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Implementation Outcomes of Strategies to Integrate Management of Moderate Acute Malnutrition (MAM) into Ethiopia's Primary Health Care System: Application of the RE-AIM Framework

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Abstract

Background: In August 2019, Ethiopia's Ministry of Health launched the Integrated Management of Acute Malnutrition (IMAM) guideline, mandating Health Extension Workers (HEWs) to screen, admit, and provide biweekly follow-ups with specialized nutritious foods for children under five years of age and for pregnant/lactating women. This replaced the previous emergency-led model overseen by the National Disaster Risk Management Commission (NDRMC) and the World Food Program (WFP).

Objective: This study aimed to assess the implementation outcomes of MAM integration into primary healthcare using the RE-AIM framework, evaluate the status of the designed implementation strategies, and identify operational successes and challenges.

Method: We employed a mixed-methods approach to evaluate the outcomes of Moderate Acute Malnutrition (MAM) integration strategies using the RE-AIM framework. Implementation outcomes were assessed using indicators including reach, acceptability, adoption, fidelity, and implementation effectiveness/appropriateness. We conducted facility assessments on 101 randomly selected health posts and, conducted a retrospective chart review of MAM follow-up cards for children aged 6–59 months and pregnant and lactating women to assess implementation fidelity. Additionally, a structured adoption-assessment tool was developed to evaluate health system support for MAM integration across six WHO health system domains. We also conducted 12 in-depth interviews with the program implementers to explore the contextual factors and perceptions of the implemented strategies. Quantitative data were analyzed descriptively in Stata version 14.1, and qualitative transcripts underwent thematic analysis in NVivo version 14 using Braun and Clarke’s six-phase approach.

Results: In terms of Reach, MAM services were nearly universal across 101 pilot health posts; 99 percent offered the service (88 percent biweekly) screening 66,921 children aged 6–59 months and 22,377 pregnant or lactating women monthly. Regarding effectiveness, chart reviews showed high fidelity to admission criteria (> 97 percent) and correct supplement distribution (90 percent). For Adoption, governance and service delivery integrated fully into primary healthcare, while health financing, information, workforce competencies, and logistics showed partial uptake. Under Implementation, equipment (MUAC tapes at 94 percent, scales at 42 percent) and commodities (RUSF in 75 percent of posts) were broadly available, though storage quality (23.6 percent) and HEW workload remained challenging. Qualitative findings indicated that advocacy, supervision, and mentorship improved HEW adherence to protocol, yet persistent equipment shortages, stockouts, and heavy workloads constrained service delivery. Budget constraints, parallel reporting systems, and staff turnover hindered MAM management integration into primary health care.

Conclusion: The integration of MAM services into Ethiopia's primary healthcare system has achieved strong geographic coverage and frontline engagement; however, it faces resource constraints and supply chain inefficiencies. Securing sustainable financing and reinforcing policy frameworks are essential to sustain quality MAM care within Ethiopia's primary health care system.

Introduction

Acute malnutrition (wasting) is characterized by rapid deterioration in a child's nutritional status, resulting in low weight-for-height, reduced mid-upper arm circumference (MUAC), and nutritional edema [1]. It manifests as severe acute malnutrition (SAM) or moderate acute malnutrition (MAM), with global acute malnutrition (GAM), and the combined prevalence of SAM and MAM serves as a critical indicator of population-level nutritional emergencies[2]. Globally, 14 million children under the age of five suffer from SAM, while 31 million experience MAM [3]. Despite Ethiopia's progress in reducing childhood wasting by five percentage points between 2000 and 2019[4–7], the 2019 Mini Ethiopia Demographic and Health Survey (EDHS) revealed alarming rates: 1.2 million wasted children, including 170,000 with SAM and 1 million with MAM[7]. This trajectory falls short of Ethiopia's 2025 Global Nutrition Targets[8].

Although SAM management has been integrated into Ethiopia's health system since 2008 [2, 9, 10], MAM integration remains nascent. Unlike SAM, which benefits from standardized global guidelines enabling successful health system integration of MAM lacks scalable models for integration, creating a policy vacuum filled by fragmented, humanitarian-focused approaches [11, 12]. A pivotal shift occurred in August 2019, when Ethiopia's Ministry of Health (MoH) launched the Integrated Management of Acute Malnutrition (IMAM) guideline, mandating Health Extension Workers (HEWs) to screen, admit, and provide biweekly follow-ups with specialized nutritious foods (SNF) for children under five years of age and pregnant/lactating women [21]. This replaced the previous emergency-led model overseen by the National Disaster Risk Management Commission (NDRMC) and the World Food Program (WFP) [22]. Currently piloted in 150 woredas, IMAM aims to transition MAM services from parallel humanitarian interventions to routine primary health care.

Evaluations of wasting programs in low-income settings highlight systemic challenges in terms of structural readiness, clinical capacity, and integration [13–17]. However, these assessments have focused almost exclusively on SAM, with little attention to MAM management or combined SAM/MAM approaches. As Ethiopia's Ministry of Health and the World Food Program, supported by implementation research from Addis Ababa University, work to pilot MAM integration into primary health care, there is an urgent need to ensure that adding MAM services does not overwhelm already limited resources or compromise the quality of SAM care.

To address this gap, our broader implementation research effort systematically designed and adapted context-specific strategies using the Expert Recommendations for Implementing Change (ERIC) taxonomy [18] and the RE-AIM framework to evaluate these strategies. The RE-AIM framework is a valuable tool for evaluating nutrition and health promotion programs in various settings. It assesses five dimensions: reach, effectiveness, adoption, implementation, and maintenance [19]. RE-AIM has been widely applied in various health fields, including interventions to improve community-based management of possible serious bacterial infections (PSBI) in young infants[20]. The framework has also been used for systematic reviews of interventions to prevent eating disorders in adults[21] and the evaluation of physical activity interventions in children [22]. However, its use for evaluating MAM integration models

remains undocumented. Therefore, this study aims to assess the implementation outcomes of MAM integration into primary healthcare using RE-AIM, evaluate the status of designed implementation strategies, and identify operational successes and challenges to inform improvements.

Methods

Study setting

The present study was part of a broader implementation research project conducted by the School of Public Health at Addis Ababa University in collaboration with the World Food Program and the Federal Ministry of Health of Ethiopia (FMOH). The aim of the parent project is to develop, pilot, and evaluate context-adapted strategies for sustainably integrating the management of MAM into Ethiopia's national primary health care (PHC) system. The program operates under the governance of a technical advisory committee (TAC) (including WFP, FMoH, NDRMC and implementing partners), which provides strategic oversight.

The present study was conducted in five selected districts in Amhara, Oromia, Sidama, Afar, Somali, and Southern Nations Nationalities and Peoples' Regions. The five districts selected for the implementation research were Girawa (Oromia region), Zala (SNNPR), Aleta Cheko (Sidama region), Mille (Afar Region), and Adadle (Somali Region).

Study design and approach

This study employed a formative, mixed-methods evaluation guided by the RE-AIM framework[23] to assess strategies for integrating MAM into primary health care. We evaluated four RE-AIM dimensions: Reach, Adoption, Implementation/Fidelity, and Acceptability. Quantitative and qualitative data were used to comprehensively identify program successes and areas for improvement.

Quantitative Component

Data collection methods and metrics were aligned with specific RE-AIM dimensions:

1. Reach:

- Quantified by the number of health posts providing MAM services.
- Calculated as the proportion of the target population (children aged 6–59 months and pregnant/lactating women [PLW]) enrolled in care.

2. Implementation/Fidelity:

- Facility Assessments: Evaluated health post infrastructure, staffing, and management practices to gauge fidelity of MAM service delivery.

- Chart Reviews: Analyzed MAM follow-up cards for children (6-59 months) and PLW to assess consistency and quality of care.

3. Adoption

- Mapped MAM integration across all six WHO Health System Building Blocks: service delivery, health workforce, information systems, medical products, financing, and leadership/governance.

4. Acceptability

- Surveyed Health Extension Workers (HEWs) to capture their perceptions of MAM integration and the adequacy of available resources.

Qualitative component

The qualitative component explored the implementation challenges in depth to also compliment the quantitative component of acceptability. Semi-structured interviews with woreda nutrition focal persons and HEWs identified barriers to fidelity, logistical constraints and contextual adaptations.

Sample size and Sampling approach

The study employed a mixed purposive and random sampling design to recruit respondents from all levels of the health system. For the qualitative component, we purposively selected 12 key informants: five woreda nutrition focal persons (one per region), five IMAM Technical Assistants (one per region), one representative from the Ministry of Health, and one from the World Food Program, capturing diverse perspectives on implementation challenges and adaptations. Concurrently, for the quantitative component, we randomly chose 101 health posts for facility assessments and chart reviews.

One IMAM-implementing woredas where the implementation research was conducted and the enhancement strategies were implemented was selected from each of the five regions: Girawa (Oromia), Adadle (Somali), Mille (Afar), Aleta Chuko (Sidama), and Zala (SNNP). Within these pilot woredas, we randomly selected 101 health posts for assessment, distributed as follows: Oromia (31), Somali (15), Afar (11), Sidama (18), and SNNP (26).

All 101 health posts were visited for on-site facility assessment and chart review. At each site, we reviewed approximately 10 follow-up cards for children aged 6–59 months (totaling 798 charts) and 10 cards for pregnant and lactating women (totaling 782 charts). These reviews provided quantitative measures of fidelity, such as record completeness, adherence to follow-up schedules, and the number of beneficiaries reached.

Strategies under evaluation

Table 1 provides an overview of the implementation strategies evaluated to enhance the integration of MAM management into Ethiopia’s primary healthcare system, organized by key thematic categories.

These strategies span leadership and governance, service delivery, workforce development, financing, supply management, and strengthening health information.

Table 1. Implementation Strategies Evaluated for Integrating MAM Services

Category	Sub-category
Leadership	Conduct the advocacy workshop on IMAM program at kebele, woreda and regional levels.
	Strengthening woreda level multisectoral coordination
Service delivery	Supportive Supervision and regular spot checks of IMAM protocol fidelity.
	Introducing the family MUAC approach.
	Avail implementation tools (Guidelines, follow-up cards, registration books, demonstration kits and other supplies).
	Making MAM Day flexible (consider making it multiple days/routine)
	Support in conducting monthly screening
	Strengthen reviewing of IMAM activities at woreda level (Review Meeting)
Health workforce	Provide training on IMAM protocol
	Provide training in logistics documentation & supply management
	Provide training on DHIS-II, documentation, and reporting
	Implement HEWs incentives and motivation mechanisms
	Provide onsite mentorship for HEWs
Finance	Introducing and developing matching fund allocation
	Map and integrate resources
Supplies	Support HEWs in doing timely forecast, quantification, and request of nutrition supplies
	Establish nutrition supplies misuse controlling taskforce committee
	Maintain and re-innovate existing storage facilities
Health information	Strengthening PMT at woreda and health center level ensure data quality
	Introducing one channel reporting system (DHIS-II)

Data collection

The data collection period for both the quantitative and qualitative components spanned from November 25 to December 4, 2024.

Quantitative Data Collection: tools and procedures

Chart Review: A retrospective chart review was conducted to examine the MAM follow-up cards for both children aged 6-59 months and pregnant and lactating women (PLW) at health facilities. This method provides insights into MAM implementation and fidelity.

Facility Assessments: Surveys and structured observations were used to assess the infrastructure, supplies, staffing, and management of health posts. This method provided insights into implementation/fidelity and acceptability.

Program Data Analysis: Program data, such as admission trends, service reach, and the proportion of health facilities implementing MAM management, were collected and analysed from routine program records.

Adoption tool: To evaluate the extent to which key health system functions support the integration of Moderate Acute Malnutrition (MAM) management into primary health care, we developed a structured adoption-assessment tool. This tool comprises six domains (elements), each with specific indicators scored on a three-level scale (full = 2, partial = 1, none = 0). The total scores reflect the degree of adoption and guide targeted strengthening activities.

We developed the tool by first selecting six health system functions: Governance, Health Financing, Health Information, Health Workforce, Medical Products, and Service Delivery, based on the WHO's health system framework. Each indicator was scored on a three-level rubric: Full (2 points) when all criteria were met with documented evidence, Partial (1 point) when some but not all criteria were satisfied, and No (0 points) when the indicator was absent or non-functional. Semi-structured interviews were conducted with ministry of health IMAM focal and regional IMAM technical assistants to clarify the practical implementation of each function.

Qualitative Data Collection

The in-depth interviews explored perceptions, challenges, and the impact of various strategies, and were semi-structured, allowing for in-depth exploration of the specific challenges and changes observed during implementation of strategies to enhance the MAM integration (Supplementary files). Data collection was conducted by proficient qualitative research assistants and investigators. They were conducted in local languages, transcribed, translated into English, and recorded. The interviewers also took notes during the sessions.

Measurement

Table 2 shows the measurement framework used to evaluate the integration of MAM services across RE-AIM dimensions**.**

Table 2. Measurement Framework and Indicators for Evaluating MAM Integration Using the RE-AIM Framework

Dimension	Description	Indicator(s)
Reach	-Service access/level of institutionalization -MAM service is available and integrated within primary health care. -These include mainly biweekly supplementation and follow ups for children.	-% of HFs implementing MAM management routinely/biweekly -Children accessing MAM management and follow up services
Effectiveness/Appropriateness	-Intervention effects on target outcomes	-Indicators under service and clinical outcomes
Adoption	-Intention to try or uptake: the extent to which key health system functions support the integration of MAM management into primary health care.	- MAM integration across all six WHO Health System Building Blocks: service delivery, health workforce, information systems, medical products, financing, and leadership/governance.
Implementation	-Quality of MAM program delivery	-% of HEWs on average trained/mentored on MAM management, logistics and documentation -Mean percentage of materials/ equipment available -Mean percentage of supplies available -% of HEWs supervised on MAM Management -% of health facilities with secure and enough storage for MAM commodities -% U5 children who are followed by the MAM protocol
Acceptability	-Satisfaction of MAM service delivery	-Perceptions of service providers on integrating MAM into primary health care. -Ongoing implementation challenges

Data management and analysis

The collected data were systematically managed and analyzed to ensure quality, accuracy, and reliability. Data collectors participated in a three-day training session to standardize the procedures and minimize inconsistencies. Data collection was conducted digitally using the KoboToolbox, which allowed for the application of real-time validation rules to reduce errors and identify missing or inconsistent responses. After collecting, the data were exported to Stata version 14.1 software packages for cleaning. Data cleaning involved addressing outliers, resolving inconsistencies, and managing missing data points.

For adoption, health system domains (Governance, Health Financing, Health Information, Health Workforce, Medical Products, and Service Delivery) were assessed using predefined indicators scored as follows: 2 points for full achievement, 1 for partial, and 0 for none. For acceptability, provider satisfaction and perceived challenges were assessed using Likert scale responses from structured questionnaires. All quantitative analyses were conducted in Stata v14.1, with descriptive statistics (proportions) and stratification by region.

Qualitative data from the in-depth interviews (IDIs) were transcribed and analyzed using Nvivo software version 14. Thematic analysis was conducted to identify key themes and insights related to ongoing integration challenges within the primary health care system. Thematic analysis followed Braun and Clarke's six-step framework: (1) familiarization through repeated reading; (2) generation of initial codes in NVivo; (3) collating codes into candidate themes; (4) reviewing themes against the dataset; (5) defining and naming themes; and (6) producing a narrative report enriched with illustrative quotations. Analytical memos documented emerging patterns, researcher reflections, and coding decisions throughout the process. The findings were triangulated with quantitative results to enhance the depth and validity of the conclusions.

Results

a. Reach

Nearly universal access to MAM services was achieved across the 101 pilot health posts, with 99 percent (n=100) offering the service and 88 percent on a biweekly schedule (12 percent monthly) (Table 1).

Table 3: Health post providing MAM service (n=101)

	Frequency n (%)
HPs providing MAM service	100 (99.0)
Frequency of MAM service	
Routine (every 2 weeks)	88 (88.0)
Routine (every month)	12 (12.0)

Over the 10-month evaluation, health posts screened an average of 66,921 children aged 6–59 months per month (range: 60,760–76,701) and 22,377 pregnant or lactating women (PLW) per month (range: 19,609–26,399) (Figure 1).

Retention gaps between identification and sustained follow-up were substantial. On average, 28 percent of children and 24 percent of PLW identified with MAM did not complete the recommended biweekly visits. These gaps peaked in August (52 percent for children and 36 percent for PLW) and were lowest in May (13 percent for children) and the early months for PLW (7 percent) (Figure 2 and 3).

b. Acceptability of MAM Services (Provider Perspective)

HEWs demonstrated strong readiness and confidence in delivering integrated MAM services. Nearly all respondents (96%) felt confident managing MAM in children aged 6–59 months and pregnant or lactating women (PLW), and 94% agreed that their training adequately prepared them. District-level advocacy was also effective, with 92% of respondents recognizing its role in supporting service delivery. The commitment to integrating MAM screening and follow-ups into routine duties was equally high (95%) (Supplementary Table 1).

Despite this enthusiasm, HEWs reported mixed perceptions of resource adequacy. While 83% felt supported by their supervisors, fewer than half believed they had sufficient storage space (36%) or equipment (41%) for MAM commodities. Nearly half (49%) experienced frequent stock-outs of key supplies (RUSF and CSB++). Pressure from communities or local authorities to admit clients outside the eligibility criteria was reported by 42% of HEWs, although 48% reported minimal or no such pressure (see Supplementary Table 2).

c. Implementation

Essential equipment was largely available for anthropometry (94% MUAC tapes; 72% child spring scales), but fewer sites had functioning weighing scales (42%) or thermometers (53%) (Supplementary Table 3). Among essential nutrition commodities, 75.3 percent of health posts had ready-to-use supplementary foods (RUSF) in stock and 73.3 percent had CSB++ (corn-soy blend) available. Vitamin A capsules were present in 61.4 percent of posts, while deworming tablets were available in 59.4% of posts (Supplementary Table 3). Monitoring tools showed a high uptake of registration materials: 90.1 percent of the health posts maintained MAM registration books for children and 93.1 percent for pregnant and lactating women, but only 44.5 percent kept up-to-date stock cards for RUSF and CSB++ (Supplementary Table 4). Dedicated storage infrastructure existed at 88.1 percent of posts, with 23.6 percent rated as very good and 56.2 percent as good; 48.3 percent used pallets, 64.0 percent had secure perimeters, and 78.7 percent reported adequate ventilation (Supplementary Table 4).

On average, each health post was staffed by 2.1 HEWs (SD = 1.2). External supervision was nearly universal, with 99% of posts reporting at least one supervisory visit; 76% occurred within the previous three months (Supplementary Table 5). However, over half of the HEWs (52.5%) felt that they had more

work than they could manage, and 5.9% reported always feeling overworked. Training coverage in the past six months was highest for IMAM protocols (70.3%), followed by supply management (61.4%) and HMIS/DHIS-II (46.5%). Despite this, 84.2% of health posts experienced shortages of RUSF or CSB++ during this period (Supplementary Table 5).

Chart review fidelity (Supplementary Table 6) demonstrated high adherence to age and MUAC admission criteria (>97%) and correct SNF distribution (90% of visits). However, only 33% of children received deworming, and 68% of child-visit records documented outcomes of each visit.

d. Adoption of the MAM Program

The overall adoption of IMAM varied across the six WHO health system building blocks (Table 4). Governance was fully established with dedicated Technical Working Groups and coordinated alignment of all nutrition actors under the MOH and Regional Health Bureau leadership. Service delivery has also achieved full integration: outpatient MAM admission and management now managed within the Health Extension Package at health posts.

In contrast, health financing remains a gap: no regular pooled budget or costed action plans at the woreda level support IMAM activities, although HEWs are salaried on the Ministry of Health payroll. Health information systems showed partial adoption, with only selected MAM indicators incorporated into DHIS-II. Workforce adequacy is rated as full, sufficient HEWs cover child health, but competency gaps persist among health managers and HEWs in IMAM-specific technical and organizational skills. Finally, medical products and logistics are partially adopted: transportation and supply management rely on partner support, and woreda offices maintain limited storage capacity for MAM commodities.

Table 4: Adoption of MAM program across the WHO building blocks

Elements	Indicator	Level	Score
Health system functions			
Governance			
Technical leadership	A technical working group for IMAM	Full	2
Regulation and coordination	Regulation and coordination of nutrition actors (including INGOs, CSOs, UN agencies and donors) aligning with the IMAM guideline.	Full	2
Health financing			
Regular budget-pooled funding	Regular budget from pooled funds to support covering financing for IMAM	No	0
Annual costed action plans	Annual costed action plans covering IMAM interventions (woreda level review meeting and supervision)	No	0
Health workers payroll	Staff in health facilities involved in IMAM on government payroll	Full	2
Health information			
Health information system (HIS)	National DHIS-II includes moderate acute malnutrition (MAM) indicators	Partial	1
Health workforce			
Adequate health workers	Adequate number of qualified health workers with geographic coverage for comprehensive child health care	Full	2
Competences of health managers and health workers	Adequate technical and organizational management skills for IMAM implementation/IMAM rollout.	Partial	1
Medical products			
Logistic management system	National logistic management system for drugs and medical supplies including for IMAM	Partial	1
Storage	Adequate storage for MAM product available and managed by woreda health office	Partial	1
Service delivery			
MAM admission and management	Outpatient management of moderate acute malnutrition (MAM) as part of the health extension program (HEP)	Full	2

Qualitative component

Qualitative evaluation examined the achievements of implementation strategies and ongoing challenges across six themes: Leadership and Governance, Service Delivery, Health Workforce, Financial Planning, Supply Chain and Resource Management, and Health Information Systems.

Leadership & Governance

Advocacy workshops and stakeholder engagement were pivotal in shifting perceptions and securing local commitments. Advocacy sessions attended by woreda leaders, community elders, and partners clarified that IMAM was a targeted treatment program rather than general food distribution program. As one woreda nutrition focal explained,

"Advocacy was conducted in the presence of woreda leaders and other stakeholders. There are changes in terms of increased awareness among the community not only among the community but also among the leaders." (Afar IMAM TA)

Local authorities pledged matching funds, improved security for storage sites, and collaborated on road repairs, although regular coordination meetings often fell short because of competing priorities.

"There should be a regular meeting every 15 days or every month, but because there are a lot of other agendas, there is a gap in the regularity of meetings… There is also a gap in fulfilling their mandates and an issue of budget." (Afar IMAM TA)

Community leaders, particularly women's groups and traditional elders, mobilized households for screening, repaired roads to support supply transport, and helped minimize the misuse of therapeutic foods. However, religious leaders were largely excluded from orientation workshops due to a lack of resources, which limited their potential influence.

a. Service Delivery

Supportive Supervision:

Regular, MAM-specific supervisory visits improved HEW adherence to admission/discharge criteria, data documentation, and supply management. One nutrition focal person described how supervisory checklists corrected earlier errors:

"Some HEWs used to register only 12.5 cm of MUAC as discharge criteria. But now, with MAM-specific supportive supervision, we have solved these errors by supporting them to work according to the MAM guideline." (Afar Woreda Nutrition Focal)

Strong supervision correlates with faster recovery times and higher cure rates. In areas with inconsistent oversight, recovery took longer and documentation gaps persisted.

Onsite Mentorship:

Immediate on-the-job coaching helped HEWs to correct errors in real time. In regions where mentorship was implemented, HEWs reported greater confidence and fewer protocol deviations:

"We use a standardized checklist during visits—if there is a gap, we develop an action plan on the spot. If it's a minor error, like admission/discharge criteria, we mentor them immediately." (Afar Woreda Nutrition Focal)

However, resource and staffing shortages have prevented the widespread rollout of mentorship. Many woredas lack trained personnel and budgets for regular visits.

Flexible Service Delivery Models:

Flex-day MAM services, which allow beneficiaries to attend any day, were viewed as a means to reduce overcrowding and defaulter rates. However, HEWs cautioned that without additional manpower and clear guidance from the MOH, flexible schedules risk overburdening staff and confusing communities.

"Although flexible days could help manage large crowds, the workload for HEWs will increase significantly. They are already managing services for over 200 beneficiaries every two weeks." (Afar Woreda Nutrition Focal)

Family MUAC Approach:

Training mothers to use MUAC tapes was recognized as a low-cost, high-impact strategy for early malnutrition detection and for reducing HEW workload. One respondent highlighted its simplicity and community acceptability:

"It's very easy. It needs resources to give orientation. Then the women will start screening at home—our community is very interested in nutrition programs." (Oromia Nutrition Focal)

However, sporadic training, limited coverage, and lack of orientation materials hampered scale-up; only two or three woredas had piloted Family MUAC at the time of evaluation.

b. Health Workforce Development

Capacity Building:

Formal IMAM training, which combines protocol instruction and logistics management, significantly improved HEW performance. HEWs learned to maintain bin cards and manage supplies effectively:

"There was a big issue in this woreda related to bins and cards, but now there is no health post without a functioning bin card or model. This is the result of training and refresher courses." (Oromia Nutrition Focal)

Frequent refresher sessions during review meetings further reinforced adherence, although the high turnover among trained staff necessitated repeated training. Documentation gaps persisted because many newly posted HEWs lacked prior IMAM training.

Workload Management:

HEWs' workloads remained heavy, and engaging additional staff (e.g., Food Distributing Agents, health center personnel, and Woreda staff) helped only where incentives and coordination existed. Food Distributing Agents are often illiterate or unpaid, limiting their usefulness:

"FDAs cannot measure MUAC or register properly; most are illiterate. They cannot help reduce HEWs' workload in any meaningful way." (Afar Woreda Nutrition Focal)

Health center and woreda staff sometimes assisted, but competing responsibilities and budget constraints restricted sustained support.

Incentivizing and Motivating HEWs:

Non-monetary recognition, such as certificates for top-performing health posts, boosts morale. As one respondent noted,

"We could not give money, but we give certificates. Certificates were given to health posts ranked 1–3 for their accomplishments." (Aleta Cheko Nutrition Focal)

However, monetary incentives remained largely unmet due to budget shortfalls and HEWs often felt overworked without commensurate compensation for their efforts.

c. Financial Planning & Budget Integration

Woredas lacked dedicated budgets for IMAM activities, and nutrition partners covered the transportation and commodity costs. Advocacy was needed to integrate IMAM into annual costed plans and leverage the newly formed *kabine* structure at the kebele level for budget allocation.

"But allocating matching fund just for nutrition is difficult at the woreda level... currently, there is resource scarcity at the woreda level due to different reasons." (Afar IMAM TA)

d. Supply Chain & Resource Management

The misuse of RUSF and CSB++ has declined due to community advocacy and engagement with legal authorities. However, intermittent stockouts persisted, and warehousing conditions varied. Storage infrastructure was often inadequate, with only a minority using pallets or secure perimeters. Logistics documentation improved waybills became nearly universal, but ledger books, stock cards, and distribution pads remained unevenly available.

"We found Plumpy'Nut in shops, but it was due to a gap in monitoring; once corrective action was taken, some shops were closed" (Sidama IMAM TA).

e. Health Information & Data Systems

Challenges in the health information system remain significant barriers to effective program implementation. One major issue is the lack of comprehensive training for HEWs and other frontline staff on the proper use of reporting tools, such as the District Health Information System (DHIS). Moreover, the presence of parallel reporting systems remains a persistent challenge. Various stakeholders and partners often require different reporting formats and indicators, leading to duplication of effort and an increased workload for health workers.

"We have reported the gaps repeatedly to the MOH. The reporting should be one channel, the HMIS is online and easy to use, and WFP can also get reports from that. So, we have asked, and it has started, but it has gaps" (Sidama IMAM-TA).

Discussion

The study indicated that while MAM services have achieved near-universal geographic coverage, 99 percent of health posts offer MAM management. Population-level reach remains uneven, with substantial gaps between case identification and follow-up. Health Extension Workers express strong confidence in delivering integrated MAM services and generally welcomed the program; however, persistent concerns about resource adequacy and recurrent stockouts highlight ongoing operational barriers. Although governance and service delivery show robust adoption, critical shortfalls in health financing, information systems, and supply chain management threaten the sustainability of gains.

HEWs demonstrated strong readiness and confidence in delivering integrated MAM services despite mixed perceptions of resource adequacy. Although essential equipment and commodities were generally available, gaps persisted in the monitoring tools and storage infrastructure. studies indicated that integrating nutrition services into existing health programs is generally well-accepted by communities and health workers, leading to increased service utilization and efficiency[24, 25]. Properly trained and supervised community health workers can effectively manage cases of severe acute malnutrition[26, 27]; however, persistent challenges, such as inadequate staffing, insufficient training, and broader health system constraints, often hinder integration efforts[24, 28]. Successful integration requires strengthening health systems, optimizing task allocation, and synchronizing work schedules across sectors[28, 29]. Frontline workers adopt various practices that both facilitate and impede nutrition integration, influenced by societal, organizational, and individual factors[30]. Despite these challenges, integrated approaches have shown potential for improving service coverage and treatment outcomes in countries such as Malawi, Ghana, and Zambia[17].

Adoption of the MAM program varied across the six WHO health system building blocks: governance and service delivery were fully established, whereas health financing, information systems, and logistics

were only partially adopted. Integrating nutritional interventions into health systems and community programs can enhance maternal and child health outcomes. Studies have demonstrated positive impacts when nutrition is incorporated into extension services, health systems, and intersectoral programs[31–33]. Key factors for successful integration include clear leadership, shared priorities, adequate workforce training, and strong coordination across sectors and administrative levels[32, 34]. Community-based integrated programs that utilize local workers can deliver cost-effective, multifaceted services, such as nutrition education, health care, and family planning[35]. However, fully integrating nutrition across all health system functions remains challenging, particularly in financing and supply management[29]. Careful program design, active community participation, and ongoing evaluation are essential for developing sustainable, context-specific integrated nutrition interventions [34].

Qualitative findings highlighted that advocacy and multisectoral coordination have successfully shifted perceptions and fostered local ownership, while targeted supervision and on-site mentorship bolstered HEW performance. Although the Family MUAC approach holds promise, its effectiveness depends on sustainable funding, consistent training, and clear policy support. Addressing persistent gaps in human resources, logistics, and data systems is essential for sustaining and scaling up IMAM integration. These findings align with evidence from other studies that emphasize the value of such strategies not only for MAM but also for broader maternal, newborn, and child health (MNCH) programs[36–38].

Integrating community-based management of acute malnutrition (CMAM) into health systems requires more than technical guidelines; it demands strengthened coordination, targeted training for frontline workers, and a consistent and reliable supply of essential commodities[39, 40]. Supervision is a key driver of improved health worker performance; however, studies highlight the difficulty of maintaining high-quality and regular supervision amidst systemic constraints such as limited resources, competing priorities, and geographic inaccessibility[41].

Task shifting and family MUAC have shown promise in improving community nutrition programs and reducing the workload of health workers. Studies have demonstrated that mothers can effectively screen their children for malnutrition using MUAC tapes, with a sensitivity and specificity comparable to that of community health workers[42, 43]. Integrating the treatment of acute malnutrition by community health volunteers into existing programs has led to better outcomes, including higher recovery and lower default rates[44]. Task shifting is a viable option for improving health system efficiency and access to care in low-resource settings[45].

Supply chain effectiveness is essential for ensuring uninterrupted service delivery; however, health product supply chains in developing countries face numerous challenges, including ineffective distribution networks, stock-outs, and coordination problems among stakeholders [46, 47]. These issues significantly affect access to essential medicines and health technologies. [48]. Addressing both supply and demand constraints in local value chains is crucial for improving nutritional outcomes in developing countries[49].

Finally, information systems are increasingly important for measuring and improving the quality and coverage of health services[50]. However, the implementation of health information systems, such as DHIS, in low- and middle-income countries faces several challenges. While these systems can improve data timeliness and completeness[51], barriers include inadequate infrastructure, unreliable Internet, and lack of training[52]. Parallel reporting systems and unintegrated tools create duplication and increase the workload [53]. To improve DHIS implementation, recommendations include integrating systems, providing regular training and supervision, enhancing infrastructure, and promoting local ownership[52, 53].

This study had several limitations. First, facility assessments and chart reviews provide only a snapshot in time and cannot capture long-term maintenance or evolving trends in service quality without repeated measurements. By design, the evaluation focused on early implementation; therefore, long-term sustainability (maintenance) remains unassessed and will require follow-up studies to understand institutionalization over time. Finally, our reliance on routine data means that chart review findings depend entirely on the completeness and accuracy of MAM follow-up cards; any documentation gaps or data quality issues directly undermine the validity of our fidelity and effectiveness measures.

Conclusions

In conclusion, the integration of MAM services into Ethiopia’s primary healthcare system has achieved remarkable geographic coverage and strong frontline engagement; however, it continues to struggle with resource constraints and supply chain inefficiencies. Moving forward, securing sustainable financing and reinforcing policy frameworks will be essential to sustain high-quality and equitable MAM care within Ethiopia’s primary health care system.

Abbreviations

CMAM	Community Management of Acute Malnutrition
CSB++	Corn-Soy Blend Plus Plus
CSOs	Civil Service Organizations
DHIS	District Health Information System
DRMC	Disaster Risk Management Commission
EDHS	Ethiopia Demographic and Health Survey
HEP	Health Extension Program
HEW	Health Extension Workers
IDI	In-depth Interview
IMAM	Integrated Management of Acute Malnutrition
INGOs	International Non-Profit Organizations
MAM	Moderate Acute Malnutrition
MNCH	Maternal, Newborn, and Child Health
MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
PLW	Pregnant and Lactating Women
RE-AIM	Reach, Effectiveness, Adoption, Implementation, and Maintenance
RUSF	Ready-to-Use Supplementary Food
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SNF	Specialized Nutritious Food
UN	United Nations
WFP	World Food Programme
WHO	World Health Organization

Declarations

Ethics approval and consent to participate

This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving research study participants were approved by the Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University. Additionally, the necessary permissions were

obtained from the relevant federal and local government offices/authorities. Participants were provided with a detailed explanation of the study's purpose, procedures, potential benefits, and risks before they provided their written informed consent. Throughout the process, participants were assured of their right to decline or refuse to answer any or all questions without facing any consequences. Privacy was strictly maintained, and all the information collected was kept confidential. To ensure data security, all audio recordings were stored on a password-protected computer accessible only to the researchers involved in this study.

Consent for publication

Not applicable

Availability of data and materials

The transcripts are available from the corresponding author on reasonable request**.**

Competing interests

The authors declare that they have no conflicts of interest.

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Author contribution

AM, SH conceived the study. AM analyzed the data and wrote the first draft with inputs from SH, YD and SB. All authors have read and approved the final manuscript.

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Figures

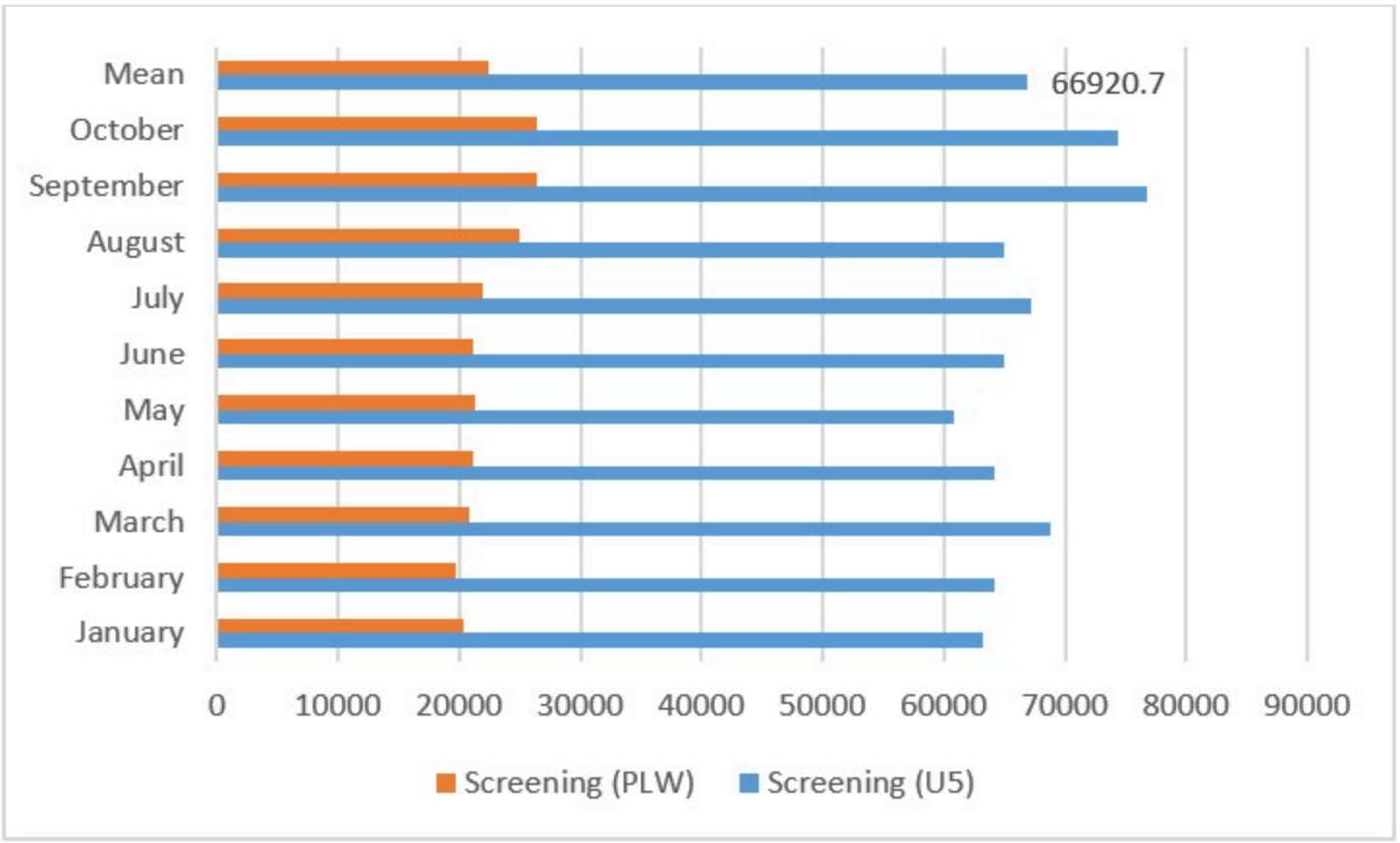


Figure 1

Screening for children 6-59 months and pregnant and lactating women

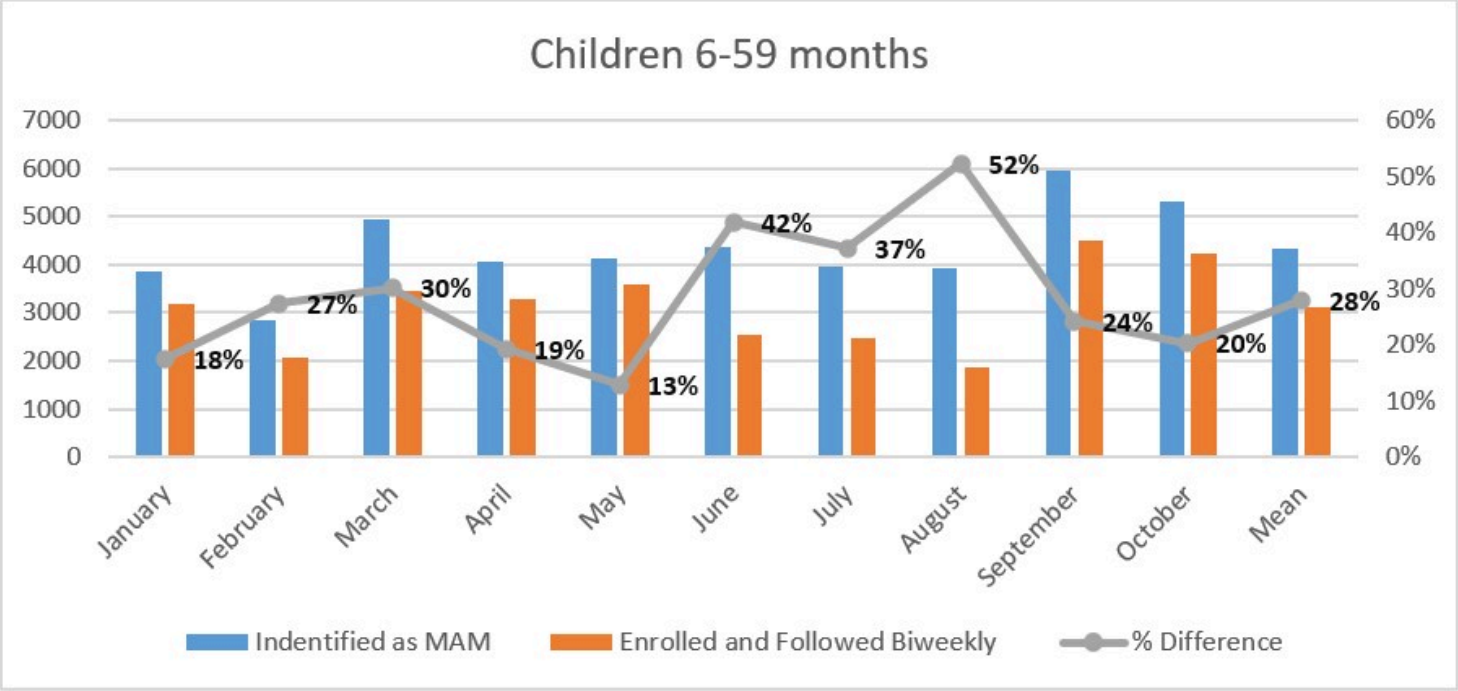


Figure 2

children 6-59 months identified through screening as MAM with those who were subsequently enrolled and followed biweekly

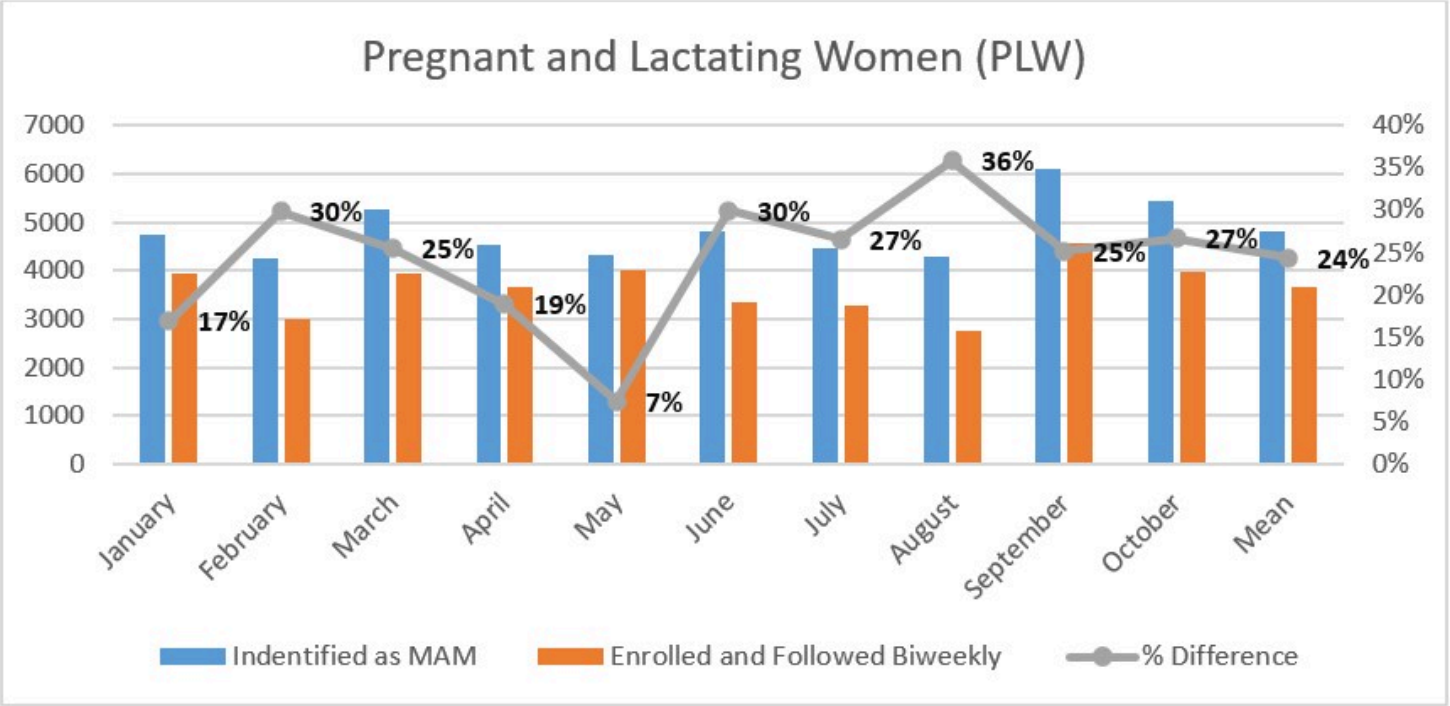


Figure 3

PLW identified through screening as MAM, with those who were subsequently enrolled and followed biweekly.

Supplementary Files

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- SupplementaryTables.docx
- InterviewguideIMAMTAsNutritionfocals.docx
- InterviewguideFMOHWFP.docx