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Piloting Multiple Micronutrient Supplementation Within the Routine Antenatal Care System in Ethiopia: Insights From Stakeholders

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ABSTRACT

In low and middle-income countries, addressing maternal and child nutrition needs is crucial. Prenatal multiple micronutrient supplementation (MMS) holds promise in reducing low birthweight and preterm births. Ethiopia is considering a transition from the provision of iron-folate supplementation to the provision of MMS in antenatal care, guided by WHO guidelines. This paper explores stakeholders' early perceptions and experiences in piloting that transition in five Ethiopian regions, informing decision making about future policy and scale-up. We used a qualitative study involving interviews and document reviews to assess the MMS pilot, analyzing themes with Nvivo 12 software. Key informant interviews revealed challenges such as supply chain issues and funding constraints, along with proposed improvement strategies such as closer coordination within existing structures. The importance of engaging with communities to create demand was emphasized, as was the need for capacity-building efforts utilizing existing staff in the health system with a clear plan for ongoing refresher training. Finally, enhancing the monitoring and evaluation framework, including a dedicated regional team for supportive supervision, was vital for accountability. In conclusion, prioritizing supply chain strengthening, community engagement through demand creation, coordination, and continuous capacity building for healthcare workers were thought to be crucial for the MMS program's success.

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1 | Introduction

Improving the health and well-being of women and children in low- and middle-income countries (LMIC) requires a focus on the nutrition of pregnant women and young children (Fuentes-Afflick et al. 2021). In such settings, multiple micronutrient deficiencies often co-exist among women of reproductive age and are exacerbated during pregnancy due to the increased demands of the developing foetus, leading to potentially adverse effects on the mother and baby (WHO 2020).

Summary

- The study identified key themes in piloting multiple micronutrient supplementation (MMS) in Ethiopian antenatal care, highlighting the importance of resource availability, supply chain adequacy, stakeholder roles, coordination plans, community engagement, capacity building and monitoring and evaluation, with critical factors including funding, consistent MMS supply and strong coordination among health authorities and community leaders.
- Effective community engagement and leveraging existing human resources were vital, though ongoing training was needed.
- Strong monitoring and evaluation frameworks ensured program accountability.

Trials have investigated the extent to which the use of a multiple micronutrient supplementation (MMS) during pregnancy—including iron-folic acid (IFA)—improves maternal and infant health outcomes (Ahmed et al. 2005; Caniglia et al. 2022; Gomes et al. 2022). A meta-analysis of data from 19 MMS trials conducted in LMIC comparing outcomes among pregnant women using MMS to outcomes in pregnant women using iron supplementation (with or without folic acid), suggested that MMS reduced the number of newborns identified as having low birthweight and probably led to a slight reduction in preterm and small-for-gestational-age births (Keats et al. 2019). As a result, in 2020 the World Health Organisation (WHO) updated its global guideline to recommend the use of prenatal MMS in the context of rigorous research (WHO 2020).

There is growing recognition of the importance of testing new health programs in situ before full-scale implementation, a practice that aims to proactively identify and address potential challenges in real-world scenarios (Hardison 1998; Weiner 2009). A recent systematic review that assessed implementation strategies for essential newborn care interventions in LMIC observed high variations of strategies between contexts. In addition, this review revealed that inadequate descriptions of interventions and implementation outcomes could limit learning about which strategies had worked, and how (Peven et al. 2020).

In line with the updated WHO guideline (WHO 2020), since 2023, the Ethiopian Ministry of Health has been piloting a policy change in 21 districts towards the use of MMS as part of routine antenatal care instead of IFA supplementation. This pilot program is being supported technically and financially by UNICEF and the Children's Investment Fund Foundation (CIFF), respectively (UNICEF 2020). The pilot implementation has an embedded evaluation that aims to quantify the impact of the policy change on birth weight and to carry out a detailed investigation of the challenges, adaptations, and implications that emerge as the healthcare system navigates this potential shift in nutritional supplementation policy. Therefore, this paper analyses and reports on the perceptions and early experiences of program implementers and stakeholders regarding the Ethiopian pilot of a policy change from IFA to MMS as part of routine antenatal care services.

2 | Methods

2.1 | Study Setting

Ethiopia's estimated population in 2024 is over 129 million, with a birth rate of 29,758 births per 1000 people (Macrotrends 2024). According to the WHO, the prevalence of anemia in women aged 15–49 was 23.9% in 2019, underscoring the need for iron and folic acid (IFA) supplementation (World Health Organization 2019). Antenatal care (ANC) is a critical platform for IFA distribution; according to the 2022 Ethiopian Demographic and Health Survey, 74% of pregnant women attended at least one ANC visit, but only 43% completed four or more visits, revealing significant gaps in maternal health service utilization (Central Statistical Agency CSA Ethiopia and ICF 2022).

2.2 | The MMS Policy Shift

The MMS policy shift aimed to substitute IFA as part of routine antenatal care for MMS. According to the theory of change (Supporting Information S1: File 1), the goal of the MMS pilot was to introduce MMS to pregnant women across 21 woredas (districts) in Ethiopia by the end of 2024. These districts were spread across five Ethiopian regions, namely Gambella, Oromia, Sidama, SNNP (Southern Nations, Nationalities, and Peoples'), and Somali. Four outputs were defined: (1) to strengthen the enabling environment to support the introduction and subsequent scaling up of MMS; (2) to ensure delivery platforms to support the introduction of MMS as part of a comprehensive package of maternal nutrition interventions; (3) to ensure that pregnant women and healthcare workers understand the importance of MMS and support its use; and (4) to integrate MMS monitoring into routine nutrition information systems and generate evidence to inform national scale-up. A full description of the implementation description based on the Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann et al. 2014) is provided in Supporting Information S2: File 2.

2.3 | Study Design

This qualitative study employed key informant interviews with national and subnational stakeholders who were involved in the MMS pilot. In addition, we requested relevant documents from the Ministry of Health (MoH) and implementing partners to inform the study, including the implementation theory of change, national guidelines for the provision of ANC, and global guidance papers on the provision of MMS.

2.4 | Study Participants and Data Collection

We purposively selected and interviewed seven nutrition program focal persons from the MoH, five Regional Health Bureaus, and partner organizations. The inclusion criteria were based on direct involvement and familiarity with the pilot program. Since few people were well-versed in the questions we were asking, we included all available participants. Each region had one focal person involved. The researchers (A.D., A.K.D.,

A.T.B., and G.T.) conducted the interviews themselves. No external data collectors were recruited.

A tailored topic guide was used to explore the pilot MMS program. The topic guide included questions related to the identification of core intervention components, required resources for MMS delivery in routine antenatal care, essential preparatory and support activities, and the underlying intervention delivery assumptions. The topic guide was initially developed in English and translated into local languages (Amharic and Afaan Oromo). The interviews were conducted in languages suitable for the respondents, including English, and were audio-recorded with the participant's consent. Data collection continued until no new themes or insights were emerging from additional interviews. A thorough quality check was conducted by senior research members throughout the process.

2.5 | Data Management and Analysis

Thematic analysis was employed for qualitative data analysis, facilitated by using Nvivo 12 software, Lumivero, US. The initial step involved the transcription of recorded interviews verbatim, followed by translation into English. The field notes taken during the data collection phase were included in the transcription and were used to substantiate the results by reflecting the actual situation during the interviews. The transcripts were thereafter systematically coded using a codebook that was inductively derived from the content of the transcripts. The coding process was done by one person and allowed the identification of emerging themes and sub-themes. To enhance the credibility and trustworthiness of the findings, relevant quotations were meticulously selected to illustrate key insights.

2.6 | Ethical Considerations

Ethical approval was obtained from the institutional review board of the Ethiopian Public Health Institute [EPHI-IRB-455-2022] and the London School of Hygiene and Tropical Medicine [LSHTM ref 28021]. Informed written consent was obtained from all participants, and steps were taken to ensure their confidentiality and anonymity. To ensure confidentiality and anonymity, we obtained informed consent, anonymized data, stored it securely, conducted private interviews, restricted data access, and disposed of identifiable information after analysis.

3 | Results

The study purposively selected and interviewed nutrition program focal persons from the Ministry of Health, five Regional Health Bureaus (RHBs), and partner organizations based on their direct involvement or knowledge of the pilot MMS program implementation. The results of the study illustrated key themes and insights regarding challenges and opportunities highlighted by participants related to (i) physical resources and supply chain requirements, (ii) the roles of different actors involved, (iii) coordination plan, (iv) community engagement for demand creation, (v) capacity building, and (vi) monitoring and evaluation. In each section, experiences and lessons learned are presented to showcase effective adaptation strategies or encountered difficulties.

3.1 | Physical Resources and Supply Chain Requirements

Resources and access are crucial factors in the successful implementation of a particular program. According to the Theory of Change (TOC) (Supporting Information S1: File 1) and the project documents reviewed, the plan was to seamlessly integrate the replacement of IFA with MMS into the existing healthcare system. This strategy aimed to mitigate inconveniences and minimise additional costs.

We identified key inputs essential for the successful integration of MMS into the routine ANC system. These included funding, a consistent supply of MMS, physical resources, and qualified manpower. Participants underscored the pivotal role of funding, particularly emphasizing the need for a continuous and sustainable supply of the MMS. They also highlighted the importance of funding for physical resources and emphasized the significance of a robust supply chain.

According to the respondents, integrating a new program into an existing one may not resolve challenges from the previous program unless improvements are made. One example is the supply chain, and respondents expressed concerns about potential obstacles to the success of the new program. The study identified MMS's supply chain challenges, including awareness gaps, high costs, and issues related to procurement, ordering, and distribution processes.

In one of the regions, study participants reported a shortage of the supplement, expressing concerns about potential future deficits. As perceived by the participants, this shortage was attributed to inaccuracies in predicting the target population.

> *During project initiation, concerns arose about input issues, particularly the challenge of preventing shortages in rural districts due to target population miscalculations. With 27 rural kebeles and 4 health centers allocated to serve the population, the medicine supply (MMS) for pregnant women ran out within two months, prompting the city administration to provide IFA to pregnant women from the town and adjacent districts, while rural kebeles received MMS. The hospital adjusted its provision of MMS based on mothers' registration information.*
>
> Regional_KII_03

Additionally, the importance of revising registration templates to align with the new MMS program and the provision of a sufficient amount of advocacy materials were indicated by respondents. One of the key informants of the study indicated this as follows:

> *Since this MMS is a new program, the use of the old iron folate registration template book for the new MMS record*

by itself is a problem. It may be unfit and collide with the current registration process. On record, it says iron folate, so it needs further understanding during reporting. Therefore, the practical information recording and reporting templates or tools need revision and amendment based on the implementation of the newly launched MMS program.

Regional_KII_02

In general, while most of the study participants believed they were on the right track, they emphasized the importance of considering the above physical resource and supply chain aspects for any future expansion.

3.2 | The Roles of Different Actors Involved

This section reveals a detailed exploration of the stakeholders involved in the implementation of the MMS program in Ethiopia.

At the national and subnational levels, a diverse group of stakeholders were identified, including UNICEF, MoH, the Regional Health Bureau, the Zonal Health Department, and the Woreda Health Office. The leadership role of UNICEF in collaboration with the MoH was emphasized by national-level respondents. MoH and Regional Health Bureaus were key players in spearheading the MMS program implementation at the district level.

Individual-level actors, alongside major institutional stakeholders, were recognized for their crucial roles in program implementation. Pregnant women, health extension workers, and midwives play essential roles in successful program implementation through community-level structures like the Health Extension program and the Women's Development Army platform. Their distinct contributions enhance adherence, awareness, and community acceptance. Additionally, religious leaders, kebele administrators, and representatives from Women and Children Affairs were recognized for promoting awareness and acceptance of the program.

The stakeholders involved in the MMS program implementation in our region include the Regional Health Office, district chairpersons, Kebele administrative councils, Women and Children affairs representatives, health extension agents, religious leaders, mothers, particularly pregnant women, and village leaders. UNICEF and Ethiopian Public Health Institute are the principal stakeholders providing awareness and orientation to local religious leaders and village administrative bodies who are crucial for a smooth program launch and implementation.

Regional_KII_02

The establishment of a technical working group within health facilities demonstrated a strategic approach to executing the Ministry of Health's plan for MMS implementation. This collaborative effort involved various stakeholders and developmental partners, ensuring smooth implementation through dedicated teams and micro-level workers. Stakeholders that engaged in program evaluation and other frontline workers such as the health care staff were acknowledged by the respondents.

3.3 | Coordination Plan

This section describes how the interlinkage of various stakeholders involved in the implementation of the MMS program in Ethiopia was designed.

According to the documents reviewed, the coordination plan was established through extensive consultation and discussion during the preparatory phase, involving national and subnational activities to create a conducive environment for successful implementation. In the preparatory phase, key steps were taken, such as district selection, identification of accountable individuals, and strategic planning to address challenges related to MMS distribution, particularly in regions facing shortages or budget constraints. Coordination tasks were outlined to involve supervising, monitoring, providing solutions to identified problems, and giving directions at all levels.

The initial step involved selecting the districts and identifying accountable individuals from the zonal, district, and health institutions to initiate and sustain the program. Professionals from the zonal maternal and child health, nutrition, drug dispensaries, logistic pharmacy, and maternity and child health units were involved at the regional, health centers, and hospital levels.

Regional_KII_01

A coordination mechanism was created through in-person regular meetings at national and regional levels during the MMS implementation program in selected districts. Regular meetings involving maternal and child nutritionists were organized to strengthen existing coordination structures at regional, district, and health institution levels. To streamline communication, Telegram and WhatsApp group pages [commonly used social networking digital medias in Ethiopia] were established at the national level, facilitating monthly evaluation meetings and the submission of reports. The regional-level implementation of this communication strategy was encouraged to ensure timely updates and foster a sense of belonging among stakeholders.

... we established a Telegram page for training and formed a national technical working group for the MMS project and micro-nutrient deficiency prevention and control. Monthly evaluation meetings update stakeholders, and similar regional meetings and evaluations are encouraged. Monthly reports are submitted via email and Telegram, reviewed by regions and higher authorities to assess program progress, with UNICEF leading report interpretation and data analysis at the regional level.

National_KII_01

We created Telegram and WhatsApp groups for sharing daily updates and experiences across different regions and health facilities. Quarterly review meetings involving regional, zonal, and district health offices, as well as health centers and health posts, ensure everyone stays informed.

Regional_KII_04

Respondents emphasized the importance of frequent meetings between UNICEF and key partners, including the MoH and Regional Health Bureaus, for ongoing coordination, monitoring and evaluation. UNICEF's proactive approach included monthly meetings with implementing partners and quarterly strategic meetings with the technical advisory committee for progress evaluation and recommendation activities.

3.4 | Community Engagement for Demand Creation

This section highlights the critical role of community engagement in implementing the MMS program. Community engagement is instrumental in problem identification, solution design, program planning, evidence sharing, process management and scaling up of findings.

Study participants expressed concerns about potential hesitancy or resistance towards the new tablets, as mothers were previously accustomed to using IFA. The concern emanated from introducing new tablets and the varying perspectives and interpretations that might be encountered.

The challenge is particularly notable in the Somali community. For example, in Aware woreda, people may perceive this medicine as a contraceptive that prevents childbearing. Aware is a pastoralist area, unlike Awbare, which is agro-based, settled, and located near Jijiga with access to agricultural activities. In contrast, Aware is far from Jijiga, situated near the border with Somaliland. Its population is more mobile, with some even traveling to Somalia. This mobility and distance contribute to misconceptions, similar to those seen with iron and folic acid or immunization programs, where such interventions were also misunderstood as contraceptives. However, I don't think this issue will entirely prevent uptake.

Regional_KII_05

To address this challenge, implementers underscored the importance of conducting awareness activities on the difference between MMS, which has 15 nutrients, and IFA, which contains only 2 nutrients. The objective of these awareness initiatives is to motivate mothers, instill confidence in the new tablets, and address any questions or concerns they may harbour.

We engaged religious leaders, Sharia offices, and women's offices as our primary partners. Their endorsement holds significant sway within the community. We first informed them about the new medicine and its benefits, emphasizing the transition to MMS. Once they approved, we organized conferences and spread the message through mosques at 'juma'a Futaba' (a ceremony conducted every Friday). They mentioned the tablets have no harm and are not contraceptives.

Regional_KII_05

Health professionals at lower health facilities play a pivotal role in this process, being tasked with providing detailed explanations, responding to queries, and offering counselling to underscore the benefits and outcomes linked to the transition from IFA to MMS, for both pregnant mothers and their children.

In most areas of the country, mothers receiving IFA are often too scared to take a different medication, leading them to leave MMS at home out of fear. Therefore, awareness creation and counselling by healthcare providers are crucial to improve understanding and drive behavioral change. I believe it is essential to enhance uptake by involving healthcare professionals from the same community.

Regional_KII_04

The MMS program demonstrated the successful engagement of all stakeholders within the healthcare system through its demand-creating activities. The engagement process included raising awareness among specific community leaders before program commencement. Health education and training were conducted for healthcare professionals, teachers, community leaders, and religious leaders at the district level.

Health education and training were conducted for healthcare professionals, teachers, community leaders, and religious leaders at the district level, reaching over 700 individuals in 10 districts.

Regional_KII_01

The involvement of all stakeholders in demand creation, particularly social behavioural change experts, was highlighted as a strength of this program. Changing the behaviour of women to encourage early and frequent clinic visits resulting in improved uptake of services including prenatal supplementation was identified as a key component. In addition, funding partners emphasized the need to consider both demand and supply perspectives, focusing on training and improving service quality to meet the healthcare needs of pregnant women.

3.5 | Capacity Building

This section outlines the capacity-building activities identified during the planning and initiation of the project. Specifically, within the MMS program, the MoH applied various materials, including memoranda of understanding with implementing partners, guidelines, and brochures to facilitate the program's introduction.

A cascade training from the top to lower levels in the healthcare system aimed at bridging gaps and enhancing understanding by

drawing insights from previous programs. The training provided crucial information regarding the purpose, opportunities, barriers, and implementation of the MMS project. Respondents highlighted the effectiveness of utilizing existing human resources and targeting the already established healthcare system, that is, the routine ANC services. Leveraging the skills and training of healthcare workers, who were already well-versed in the subject matter, ensured that additional training was neither resource-intensive nor time-consuming for the MMS pilot program.

> *Training was conducted at the national and regional levels, starting with an inception workshop to introduce the program. Five regions were chosen for program implementation, and subsequent training was cascaded to health workers in the woreda and health extension workers who already had relevant experience with iron-folic acid supplementation...*
>
> National_KII_01

Respondents made no mention of a plan for future formal or refresher training at the time of our assessment.

3.6 | Monitoring and Evaluation

Monitoring and evaluation are crucial parts of project implementation. In this part, we have included findings related to the monitoring and evaluation plans of the pilot program. At the national level, the responsibility of overseeing and facilitating the progress of selected woredas falls on the regional authorities, as highlighted by respondents. Their role involves coordination, follow-up, and the collection of reports to support future research and evaluation.

> *The region, as well as the concerned bodies, are aware that the program is newly launched and requires close support. Support is not provided solely by the MCH at the regional level. The Sidama Regional Health Office and representative staff in the two districts consistently provide the necessary support to stakeholders. As a result, I believe the implementation has been successful so far.*
>
> Regional_KII_03

Despite some regional respondents acknowledging a gap in the anticipated supportive supervision or monitoring of project implementation, communication across all levels was reported as robust.

Recognizing the need for more proactive measures, especially in supportive supervision, one regional informant emphasized plans to establish a dedicated team at the regional level to address these concerns in the future. The intention was to bridge the existing gap in the monitoring process and ensure that health programs aligned with their objectives.

> *We have conducted training and provided supplies, but regional-level supportive supervision and monitoring of the project have not been implemented yet. However, we maintain good communication with all levels. Going forward, we plan to establish a team at the regional level to provide support and monitor the project.*
>
> Regional_KII_03

The division of responsibilities among stakeholders was outlined, with government-side entities focusing on program monitoring, while independent evaluations were conducted by external entities. The implementers' role was defined as assessing whether the program adhered to its intended design by monitoring specific indicators, such as outreach to women and meeting established targets. According to the respondents, this dual-role system ensured both real-time progress tracking and in-depth evaluations, contributing to the overall effectiveness of the health program.

4 | Discussion

The implementation of the pilot MMS program in Ethiopia presents a unique opportunity to inform and guide the policy shift intended to improve the health of pregnant women and their children (UNICEF 2020). The study highlighted key factors such as coordination, community engagement, and capacity-building, with stakeholders at all levels playing important roles in the program. However, it also identified challenges, including supply chain issues and funding constraints. Clear plans for capacity building and monitoring and evaluation were identified as areas for improvement.

The MMS pilot program is planned to effectively utilize existing resources and expertise within the healthcare system to build capacity for MMS implementation. While program integration within the existing system aims to minimise costs and inconveniences, in our current study concerns persisted regarding consistent MMS supply, funding, and qualified manpower. This finding echoes results from a secondary analysis of 64 studies where inadequate resources hindered the successful implementation of a maternal health program (Solnes Miltenburg et al. 2017).

Another input-related finding of our study indicated a lack of documentation materials such as revised registration books. This unmet need has the potential to affect the implementation process by causing ambiguity in recording and reporting. Ensuring the revision of registration templates, adequate provision of advocacy materials, and timely distribution of documents to required locations before program implementation are essential for program uptake and implementation (Abdelrahman and Abdelmageed 2014).

The success of the program depends on the collaborative efforts of various stakeholders, encompassing government agencies, healthcare professionals, community leaders and pregnant women. This multi-stakeholder approach is essential for program effectiveness, aligning with both implementation research principles and the triple C methods (Consultation, Collaboration and Consolidation) recognized for sustaining such initiatives (Khalil 2017). The program's adept engagement with stakeholders, facilitated by awareness campaigns, training

sessions, and active involvement of community leaders, is a good start for program effectiveness and a sense of community ownership.

A qualitative study conducted in India showed that community acceptance and tailoring programs to existing social norms are vital for successful intervention (Sedlander et al. 2020). To avoid challenges of community acceptance in the transition from IFA to the new MMS, the pilot MMS program included thorough awareness activities, ensuring that community members were informed about the substantial differences between the two supplements. Health professionals at lower health facilities played a crucial role in explaining these changes, responding to queries, and counselling mothers on the benefits of the new MMS nutrients. The program's success in community engagement activities was evident through activities such as raising awareness among community leaders, conducting community dialogues and health education for various stakeholders at the district level, and involving social behavioural change experts. The engagement of diverse stakeholders and funding partners underscores the program's multifaceted strategy for effective demand creation.

Capacity building is another tool for the success of health programs, serving as a catalyst for seamless execution throughout the healthcare system, and ensuring effective delivery of the program to beneficiaries. The design of these activities must be meticulous, addressing needs comprehensively across all system levels, with a specific emphasis on grassroots levels. Though not the sole factor, several scoping reviews, and studies have demonstrated the necessity of training healthcare workers to enhance the use and adherence to IFA (Kurzawa et al. 2021; Haldane et al. 2019; Rowe et al. 2018). Although the study identified training activities at the initial phase of the program, respondents were vague about the continuity of these training sessions or when the next round of training will be conducted. Capacity building is a strategic approach that not only strengthens the health system but also prepares it to proactively overcome challenges. Importantly, capacity building is an ongoing effort, not a one-time event (Kurzawa et al. 2021).

After training at the district level, a well-designed follow-up activity is imperative. Regions, especially, should integrate technical assistance and establish mechanisms for monitoring and controlling performance to ensure ongoing success (Liu et al. 2013; Moore et al. 2015; Skivington et al. 2021). However, our study has revealed that there is a gap in subnational-level supportive supervision and monitoring activities. This aspect will be a threat to the sustained success and adaptability of the project in the long run.

4.1 | Strengths and Limitations of This Study

This study provides a direct assessment of the key stakeholders involved, offering first-hand insights from the implementers themselves. By tapping into the perceptions and perspectives of implementers, one may craft optimised strategies and initiatives tailored to the unique challenges and opportunities characterised. Additionally, the lessons learned from this study can prove invaluable in shaping the design and implementation of new initiatives or programs through the existing healthcare system in LMICs like Ethiopia.

This study was conducted in purposively selected regions of the country as part of a pilot program and it is important to note that the findings and opinions gathered may have limited transferability beyond the immediate study area. In addition, the study was done before the program was in full swing, therefore there may be improvements or additional setbacks experienced during the implementation process.

5 | Conclusion

In conclusion, to enhance the effectiveness and sustainability of the current pilot MMS program in Ethiopia, it is imperative to focus on strengthening the supply chains by learning from past experiences and collaborating with stakeholders. Community engagement should be prioritized through consistent communication and involvement of community leaders, ensuring adaptability and sustained support. Investing in continuous capacity building of healthcare workers and community members is crucial for maintaining program efficacy. Improving the monitoring and evaluation framework, including the establishment of a dedicated regional team for supportive supervision, may contribute to program accountability and timely issue resolution. Furthermore, our ongoing additional research to assess the long-term health impact, cost-effectiveness, and comparative effectiveness of the program in the natural setting will provide valuable insights for future maternal and child health interventions. By addressing these key areas and continuously adapting to evolving needs, the pilot MMS program will inform MoH for appropriate policy decisions.

Author Contributions

A.T.B. contributed significantly to the conception, design and data acquisition. A.T.B., A.D., G.T., A.K.D., S.A., B.T., K.Z., C.O. contributed significantly to data collection, analysis and interpretation, drafting the article. M.T., T.M., L.A.P., J.S., M.H., and G.T. critically revised the paper for important intellectual content, and gave final approval to the version to be published. All authors have agreed to be accountable for all aspects of the work.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

References

Abdelrahman, W., and A. Abdelmageed. 2014. "Medical Record Keeping: Clarity, Accuracy, and Timeliness Are Essential." *BMJ* 348: f7716. https://www.bmj.com/content/348/bmj.f7716.

Ahmed, F., M. R. Khan, M. Akhtaruzzaman, et al. 2005. "Efficacy of Twice-Weekly Multiple Micronutrient Supplementation for Improving the Hemoglobin and Micronutrient Status of Anemic Adolescent Schoolgirls in Bangladesh." *American Journal of Clinical Nutrition* 82, no. 4: 829–835. https://doi.org/10.1093/ajcn/82.4.829.

Caniglia, E. C., R. Zash, S. A. Swanson, et al. 2022. "Iron, Folic Acid, and Multiple Micronutrient Supplementation Strategies During Pregnancy and Adverse Birth Outcomes in Botswana." *Lancet Global Health* 10: e850–e861. https://doi.org/10.1016/S2214-109X(22)00126-7.

Central Statistical Agency (CSA) [Ethiopia] and ICF. 2022. *Ethiopia Demographic and Health Survey 2022: Key Indicators Report*. CSA and ICF.

Fuentes-Afflick, E., J. M. Perrin, K. H. Moley, Á. Díaz, M. C. McCormick, and M. C. Lu. 2021. "Optimizing Health and Well-Being for Women and Children." *Health Affairs* 40, no. 2: 212–218. https://doi.org/10.1377/hlthaff.2020.01504.

Gomes, F., R. Agustina, R. E. Black, et al. 2022. "Multiple Micronutrient Supplements Versus Iron-Folic Acid Supplements and Maternal Anemia Outcomes: An Iron Dose Analysis." *Annals of the New York Academy of Sciences* 1512, no. 1: 114–125. https://doi.org/10.1111/nyas.14756.

Haldane, V., F. L. H. Chuah, A. Srivastava, et al. 2019. "Community Participation in Health Services Development, Implementation, and Evaluation: A Systematic Review of Empowerment, Health, Community, and Process Outcomes." *PLoS One* 14, no. 5: e0216112. https://doi.org/10.1371/journal.pone.0216112.

Hardison, C. D. 1998. "Readiness, Action, and Resolve for Change: Do Health Care Leaders Have What It Takes?" *Quality Management in Health Care* 6, no. 2: 44–51. https://doi.org/10.1097/00019514-199806020-00006.

Hoffmann, T. C., P. P. Glasziou, I. Boutron, et al. 2014. "Better Reporting of Interventions: Template for Intervention Description and Replication (TIDieR) Checklist and Guide." *BMJ* 348: g1687. https://doi.org/10.1136/bmj.g1687.

Keats, E. C., B. A. Haider, E. Tam, and Z. A. Bhutta. 2019. "Multiple-Micronutrient Supplementation for Women During Pregnancy." *Cochrane Database of Systematic Reviews* 3, no. 3: CD004905. https://doi.org/10.1002/14651858.CD004905.pub6.

Khalil, H. 2017. "The Triple C (Consultation, Collaboration and Consolidation) Model: A Way Forward to Sustainability of Evidence Into Practice." *International Journal of Evidence-Based Healthcare* 15, no. 2: 40–42. https://doi.org/10.1097/XEB.0000000000000110.

Kurzawa, Z., C. S. Cotton, N. Mazurkewich, A. Verney, J. Busch-Hallen, and B. Kashi. 2021. "Training Healthcare Workers Increases IFA Use and Adherence: Evidence and Cost-Effectiveness Analysis From Bangladesh." *Maternal and Child Nutrition* 17, no. 2: e13124. https://doi.org/10.1111/mcn.13124.

Liu, J., Z. Mei, R. Ye, M. K. Serdula, A. Ren, and M. E. Cogswell. 2013. "Micronutrient Supplementation and Pregnancy Outcomes: Double-Blind Randomized Controlled Trial in China." *JAMA Internal Medicine* 173, no. 1: 276. https://doi.org/10.1001/jamainternmed.2013.1632.

Macrotrends. 2024. "Ethiopia Population 1950-2024." Accessed November 25, 2024. https://www.macrotrends.net/global-metrics/countries/ETH/ethiopia/population.

Moore, G. F., S. Audrey, M. Barker, et al. 2015. "Process Evaluation of Complex Interventions: Medical Research Council Guidance." *BMJ* 350: h1258. https://doi.org/10.1136/bmj.h1258.

Peven, K., D. Bick, E. Purssell, T. A. Rotevatn, J. H. Nielsen, and C. Taylor. 2020. "Evaluating Implementation Strategies for Essential Newborn Care Interventions in Low- and Low-Middle-Income Countries: A Systematic Review." *Health Policy and Planning* 35, no. Suppl_2: ii47–ii65. https://doi.org/10.1093/heapol/czaa122.

Rowe, A. K., S. Y. Rowe, D. H. Peters, K. A. Holloway, J. Chalker, and D. Ross-Degnan. 2018. "Effectiveness of Strategies to Improve Health-Care Provider Practices in Low-Income and Middle-Income Countries: A Systematic Review." *Lancet Global Health* 6, no. 11: e1163–e1175. https://doi.org/10.1016/S2214-109X(18)30398-X.

Sedlander, E., M. W. Long, S. Mohanty, et al. 2020. "Moving Beyond Individual Barriers and Identifying Multi-Level Strategies to Reduce Anemia in Odisha, India." *BMC Public Health* 20, no. 1: 457. https://doi.org/10.1186/s12889-020-08574-z.

Skivington, K., L. Matthews, S. A. Simpson, et al. 2021. "A New Framework for Developing and Evaluating Complex Interventions: Update of Medical Research Council Guidance." *BMJ* 374: n2061. https://doi.org/10.1136/bmj.n2061.

Solnes Miltenburg, A., Y. Roggeveen, J. van Roosmalen, and H. Smith. 2017. "Factors Influencing Implementation of Interventions to Promote Birth Preparedness and Complication Readiness." *BMC Pregnancy and Childbirth* 17, no. 1: 270. https://doi.org/10.1186/s12884-017-1448-8.

UNICEF. 2020. Interim Country-Level Decision-Making Guidance for Introducing Multiple Micronutrient Supplementation for Pregnant Women. https://www.unicef.org/documents/interim-country-level-decision-making-guidance-introducing-multiple-micronutrient.

Weiner, B. J. 2009. "A Theory of Organizational Readiness for Change." *Implementation Science* 4, no. 1: 67. https://doi.org/10.1186/1748-5908-4-67.

WHO. 2020. *WHO Antenatal Care Recommendations for a Positive Pregnancy Experience Nutritional Interventions Update: Multiple Micronutrient Supplements During Pregnancy*. Geneva, Switzerland. World Health Organization.

World Health Organization. 2019. *Prevalence of Anaemia in Women Aged 15–49. WHO Global Health Observatory*. Geneva, Switzerland: World Health Organization. https://data.who.int/indicators/i/41D099F/8D58801.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.