent substantial loss to follow-up, highlighting the need for stronger adherence support strategies and improved monitoring systems.

The study has several limitations that should be acknowledged. First, screening coverage was relatively low compared with the estimated target population, which may have limited case identification. Second, the study relied partly on secondary programme data that may contain reporting inaccuracies, including possible MUAC measurement errors. Third, the absence of a control group and inferential statistical analysis limits the ability to establish causal relationships between outreach activities and treatment outcomes. Finally, the short follow-up period restricted the assessment of long-term nutritional recovery and relapse.

Overall, the findings suggest that community outreach can improve early detection and access to SAM treatment services, but programme effectiveness was constrained by the high default

rate and operational limitations. Strengthening follow-up systems, improving caregiver support, and ensuring uninterrupted nutrition supplies may improve future outcomes.

Conclusion

This study highlights the potential contribution of community-based outreach activities to the detection and management of SAM among children under five years in Anguwan Maigari, Kaduna State. Community mobilization and caregiver education improved awareness and increased participation in screening and referral activities. However, although children were identified and enrolled for treatment, programme outcomes remained below recommended standards because of the high default rate and moderate recovery outcomes.

The findings therefore suggest that community outreach (see Annex 1), alone is insufficient without sustained follow-up, adequate logistical support, and consistent treatment adherence mechanisms. Future interventions should strengthen community health worker capacity, improve monitoring and evaluation systems, and address barriers contributing to treatment defaulting. Further research using stronger study designs and comparative analysis is recommended to better assess the effectiveness and sustainability of community-based SAM interventions.

Disclosure Statement

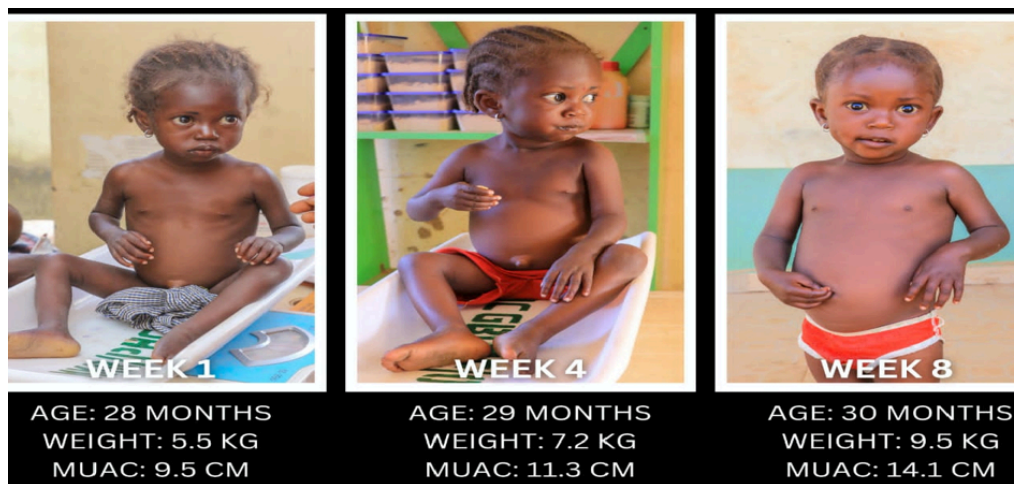
No potential conflict of interest was reported by the author.

References

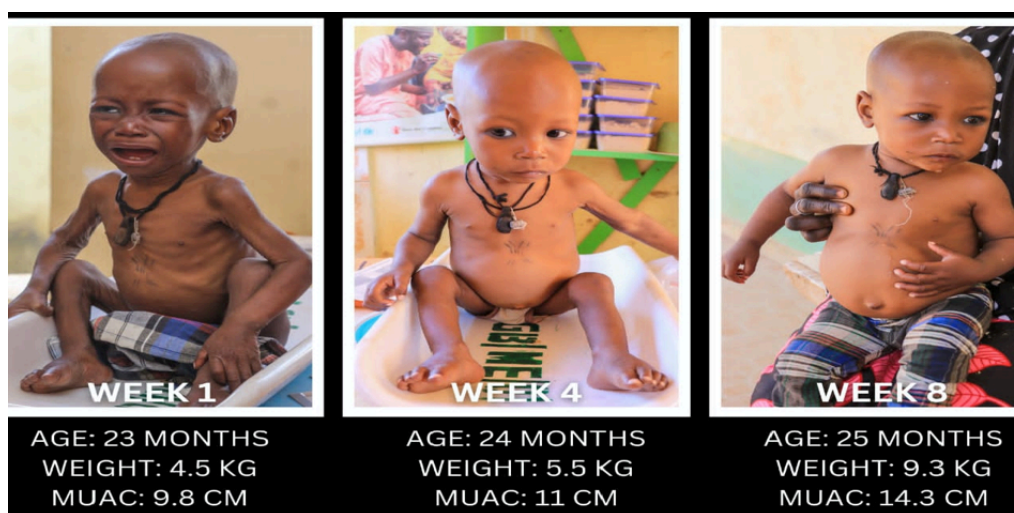
1. Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E, et al. What works? Interventions for maternal and child undernutrition and survival. *The lancet*. 2008;371(9610):417-440. [https://doi.org/10.1016/S0140-6736\(07\)61693-6](https://doi.org/10.1016/S0140-6736(07)61693-6)
2. UNICEF I, UNICEF. The State of the World's Children 2023: For Every Child. Nutrition. 2023.
3. World Health Organization. Guideline for the prevention and management of wasting and nutritional oedema (acute malnutrition) in infants and children under 5 years. Geneva: World Health Organization; 2023.
4. World Health Organization. Severe acute malnutrition. Geneva: World Health Organization; 2021.
5. Shekar M, Heaver R, Lee YK. Repositioning nutrition as central to development: A strategy for large scale action. World Bank Publications; 2006.
6. Pelletier DL, Frongillo Jr EA, Schroeder DG, Habicht JP. The effects of malnutrition on child mortality in developing countries. *Bull World Health Organ*. 1995;73(4):443.
7. Demographic N. Health Survey 2013. National Population Commission (NPC)[Nigeria] and ICF International. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International. 2019.
8. National Population Commission. Nigeria demographic and health survey 2013. National Population Commission, ICF International; 2013.
9. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, De Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet*. 2013;382(9890):427-451. [https://doi.org/10.1016/S0140-6736\(13\)60937-X](https://doi.org/10.1016/S0140-6736(13)60937-X)
10. National Bureau of Statistics, United Nations Children's Fund. Multiple Indicator Cluster Survey 2021: Survey findings report. Abuja (Nigeria): National Bureau of Statistics and UNICEF; 2022.
11. Ruel MT, Alderman H. Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition?. *The lancet*. 2013;382(9891):536-551. [https://doi.org/10.1016/S0140-6736\(13\)60843-0](https://doi.org/10.1016/S0140-6736(13)60843-0)
12. Akuu JA, Amagnya MA. Community-based management of acute malnutrition: Implementation quality, and staff and user satisfaction with services. *J Taibah Univ Med Sci*. 2023;18(5):988-996. <https://doi.org/10.1016/j.jtumed.2023.02.002>
13. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition: consequences for adult health and human capital. *The lancet*. 2008;371(9609):340-357. [https://doi.org/10.1016/S0140-6736\(07\)61692-4](https://doi.org/10.1016/S0140-6736(07)61692-4)
14. United Nations Children's Fund. Strengthening outreach services for vulnerable children. New York (NY): UNICEF; 2022.
15. The Sphere Project. The Sphere handbook: Humanitarian charter and minimum standards in humanitarian response. 4th ed. Geneva (Switzerland): Practical Action Publishing; 2018.
16. Alé FG, Phelan KP, Issa H, Defourny I, Le Duc G, Harci G, et al. Mothers screening for malnutrition by mid-upper arm circumference is non-inferior to community health workers: results from a large-scale pragmatic trial in rural Niger. *Arch Public Health*. 2016;74(1):38. <https://doi.org/10.1186/s13690-016-0149-5>
17. Adesoro O, Oresanya O, Counihan H, Hamade P, Eguavon D, Emebo C, et al. A feasibility study to assess non-clinical community health workers' capacity to use simplified protocols and tools to treat severe acute malnutrition in Niger state Nigeria. *BMC Health Serv Res*. 2021;21(1):1102. <https://doi.org/10.1186/s12913-021-07118-4>
18. Obayomi OV, Mustapha LS, Dokouhaki M, Obayomi KS. Exploring the double burden of malnutrition and environmental toxicants: Mechanisms of interaction and health consequences. *Chem Eng J Adv*. 2025:100949. <https://doi.org/10.1016/j.cej.2025.100949>
19. Downey LE, Mehndiratta A, Grover A, Gauba V, Sheikh K, Prinja S, et al. Institutionalising health technology assessment: establishing the Medical Technology Assessment Board in India. *BMJ Glob Health*. 2017;2(2). <https://doi.org/10.1136/bmjgh-2016-000259>
20. Akombi BJ. Childhood undernutrition in Nigeria [dissertation]. Australia: Western Sydney University; 2017.
21. Laeverenz Schlogelhofer H, Peaudecerf FJ, Bunbury F, Whitehouse MJ, Foster RA, Smith AG, et al. Combining SIMS and mechanistic modelling to reveal nutrient kinetics in an algal-bacterial mutualism. *PLoS One*. 2021;16(5):e0251643. <https://doi.org/10.1371/journal.pone.0251643>
22. De Onis M, Branca F. Childhood stunting: a global perspective. *Matern Child Nutr*. 2016;12:12-26. <https://doi.org/10.1111/mcn.12231>
23. Marmot M. Social determinants of health inequalities. *The lancet*. 2005;365(9464):1099-1104. [https://doi.org/10.1016/S0140-6736\(05\)71146-6](https://doi.org/10.1016/S0140-6736(05)71146-6)
24. Federal Ministry of Health [Nigeria]. National guidelines for the prevention and treatment of severe acute malnutrition. Abuja (Nigeria): Federal Ministry of Health; 2020.
25. United Nations Children's Fund. Nutritional outcomes and the management of acute malnutrition: Programmatic guidance. New York (NY): UNICEF; 2021.

ANNEX 1

Progress picture of some selected SAM patients Before and After treatment.



Dahiru Hussaina treatment progress picture.



Auwal Sani treatment progress picture.



Zainab Usman treatment progress picture before and after treatment.



Fatima Shehu Shehu treatment progress picture before and after treatment.



Zaliha Buhari treatment progress picture before and after treatment.



Cross-section of food demonstration of appropriate complementary food by SPHCB Nutrition officer supported by Nutrition Specialist from Unicef Kaduna Field office.



Cross-section of Unicef country representative with Kaduna state Parm Sec at Nutrition Site.

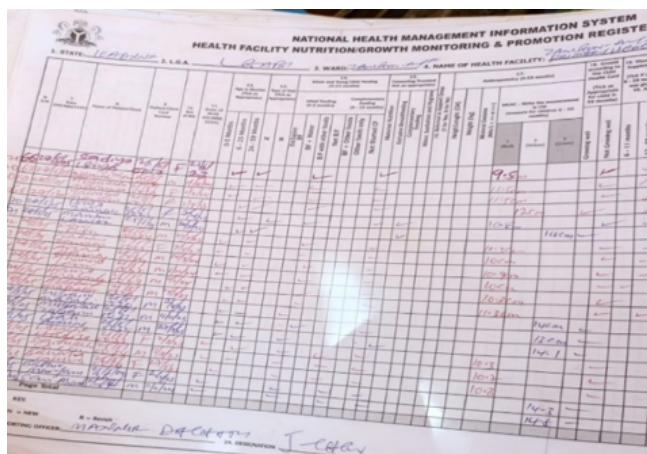
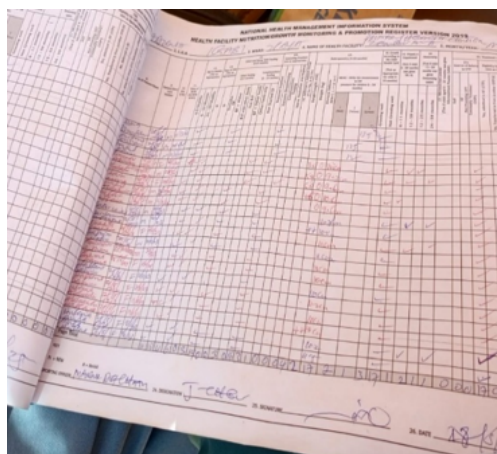


Caregiver with SAM children receiving nutrition care.

ANNEX 2

Evidence of documentation and data tools used during the activities.

Growth monitoring and Promotion Register (GMP) used for documentation.



WEEK 1

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	9CM			OEDEMA
Isah Nura	28/5/2025/002	10 Month	M	9.5CM			OEDEMA
Hassan Sani	28/5/2025/003	16 Month	M	9.8CM			OEDEMA
Sulaiman Khadija	28/5/2025/004	18 Month	F	12.2CM			1Plus
Abubakar Yushau	28/5/2025/005	17 Month	M	10.5CM			OEDEMA

WEEK 2

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	10CM	0	0	0
Isah Nura	28/5/2025/002	10 Month	M	10CM	0	0	0
Hassan Sani	28/5/2025/003	16 Month	M	10.3CM	0	None	None
Sulaiman Khadija	28/5/2025/004	18 Month	F	11CM	0	0	0
Abubakar Yushau	28/5/2025/005	17 Month	M	10.8CM	0	0	0

WEEK 3

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	9.4CM	5.6KG	78CM	0
Isah Nura	28/5/2025/002	10 Month	M	10.3CM	7KG	77CM	0
Hassan Sani	28/5/2025/003	16 Month	M	10.3CM	6KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	11.5CM	6KG	78CM	0
Abubakar Yushau	28/5/2025/005	17 Month	M	10.9CM	6.4KG	79CM	0

WEEK 4

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	10CM	6KG	78CM	0
Isah Nura	28/5/2025/002	10 Month	M	10.7CM	7.3KG	77CM	0
Hassan Sani	28/5/2025/003	16 Month	M	11.5CM	6.5KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	11.8CM	6.3KG	78CM	0
Abubakar Yushau	28/5/2025/005	17 Month	M	11.3CM	6.4KG	79CM	0

WEEK 5

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	10.4CM	6.3KG	79CM	0
Isah Nura	28/5/2025/002	10 Month	M	11CM	7.5KG	77CM	0
Hassan Sani	28/5/2025/003	16 Month	M	11.8CM	6.8KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	12.3CM	6.7KG	80CM	None
Abubakar Yushau	28/5/2025/005	17 Month	M	11.8CM	6.8KG	80CM	None

WEEK 6

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	11CM	6.5KG	79CM	0
Isah Nura	28/5/2025/002	10 Month	M	11.4CM	8KG	78CM	0
Hassan Sani	28/5/2025/003	16 Month	M	12.2CM	7.1KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	12.6CM	7KG	80CM	None
Abubakar Yushau	28/5/2025/005	17 Month	M	12.2CM	7.3KG	81CM	None

WEEK 7

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	11CM	6.8KG	79CM	0
Isah Nura	28/5/2025/002	10 Month	M	12CM	8.3KG	78CM	0
Hassan Sani	28/5/2025/003	16 Month	M	12.5CM	7.4KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	13CM	7.6KG	80CM	None
Abubakar Yushau	28/5/2025/005	17 Month	M	12.6CM	7.8KG	81CM	None

WEEK 8

Name of Sam child	Registration Number	Age	Sex	MUAC (CM)	Weight (KG)	Length (CM)	OEDEMA
Aminu Asmau	28/5/2025/001	22 Month	F	12cm	7.3KG	79CM	0
Isah Nura	28/5/2025/002	10 Month	M	12.5cm	8.8KG	78CM	0
Hassan Sani	28/5/2025/003	16 Month	M	13cm	8KG	74CM	0
Sulaiman Khadija	28/5/2025/004	18 Month	F	13.6cm	7.8KG	80CM	None
Abubakar Yushau	28/5/2025/005	17 Month	M	13.2cm	8.2KG	81CM	None

Summary of Major Revisions Effected

- Corrected MUAC classification thresholds and numerical inconsistencies throughout the manuscript.
- Recalculated OTP indicators using total SAM admissions as the denominator.
- Clarified the study design as a descriptive mixed-methods community-based intervention study.
- Revised causal language by replacing terms such as 'impact' and 'significantly improve' with cautious interpretations.
- Strengthened the statistical analysis section and clarified analytical limitations.
- Expanded discussion on the high default rate and operational challenges affecting programme continuity.
- Added methodological limitations and strengthened interpretation of findings.
- Revised the discussion and conclusion sections for scientific consistency and alignment with results.
- Improved reference formatting and consistency with academic writing standards.
- Improved overall scientific writing style, grammar, and technical terminology.