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Unveiling Barriers and Boosters: Assessing Reach and Access of the Integrated Management of Acute Malnutrition Programme in Jhapa District, Koshi Province, Nepal

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ABSTRACT

Background: Acute malnutrition is one of the leading underlying causes of morbidity and mortality among children under 5 years of age. To address this issue, Nepal Government introduced Integrated Management of Acute Malnutrition (IMAM) programme. However, limited evidence on its coverage and accessibility raises serious concerns about effectiveness of the programme. The study aimed to identify the barriers and boosters affecting the programme coverage and to estimate the programme coverage of Jhapa district along with developing the plan of action for improving the programme interventions to increase coverage and accessibility of the programme.

Methods: The study adopts a semi quantitative evaluation of access and coverage (SQUEAC), a mixed method which combines routine programme data, qualitative data through interviews and focus group discussions, direct observations and small area surveys.

Results: The assessment identified 17 boosters and 24 barriers. The barriers included poor coordination, outdated tools, poor record maintaining, lack of refresher training, and low community awareness, while boosters included, trained staff, effective counselling, and regular growth monitoring. Overall coverage found to be 34.4%, with a confidence interval ranging from 23.2% to 47.9%. Point and period coverage calculations based on survey data revealed a point coverage of 15.8% and a period coverage of 27.3%.

Conclusion: The IMAM programme in Jhapa shows the coverage is lower than the global benchmarks indicating that the programme needs the intervention to improve the systemic challenges for increasing the coverage and access.

Keywords: Barriers, Boosters, Hypothesis, Bayesian scale

BACKGROUND

Acute malnutrition remains a critical public health concern substantially contributing in the morbidity and mortality of children under 5 years of age. Globally, an estimate of 42.8 million children under 5 are suffering from wasting among which 12.2 million children are severely wasted (1). Approximately, half of the deaths among children under 5 years of age is attributed by malnutrition primarily in low- and middle-income country (2). Additionally, children with severe wasting are up to 11 times more likely to die from common childhood illnesses compared to the well-nourished children (3). In context of Nepal, despite reducing wasting from 10% in 2016 to 8% in 2022, Nepal remains far behind from achieving national and global targets (4,5). The country is yet to meet its own target set in the Second Long-Term Health Plan (1997–2017) and the Multi-Sector Nutrition Plans (MSNP I and II), of reducing wasting to 5%. The Sustainable Development Goals (SDGs) set even more ambitious targets—reducing wasting to below 5% by 2025 and to 4% by 2030 (5). Realizing this fact and need of speeding

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up the actions to achieve its national and SDG target, of reducing wasting to less than 5%, Government of Nepal introduced integrated management of acute malnutrition across the country. Despite the continuous effort of government of Nepal, many children lacked treatment leaving them at high risk of childhood illnesses.

At the time of this assessment, the treatment of acute malnutrition was being delivered through 30 Outpatients Therapeutic Care Centres (OTCCs). While service is being delivered, no prior coverage or access evaluation of the programme has been undertaken. The only source of the programme update is the existing district health information system which only captures the routine quantitative data providing information on admissions and discharges, but fail to provide insights into programmatic barriers, boosters, or implementation quality.

Recognizing that programme impact depends on both coverage and effectiveness of the service being delivered (6), this assessment used the Semi Quantitative Evaluation of Access and Coverage (SQUEAC) methodology to estimate Integrated Management of Acute Malnutrition (IMAM) coverage, identify access barriers and boosters, and recommend strategies to improve uptake.

- This assessment provided an opportunity to screen the children and aware the mothers who have not accessed the treatment services of IMAM programme for their malnourished children.
- This assessment provided an opportunity to strengthen the capacity of the health workers on IMAM services and facilitated to analyze the programmatic barriers and boosters influencing the programme coverage and access,
- The study provided a glimpse of the programmatic performance on service delivery and its quality, reach and coverage of the programme.
- This methodology supported evidence-based planning by informing a practical and actionable workplan to enhance programme implementation at the district level.th of the study

METHODS

This study employed a Semi-Quantitative Evaluation of Access and Coverage (SQUEAC) methodology to assess the coverage, access, and determinants of the Integrated Management of Acute Malnutrition (IMAM) programme in Jhapa district, Koshi Province, Nepal. This methodology combines both programme routine data with qualitative information on barriers and boosters and estimate the programme coverage (7). The necessary tools were also adopted from the tools available in coverage monitoring network (CMN) which were adapted in the context of IMAM programme implemented in Nepal. The methodology is three stages procedure viz, Stage 1: Identification of barriers and booster of the programme, Stage II: Testing a hypothesis and Stage III: Wide Areas survey.

Stage I: Identification of barriers and enablers of the programme: Routine programme data was analyzed for identifying and selecting high and low coverage areas for sampling the sites for qualitative information. Qualitative information was collected deploying focused group discussions, in-depth interview with mothers and caretakers of Severely Acutely Malnourished (SAM) children who are enrolled in the programme, who defaulted from the programme, who are not covered in the programme, mothers of under 5 years of age children, female community health volunteers, OTCC in charges, nutrition focal persons, influential people. The qualitative information was collected from 18 different location of high and low coverage areas which was guided by the two fundamental principles of 1) exhaustiveness of information up to the point of saturation and 2) triangulation of information that is collected from different sources using alternative methods and cross-checking data until findings become redundant before being validated. The collected qualitative data were analyzed using a Barriers, Boosters, and Recommendations (BBR) framework. In this framework, barriers, boosters and recommendations identified during the qualitative data collection were synthesized along with source, method and locations to gauge the impact of these barriers and boosters on effectiveness and coverage of the programme. The synthesized barriers and boosters were further categorized into eight domains, six of which aligned with WHO's health system building blocks, and two cross-cutting themes: community engagement and Gender Equality and Social Inclusion (GESI). Upon analyzing the data each barrier and boosters were scored using Simple scoring and weighted scoring. In simple scoring all barriers and boosters were given equal score considering that each of them has equal influence on coverage and access of the coverage. In Weighted Scoring each of barriers and boosters were scored based on their strength of the influence of the programme coverage and access. Upon completion of synthesis of qualitative information in BBR framework, a team undertook a concept mapping to identify the interconnection of the identified barriers and boosters influencing the programme.

Stage II: Testing a hypothesis

Based on the finding on stage I, a hypothesis which states that "Coverage of the programme is high in communities having low concentration of disadvantaged

group (DAG) and low in communities having high concentration of DAG in both rural and urban context" was formulated. The DAG in Jhapa particularly include Rajbanshi, Majhi, muslims and santhal communities. This hypothesis was tested and validated adopting active adaptive and door to door case finding method in rural and urban context respectively. Case finding or screening was done in 6 locations each of rural and urban context; 3 locations with low concentration and other 3 location with high concentration of disadvantaged group (DAG) in both rural and urban context. Standard questionnaire adapted from coverage monitoring network was deployed to collect the information from covered and uncovered SAM cases.

Stage III: Wide Area Survey

Upon confirmation of hypothesis in stage II, wide area survey was conducted. This stage involves prior building based on the scoring done in stage I to provide an educated guess on coverage. Sample size for the wide area survey was calculated deploying Bayesian scale. Upon calculation on sample size, number of villages to be visited to identify the required number of sample size following formula was deployed.

The required number of locations required was calculated using:

$$n_{villages} = n/\ [(\text{Average population} \times \%\ \text{children}_{6-59\ \text{months}} \times \text{SAM}_{prevalence})] \times 100$$

Using this, 28 locations were sampled. Cases were identified through Mid Upper Arm Circumference (MUAC) and oedma assessment. Responses from both the covered and uncovered cases were recorded using adapted Coverage Monitoring Network (CMN) questionnaires and coverage tally sheets.

Ethical Approval

Ethical approval from the Nepal Health Research Council (NHRC) was taken prior to the commencement of field activities with additional approvals from the Family Welfare Division (FWD) under the Ministry of Health and Population (MoHP) and district-based Health Office in Jhapa. All participants, including caretakers, Female Community Health Volunteers (FCHVs), health workers, and community stakeholders, were informed about the study's purpose methods, potential risks, and benefits. Written informed consent was obtained prior to conducting interviews, Focus Group Discussions (FGD), and anthropometric assessments. Participation was entirely voluntary, and participants retained the right to withdraw the interview at any point. Confidentiality and anonymity were strictly maintained throughout the study, and data were securely stored with access limited to authorized personnel. The assessment adhered to national ethical standards and respected the dignity, privacy, and autonomy of all participants.

RESULTS

The results of this study are presented by stages as this assessment is 3 phase procedures where the results of one stage lead to another.

Stage I: For the quantitative data, the routine data from Health Management Information System (HMIS) for the year 2023/24 (2080/81 BS) was analyzed for admission over time, discharge over time and Mid Upper Arm Circumference (MUAC) on admission, length of stay was analyzed from HMIS 2.6 (IMAM register) maintained at Outpatient Therapeutic Care Centres (OTCCs).

Quantitative Findings

Admission Over time

Admission of the children into the programme over the time was extracted from District Health Information System-2 (DHIS 2) platform and analysed which showed that in fiscal year 2023/24(2080/81) a total of 216 children were admitted. The admission fluctuated throughout the year. Admissions gradually declined from mid-July to mid-October which spiked in mid-November to mid-December and decreased until mid Feb to mid-March which eventually increased from mid-March to mid-April peaking in mid Jun to mid Jul. In Nepal, usually, mid-May to mid-August is marked by heavy rainfall leading to a higher prevalence of waterborne diseases such as typhoid and diarrhoea, contributing to a spike in Severely Acutely Malnourished (SAM) cases during this period. Admissions also rose from mid-March to mid-April, coinciding with the transition from winter to spring. Seasonal changes during this time, along with the dry conditions prevalent from mid-March to mid-May until mid-June, may increase the risk of illnesses such as seasonal flu, further contributing to the rise in SAM cases. Looking at the median of three months (M3A3), from mid Jul to mid Jan, the admission is in decreasing trend and the trend increased from mid-Jan to mid Feb.

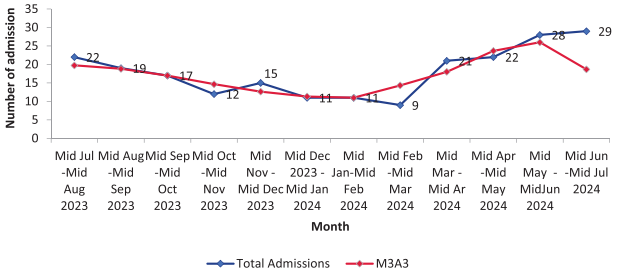

Figure 1. Admission over time

MUAC at admission

MUAC data at admission was analysed from the IMAM register (HMIS 2.6) maintained at 13 OTCCs of 4 rural municipalities and 3 urban municipalities for the period

of mid July to mid-June 2023/24. The analysis reveals that median MUAC is at 115 mm suggesting that 50% of the cases were admitted with a MUAC of less than or equal to 115 mm. The graph shows that MUAC peaks at 110 mm, this tells that most of children are admitted to OTCC when their MUAC is 110 mm. Some cases are admitted late in the programme. MUAC at admission ranges from 100 mm to 150 mm. As per protocol if the cases are admitted on MUAC criteria, MUAC at admission must be less than 115 mm however the graph shows there are cases who are enrolled with MUAC >115 mm this might be either due to wrong admission or wrong recording or most of cases are admitted with Weight for Height/Length (WFH/L) z-score.

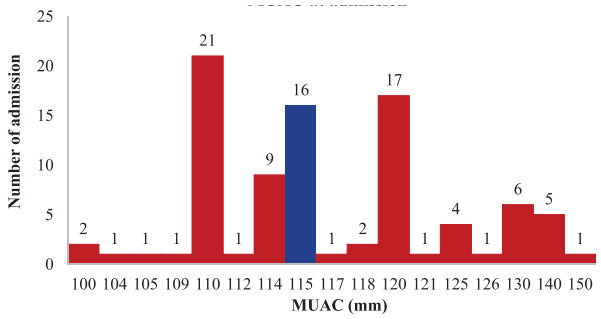

Figure 2. MUAC at admission

Discharges over time

Discharge outcomes for children in Jhapa district indicate that the programme's performance aligns with the Sphere standards, which recommend a recovery rate above 75%, a death rate below 10%, and a default rate under 15%. The data reveals a recovery rate of 75.88%, a defaulter rate of 2.63%, and a death rate of 0.44%, demonstrating compliance with these benchmarks.

However, a month-by-month analysis uncovers that the recovery rate falls short of the Sphere standard during the months of mid Jul to mid-September 2023, and these months correspond to the monsoon season characterized by heavy rainfall, which may impede mobility and access to healthcare services, potentially contributing to lower recovery rates. Mid oct to mid November 2023 encompasses major festivals like Dashain and Tihar, leading to widespread travel and social engagements that might disrupt treatment adherence. Mid November to mid-December 2023 is the harvest season, a period when agricultural activities peak, possibly causing caretakers to prioritize farming duties over healthcare appointments.

The seasonal factors such as monsoon rains, cultural festivities, agricultural commitments seem to influence the programme.

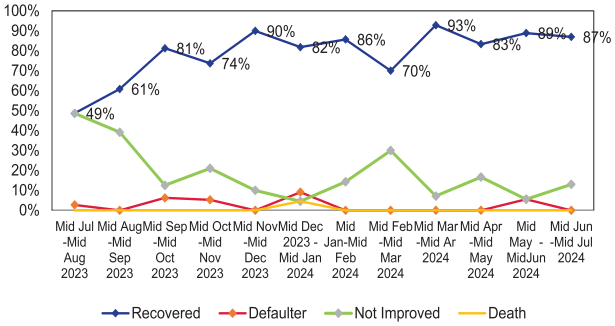

Figure 3. Discharge over time

Length of stay

The data indicates that the median length of stay in the programme for children discharged as recovered is 6 weeks. This means that 50% of children recovered and are discharged within 6 weeks or less. The graph also shows that the minimum length of stay for recovery is 2 weeks, suggesting that some children respond quickly to treatment.

However, the maximum length of stay extends to 13 weeks, suggesting that some children required longer period of treatment. Such prolonged stays may indicate challenges, such as cases with severe comorbidities, late detection of malnutrition, or issues with treatment adherence and follow-up.

The variability in recovery timelines, reflected in the wide range of lengths of stay, could stem from differences in case severity, the quality of programme implementation, or caretakers' compliance.

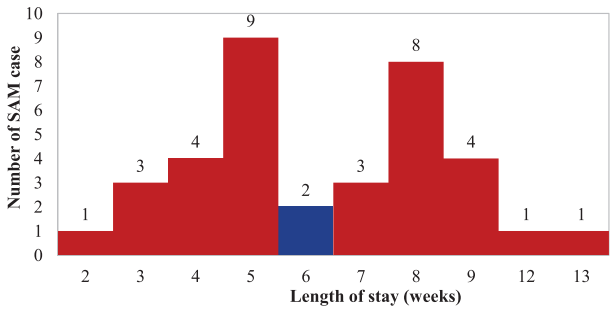

Figure 4. Length of stay (weeks) before discharge as recovered

Qualitative Findings

The assessment identified 24 barriers and 17 boosters impacting the coverage of the IMAM programme. Key barriers included insufficient coordination between different levels of government, lack of updated IMAM guidelines, registers, and referral slips, as well as improper record-keeping in IMAM registers and the non-use of referral slips by OTCCs. Other barriers included the absence of refresher training for health workers and inadequate case follow-up. Additionally, some barriers were linked to a lack of awareness among mothers and caretakers.

Despite these challenges, the IMAM programme continues to operate in the district. Boosters, contributing to the programme's continuation include strong coordination with health facilities/OTCCs, municipalities, district-based Health Office (HO), and influential community leaders. The presence of trained health workers in some OTCCs, effective counselling by health workers, and regular growth monitoring sessions also played a key role in motivating mothers to visit health facilities and ensuring that children under 2 years of age were included in screenings.

Concept Mapping

Each barrier and booster were systematically analyzed to understand its underlying causes and interconnections. The analysis revealed that barriers were not isolated; rather, they were interlinked, with one barrier reinforcing or leading to another. A similar pattern was observed among boosters, where positive factors contributed to and reinforced each other. The concept mapping below illustrates the relationship between the identified barriers and boosters.

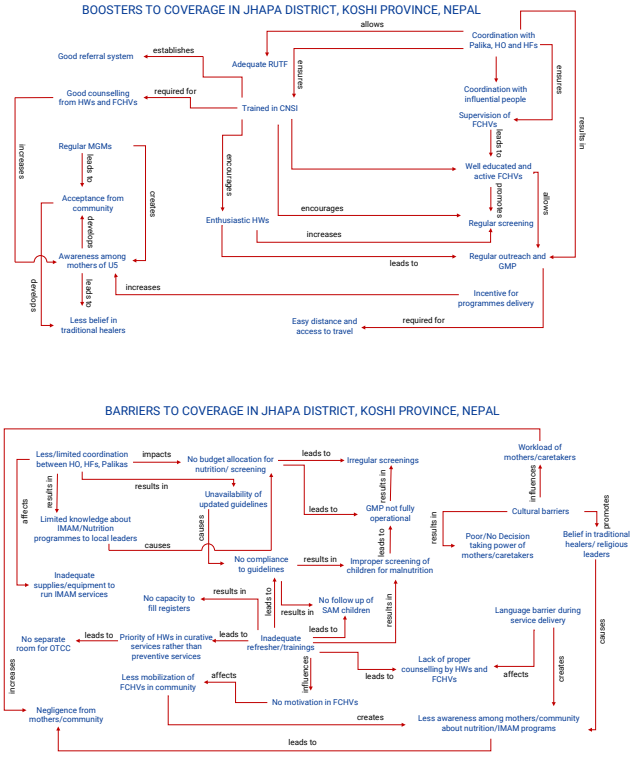

Figure 5. Concept mapping of barriers and boosters

Identified barriers and boosters were scored using Simple Scoring in which each of the barriers and boosters were given equal score. The same were scored using weighted score where each of the barriers and boosters were scored from 1 to 4 depending on the strength of its influence on the programme.

Stage II: Hypothesis Test

Based on the quantitative data and qualitative data collection and analysis, assessment team developed and tested following hypothesis in both rural and urban context.

Hypothesis: "Coverage of the programme is high in communities having low concentration of disadvantaged group (DAG) and low in communities having high concentration of DAG in both rural and urban context".

In this context, "DAG" refers to Disadvantaged Group, specifically focusing on communities facing social exclusion or marginalisation, such as Dalits (historically marginalised castes), and listed in the HMIS. Rural and urban are defined as the areas/locations in rural municipalities and areas/locations in municipalities respectively.

Hypothesis results in rural context

An active adaptive case finding approach was implemented to test the hypothesis. One covered SAM case and 2 uncovered SAM cases were identified in the areas/locations with low concentration of DAG and high concentration of DAG communities respectively. In both areas/locations with low concentration and high concentration of DAG communities, decision rule was satisfied and hence the hypothesis was confirmed. Refer to the table below for detail of hypothesis confirmation.

Table 1. Hypothesis results in rural context

Rural context			
High coverage:	**Calculation of decision rule/ result**		**Validation of hypothesis**
Total SAM cases: 1	Target coverage = 50%		
Covered cases: 1	n = 1 d = 1/2 0.5 0	Number of covered cases (1)>decision rule (0)	Hypothesis is confirmed
Low coverage:	Target coverage = 50%		
Total SAM cases: 2	n = 2	number of covered cases (0) <decision rule (1)	Hypothesis is confirmed
Covered case:0	d = n/2 1		

Hypothesis results in urban context

In the urban context, a total of 2 SAM cases were identified in areas/locations with low concentration of DAG, and 3 cases were identified in areas/locations with high concentration of DAG. Both the cases in areas/locations with low concentration of DAG were covered whereas all 3 cases areas/locations with low concentration of DAG were uncovered. In both the context, decision rule was satisfied and hence hypothesis was confirmed.

Table 2. Hypothesis result in urban context

Urban context			
High coverage:	**Calculation of decision rule/ result**		**Validation of hypothesis**
Total SAM cases: 2 Covered cases: 2	Target coverage = 70% n = 2 d = 2*70% 1.4 1	Number of covered cases (2)>decision rule (1)	Hypothesis is confirmed
Low coverage: Total SAM cases: 3 Covered case:0	Target coverage = 70% n = 3 d = 3*70% 2.1 2	number of covered cases (0) <decision rule (2)	Hypothesis is confirmed

In both rural and urban cases, the decision rule was satisfied and hence the hypothesis was confirmed and validated.

Stage III: Wide Area Survey/Likelihood survey

A total of 32 cases were to be identified from 28 different locations however, the assessment team succeeded to identify 22 SAM cases during stage III. Among 22 SAM cases, only 3 children (all female) were enrolled in the treatment programme, while another 3 cases were in the recovery phase after receiving treatment. However, 16 cases remained uncovered, meaning they were not receiving treatment at the time of the survey.

Among these 16 uncovered cases, 7 were male and 9 were female. Notably, 3 children had previous exposure to treatment services. One child had been discharged as cured, while another had been referred from the OTCC to the Nutrition Rehabilitation Centre (NRC) in Bhadrapur and later advised to seek further treatment in Kathmandu. This child had previously been admitted to Kanti Children's Hospital, Kathmandu and was later discharged as normal. Another child was identified with a congenital disease.

Upon administrating 13 caretakers of uncovered cases who had never taken their children to OTCC, the key reasons identified included lack of time and accessibility issues, as many mothers reported that OTCCs were too far from their settlements. Additionally, some mothers were unaware of OTCCs and the services available. In other cases, caretakers had taken their children to health facilities, but health workers did not inform them that their children were malnourished, leading to missed opportunities for timely intervention.

Among a total of 22 SAM cases identified, 3 cases were enrolled or covered in the treatment (Cin), 3 cases were in the recovery phase within the programme (Rin), and 16 cases were uncovered (Cout) and not receiving treatment. Using a Bayesian analysis with a prior coverage estimate of 40.4%, the overall coverage was calculated to be 34.4%, with a confidence interval of 23.2% to 47.9%. a z-value of 0.92 and a p-value of 0.359, indicating no statistically significant difference from the prior coverage estimate. Similarly, the point and period coverage were found to be 15.8% and 27.3% respectively.

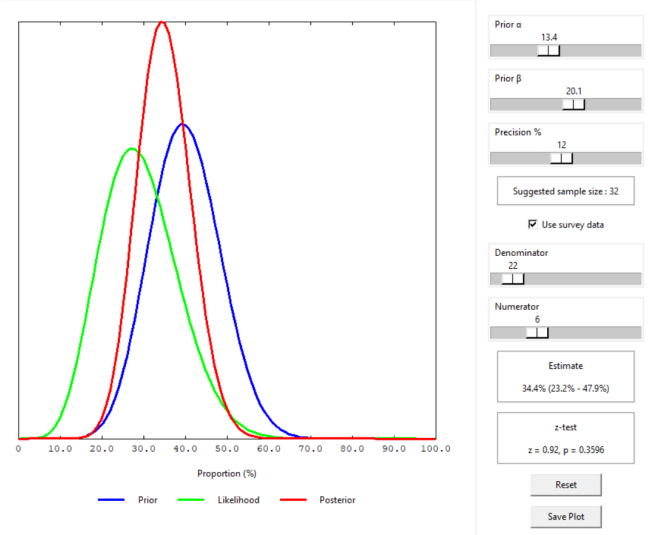

Figure 6. Coverage estimation using Bayesian Scale

DISCUSSION

The SQUEAC assessment in Jhapa district revealed that the Integrated Management of Acute Malnutrition (IMAM) programme coverage remains below global Sphere standards, which recommend a minimum of 50% coverage in rural and 70% in urban contexts. The estimated Bayesian coverage of 34.4%, with point and period coverage of 15.8% and 27.3% respectively, indicates low access and utilization of services for children with severe acute malnutrition (SAM). These findings are comparable to those of previous SQUEAC and SLEAC assessments conducted in Nepal and other low- and middle-income countries (6,8,9)

Similar study conducted in Saptari district of Nepal using SQUEAC methodology also reported limited community awareness, weak follow-up systems, and inadequate screening by FCHVs as major barriers to the low coverage of the programme (10).

Similar trends have been reported from SQUEAC and SLEAC studies conducted in other South Asian and African contexts. In Bangladesh and Ethiopia, for instance, assessments found coverage ranging from 25% to 45%, limited by weak community mobilization, health worker turnover, and irregular MUAC screening

(6). The countries such as Niger and Malawi achieved coverage exceeding 60% by ensuring regular community-based screening, adequate supply management, and strengthened supervision mechanisms (11). This suggests that coverage of the programme can be improved ensuring regular screening, adequate supply of commodities and strengthening the monitoring and supervision of the programme.

The findings in Jhapa identified weak coordination between different tiers of government, poor record-keeping, lack of refresher training, and limited caretaker awareness are major barriers which were also documented in other SQUEAC studies from Nepal and elsewhere (8,12). The low awareness among caretakers hinders early detection and enrolment which was clearly reported in study conducted in Saptari (10). Removing these barriers presents several challenges. Strengthening coordination requires sustained political commitment and clarity of roles across federal, provincial, and municipal levels. Addressing human resource gaps and refresher training needs is constrained by high staff turnover and limited training budgets. Similarly, improving caregiver awareness demands long-term investment in community engagement, rather than short-term information campaigns. These challenges underscore the need for integrated, multi-sectoral approaches rather than standalone programme fixes.

Despite these constraints, the study identified several boosters that support IMAM programme. The presence of trained health workers in some OTCCs, effective counselling practices, regular growth monitoring sessions, and engagement of influential community leaders were strongly associated with increased service uptake. These boosters exist where local leadership prioritizes nutrition, supervision is active, and health workers feel confident and supported in delivering services. Similar positive associations were identified in successful SQUEAC implementations in Congo, where monitoring of the activities, availability of the tools, capacitation of service providers enhance the programme coverage (7). Strengthening these boosters, particularly through capacity building of FCHVs for active case finding and capacity building of service providers and increasing awareness among caretakers could substantially increase treatment coverage.

To improve programme coverage, evidence from global and national SQUEAC analyses suggests capacity building of the health service providers, prioritizing Social Behaviour Change Communication (SBCC) for caretakers, ensuring programme commodities supply, strengthening coordination is must. Implementation of these measures requires sustained local government ownership and supportive supervision to ensure quality service delivery.

There are some limitations to this study. First, the timing of the coverage assessment was not optimal, as it did not align with the period when SAM cases are most prevalent. Conducting the survey during the lean season would have likely resulted in the identification of a higher number of cases. One of the challenges in the assessment was the frequent cross-border movement between from Jhapa (Nepal) to India due to the open border. Many families regularly travelled to India, often visiting relatives for extended periods. As a result, field researchers faced difficulties in locating children for assessment.

In Jhapa-3, Tagandubba, the Muslim community was uncooperative and did not respond the field researchers. Despite the presence of children in the households, some families denied having any children, making it difficult to conduct assessments. The lack of trust in programme and outsiders posed a significant challenge taking anthropometric measurement hindering in case finding process.

Overall, the Jhapa assessment aligns with evidence from Nepal and the other region, demonstrating that low IMAM coverage is primarily driven by systemic, behavioral, and equity-related factors rather than programme design flaws. Strengthening IMAM coverage will require reinforcing existing boosters such as trained personnel and community trust while addressing structural barriers through improved coordination, refresher training, reliable supply systems, and sustained SBCC. These measures are essential to translate the programme's clinical effectiveness into population-level impact.

CONCLUSION

This is the first assessment conducted in the district after the programme's two-year implementation period. It provided valuable insights into the barriers and boosters influencing programme coverage and reach, enabling policymakers to develop an actionable work plan aimed at improving access to and coverage of the programme.

Acknowledgement

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Conflict of Interest

The authors declare no conflict of interest.

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