



## Scaling up antenatal multiple micronutrient supplementation in Africa: A unified call for action



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### ABSTRACT

Maternal undernutrition in Africa remains a public health challenge, contributing to negative pregnancy outcomes, neonatal mortality, and perpetuating intergenerational cycles of poor health. Antenatal multiple micronutrient supplementation (MMS), a cost-effective intervention recognized for its potential to improve maternal and neonatal health, reduces risks of low birth weight, preterm birth, small for gestational age, and stillbirth while offering a \$37 return for every \$1 invested. Despite its benefits, MMS adoption across African countries remains suboptimal. This position paper synthesizes the outcomes of the *2nd Africa Maternal Nutrition and MMS Technical Meeting: A Path Toward Introduction and Scale-up of MMS in Africa*, held in Nairobi, Kenya, in October 2024. The 3-d meeting convened government representatives from 17 African member states, donors, and experts to align on a shared vision for MMS introduction and scale-up in Africa. Participants emphasized MMS integration into antenatal care as a cornerstone of maternal nutrition strategies and identified actionable recommendations to overcome policy, supply chain, financing, and implementation barriers. Key messages include the urgency of scaling MMS, the role of implementation science in tailoring programs to local contexts, and the necessity of regional collaboration to share lessons and facilitate progress. It outlines a pathway for integrating MMS into antenatal care services, ensuring a quality supply, securing financial commitments, strengthening delivery, and engaging communities. The accompanying "Call to Action" provides a detailed roadmap to guide stakeholders in scaling up MMS as an urgent priority to enhance maternal and neonatal health, advance gender equality, and fulfill Africa's global health commitments.

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### Introduction

The importance of adequate maternal nutrition for individual and societal well-being cannot be overstated. Well-nourished women have better health, safer pregnancies, and are more likely to have equitable access to opportunities and engage fully in society [1]. In addition, a woman's nutritional status is a powerful determinant of the survival, growth, and development of her children, influencing nutrition and health status throughout life and into future generations [2].

*List of Abbreviations:* ANC, Antenatal Care; CNF, Child Nutrition Fund; EML, Essential Medicines List; HMHB, Healthy Mothers Healthy Babies Consortium; IFA, Iron and Folic Acid supplementation; MMS, Multiple micronutrient supplementation; N4G, Nutrition for Growth; R4D, Results for Development; UNIMMAP, United Nations International Multiple Micronutrient Antenatal Preparation; WHA, World Health Assembly; WHO, World Health Organization

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### *A call for the introduction and scale-up of MMS*

Antenatal multiple micronutrient supplementation (MMS) is widely recognized as a high-impact, cost-effective intervention that improves birth outcomes and maternal health [3–6]. By providing a USD 37 return on every USD 1 spent, MMS is the top investment for global development and a safe and effective way to ensure healthy pregnancies and babies worldwide [7], making its introduction and scale-up as part of a package of essential antenatal nutrition interventions an urgent priority.

A sufficient supply of quality MMS product is currently available from global suppliers, including via UNICEF's Supply Division. The international donor community is eager to provide financial and technical resources to support MMS introduction and scale-up in low- and middle-income countries (LMICs), especially in Africa. Several global events, e.g., the Nutrition for Growth (N4G) Summit [8] and the Scaling up Nutrition (SUN) Global Gathering [9] planned for 2025, are poised to serve as platforms to advance MMS programming as a critical contribution to global development. African countries are urged to seize this opportunity to improve maternal health and birth outcomes, advance gender equality, and ensure women and children can reach their full potential by introducing and scaling up MMS programming.

This paper reflects on the collective expertise, experiences, and recommendations of delegates from across Africa, shared during the *2nd Africa Maternal Nutrition and MMS Technical Meeting: A Path Toward Introduction and Scale-up of MMS in Africa*, held in Nairobi, Kenya, in October 2024. Grounded in evidence-based discussions and enriched by diverse regional perspectives and experiences, the meeting charted a shared path for accelerating the introduction and scale-up of maternal nutrition interventions, notably MMS as a part of essential antenatal care (ANC) services to improve maternal and child health outcomes in Africa. The 3-d meeting in Nairobi marked a pivotal shift, with countries driving their own maternal nutrition and MMS programming agendas and seeking additional opportunities to engage in a community of practice to learn from each other.

### *The case for MMS in Africa*

The evidence and policy framework for MMS, a once-a-day nutritional supplement comprised of vitamins and minerals specifically formulated for pregnant women, was named as one of the top 12 best investments for global development in the 2023 Copenhagen Consensus Report [7].

MMS has been demonstrated to have equivalent benefit as compared to iron and folic acid (IFA) with respect to maternal anaemia prevention [10] and to result in a significantly reduced risk of stillbirth, low birth weight, preterm birth, and small for gestational age [3,4]. The benefits of taking MMS are even greater among pregnant women who start pregnancy anemic or underweight, e.g., MMS results in a 29% reduction of 6-mo infant mortality among anemic women [3]. The relevance and importance of MMS, not only for immediate birth outcomes but also for longer-term health and development outcomes, should not be understated. MMS has been shown to reduce the risk of giving birth to small, vulnerable newborns, particularly the types with the greatest mortality risk, including preterm–small for gestational age–low birth weight, preterm–appropriate for gestational age–small for gestational age, and preterm–small for gestational age (SGA) [11]. Furthermore, a recent systematic review showed that the mothers who took prenatal MMS, in comparison to those who took IFA, gave birth to infants who had better growth up to 6 to 12 mo of age;

further, those infants had a significant reduction in stunting, underweight, and small head circumference in the crucial first 3 mo of life [12].

Notably, as head circumference measurements reflect brain size [13], the observed significant reductions in small head circumference (of 12% at birth and 16% at 3 mo [12]) have the potential to influence neurodevelopmental outcomes, supporting previous reports that prenatal MMS improved child cognition in early and late childhood [14–16]. Scaling up MMS to 90% coverage in LMICs has been projected to contribute to better educational attainment and economic success, with a cumulative increase in lifetime income of \$18.1 billion [17]. Taken together, the overall evidence supports the need to adopt MMS as the standard antenatal supplementation intervention, which can be paired with other complementary interventions in certain contexts (e.g., calcium supplements in populations with low dietary calcium intake or balanced energy and protein dietary supplements in undernourished populations [18]). In 2020, the World Health Organization (WHO) released a recommendation that countries explore implementing MMS within the context of the existing ANC system and informed by rigorous research, including implementation research that evaluates the acceptability, feasibility, cost, and sustainability of MMS introduction [19] and, in 2021, WHO added the United Nations International Multiple Micronutrient Antenatal Preparation Multiple Micronutrient Supplements (UNIMMAP) MMS to its Essential Medicines List (EML) [20].

In August 2023, the Healthy Mothers Healthy Babies Consortium (HMHB) held the first regional convening of African countries in Addis Ababa, Ethiopia [21]. Attended by 14 country delegations, the 3-d meeting served as an opportunity to disseminate the global evidence for MMS programming, learn from “early adopter” countries about their efforts to establish an enabling environment for MMS introduction, and develop a set of country-specific next steps toward exploring MMS introduction.

### *Country-level progress and global commitment*

While countries are at various stages of implementing MMS, there has been significant progress and considerable momentum for MMS introduction and scale-up among the global nutrition community since the 2023 regional meeting in Addis Ababa, Ethiopia, which served as a catalyst for action in several countries.

*It's from the 2023 meeting in Ethiopia that we kickstarted implementing MMS on the ground. From the evidence presented and discussed at the meeting in Ethiopia, we gained a lot buy-in from stakeholders.*

—Deputy Director Nutrition (Treatment and Care),  
Ministry of Health, Malawi.

As a result, the second convening of African countries was focused on country-level progress, giving country delegations an opportunity to share their successes, challenges, lessons learned, and remaining questions. The meeting had the following objectives:

1. To assess country readiness for MMS adoption/scale-up and share high-level updates across countries.
2. To build multi-country consensus and alignment to galvanize the momentum, including forming communities of practices.
3. To identify barriers/enablers to MMS scale-up and strategic next steps by country and region.
4. To promote women's empowerment, equity, and inclusion in implementation of maternal nutrition policies and programs,

ensuring that gender considerations are integrated into all aspects of (MMS) policy, advocacy, and implementation.

During the Nairobi meeting, the African Union Commission, the African Development Bank, and key philanthropic donors (e.g., Children's Investment Fund Foundation, Eleanor Crook Foundation, Gates Foundation, Kirk Humanitarian, and UNICEF) and delegates expressed strong commitments to maternal nutrition and MMS. Global partners encouraged countries to "move quickly to adopt MMS," along with a commitment to support countries ready to introduce and scale-up MMS.

This growing momentum offers a unique opportunity to commit to improving the nutrition, health, and lives of pregnant women and their babies. Financial resources, technical assistance needs, and MMS supply should not be barriers to country-level efforts for countries ready to introduce and scale-up MMS. Growing support is available for countries interested in developing long-term, sustainable scale-up strategies.

### Key recommendations

The meeting resulted in a set of six key recommendations discussed below in detail.

#### #1: Leveraging global advocacy opportunities

Despite a robust global policy and programming framework for MMS introduction and scale-up, and high country readiness to adopt MMS, progress has been tempered by the absence of a clear WHO recommendation for MMS as the standard of care for antenatal supplementation. A full endorsement of MMS by WHO as part of the essential antenatal nutrition package of interventions would address this hesitation, empowering African countries and their partners to advance toward widespread MMS program implementation.

The African Union and the African Development Bank are uniquely positioned to support harmonization of nutrition policies, standardization of progress indicators, and contextualization of WHO recommendations by spotlighting challenges and solutions that are specific to the African continent. Importantly, the African Union is elevating maternal nutrition, and MMS specifically, through the ongoing process of developing the 2026 Regional African Union Nutrition Strategy [22].

The upcoming N4G Summit [8] and World Health Assembly (WHA) offer important opportunities to elevate maternal nutrition and notably MMS on the global and national political and policy agendas. The March 2025 N4G Summit in Paris will be an opportunity for countries to renew their financial and policy commitments to nutrition programming, including MMS. Commitments should be specific, inform national policies and guidelines delineating MMS as part of a comprehensive ANC package, and include financing. Leaders should consider a "unified commitment for N4G for Africa" that includes a plan of action for the next several years. The WHA will convene in Geneva in May 2025 to consider extending the Global Nutrition Targets to 2030.

#### #2: Adopting context-specific approaches

The 2020 WHO recommendation [19] does include a provision for "rigorous research, including implementation research." There is no longer a need to test the efficacy of MMS; we know that MMS has a positive health impact, but countries are currently and should continue to use implementation science to collect systematic information to inform the introduction (e.g., policy and regulatory change, financial and MMS procurement planning, etc.) and effective implementation of MMS programming to optimize impact in






their specific context. Tools and resources to support this process are described in *Using Implementation Science to Support the Introduction and Scale-up of MMS* [23]. In recognition of the benefits of MMS and armed with the tools and resources available to support systematic MMS introduction and scale-up, many countries are moving from considering whether or not to adopt MMS to how to introduce and scale-up MMS effectively. As countries move beyond proof of impact, implementation science approaches remain important to inform the introduction and scaling-up of MMS programming. In 2024, a collaboration of donors published the Global Investment Roadmap [24] that introduced a framework or pathway for introducing and scaling MMS programming (Fig. 1). The framework focuses on movement through three phases of introduction to achieve strategic objectives across four pillars of work required for MMS introduction and scale-up: policy/regulatory, financing, quality product, and delivery channels.

To successfully and sustainably introduce and scale-up MMS as a part of the national maternal nutrition program, four key pillars of work, each with their own strategic objectives, are required. While there is increasing guidance on, experience with, and support for MMS scale-up, the process is iterative and must be tailored to each country's unique context. Delivery platform challenges and coming up with possible strategies, the potential for local production and domestic resource mobilization, policy and regulatory requirements, monitoring and evaluation, and societal norms and cultural beliefs are all context-specific. There is no one-size-fits-all approach to introducing and scaling up MMS, although there are tools and lessons learned available that can provide best practices to be shared and adapted. Countries have been and will continue to move through this process on different timelines. Country progress is tracked on the HMHB World Map of MMS Activities [25].

Country delegates shared their experiences, challenges, solutions, lessons learned, and future plans as they work to achieve the four strategic objectives aligned with each of the four pillars described in Figure 1 (i.e., policy/regulatory, financing, quality product, and delivery channels). While global momentum is currently surging for countries to introduce and scale-up MMS programming, countries are working within their own country-led agendas, contexts, and timelines to ensure the necessary components are sufficiently planned for and addressed to support successful introduction and scale-up. Several countries, for example, are still "building an enabling environment for MMS" while others are progressing through the latter two phases—"Designing and testing implementation strategies to support effective MMS introduction" and "Scaling and maintaining an effective MMS program."

Table 1 provides brief summaries of the status of participating countries along their pathway toward MMS introduction at the time of the workshop (more detailed profiles can be found in the full meeting report) [26]. Although the Framework for MMS Program Scale-up (Fig. 1) provides a clear delineation across the specific pillars and phases, the country examples illustrate clearly how individual countries approach MMS introduction and scaling differently, given the specific context, even as all are working toward the same four strategic objectives across the four designated pillars.

Country delegations consistently referenced their previous or current efforts to utilize implementation science and their need for it to continue to inform effective MMS delivery. Introduction and scale-up is most suitable in a phased approach that accommodates iterative learning and adaptation achieved through a systematic process of reviewing existing knowledge and collecting additional information to address knowledge gaps and prioritized questions. There is, however, a need for more professionals, especially in LMICs, with experience and training in implementation science

PILLARS	I. BUILDING AN ENABLING ENVIRONMENT	II. DESIGN & TEST IMPLEMENTATION STRATEGIES	III. SCALING & MAINTENANCE	STRATEGIC OBJECTIVES	OUTCOMES
<b>POLICY/REGULATORY</b> 	<ul style="list-style-type: none"> <li>» Landscaping &amp; analysis</li> <li>» Stakeholder mapping &amp; engagement</li> <li>» Advocacy</li> </ul>	<ul style="list-style-type: none"> <li>» Advocacy</li> <li>» Policy &amp; guideline development</li> <li>» Roadmap</li> </ul>	<ul style="list-style-type: none"> <li>» Policies &amp; guidelines adoption</li> <li>» Operationalize Roadmap</li> </ul>	<b>Product is included in relevant policies &amp; instruments at all levels of government</b>	<b>REACH COVERAGE</b>    <b>IMPROVED MATERNAL NUTRITION &amp; BIRTH OUTCOMES</b>
<b>FINANCING</b> 	<ul style="list-style-type: none"> <li>» Cost-effectiveness analysis</li> </ul>	<ul style="list-style-type: none"> <li>» Forecasting</li> <li>» Financing strategy</li> </ul>	<ul style="list-style-type: none"> <li>» Demand planning</li> <li>» Finance mechanisms</li> <li>» Market shaping</li> </ul>	<b>Sufficient funding committed by governments &amp; donors for procurement &amp; delivery of product</b>	
<b>QUALITY PRODUCT</b> 	<ul style="list-style-type: none"> <li>» Supply readiness assessment</li> </ul>	<ul style="list-style-type: none"> <li>» Manufacturing support</li> <li>» Supply chain strengthening</li> </ul>	<ul style="list-style-type: none"> <li>» Cost-effective procurement coordination</li> <li>» Monitor &amp; address supply chain/distribution/stock outs</li> </ul>	<b>Sufficient volumes of quality product are manufactured, available &amp; procured</b>	
<b>DELIVERY CHANNELS</b> 	<ul style="list-style-type: none"> <li>» Delivery platform(s) assessment</li> <li>» Exploratory distribution of Product</li> </ul>	<ul style="list-style-type: none"> <li>» Demonstration projects</li> <li>» System strengthening</li> </ul>	<ul style="list-style-type: none"> <li>» National rollout</li> <li>» Expansion of delivery channels</li> </ul>	<b>Product is available &amp; accessible &amp; pregnant women receive product during ANC &amp; use as recommended</b>	
<b>COORDINATION AND MONITORING, EVALUATION, AND LEARNING</b>					

**Fig. 1.** Framework for country MMS program scale-up. Note: Reproduced from using implementation science to support the introduction and scale-up of multiple micronutrient supplementation [24]. Abbreviations: ANC, antenatal care; MMS, multiple micronutrient supplementation

that can support iterative learning and adaptation that is embedded within the broader pathway to introduction and scale-up of MMS programming.

The final 4 key recommendations are aligned with the 4 pillars and reflect the specific challenges African countries are facing as they move through the pathway to introduction and scale-up of MMS.

*#3: Building government ownership and advocacy (setting the stage for policy and regulatory change)*

The foundation for MMS success and long-term sustainability is government ownership and leadership, strategic partnerships, and evidence-based advocacy from start-to-scale. Strategic partnerships and government leadership at the highest levels, including, for example, the establishment of a national taskforce or advisory group, are critical throughout the process. Early and ongoing engagement with a broad range of stakeholders that include

national drug regulatory bodies, national ministries of finance and/or planning, health management information systems teams, and supply chain experts is necessary for considering critical policy revisions such as adding MMS onto national EMLs, determining whether MMS should be classified as a food supplement or a drug, ensuring MMS is institutionalized in national budgets, and adding MMS indicators to routine monitoring systems. Given that MMS programming is largely implemented via ANC platforms, a national taskforce or advisory group that includes appropriate representation from reproductive/maternal health stakeholders provides a forum for updating national guidelines and clinical protocols including those that need to be in place for treating anemia in the context of an MMS intervention, advising on the consumption of MMS during the postpartum period, and utilizing other supplements such as calcium alongside MMS. Delegates requested financial and technical assistance, including evidence-based advocacy materials to support stakeholder

**Table 1**  
Country-specific progress toward MMS introduction and scale-up

Pillars	I. Building an enabling environment	II. Design and test implementation strategies	III. Scaling and maintenance	Strategic objectives
<b>Policy/regulatory</b>	<b>Cote d'Ivoire:</b> Efforts are focused on establishing an MMS working group and building consensus among key stakeholders.	<b>Burkina Faso:</b> MMS is included in the EML, ANC guidelines, and other national policies; a regulatory framework with quality standards has been established; training for providers has occurred in some districts; MMS is incorporated into health and logistics management systems; monitoring systems track coverage and adoption among pregnant women.		Product is included in relevant policies and instruments at all levels of government
<b>Financing</b>	<b>Ghana:</b> UNIMMAP MMS has been registered with the Ghana Food and Drug Authority, and formative research to understand factors influencing MMS and ANC service uptake and adherence is ongoing.	<b>Democratic Republic of Congo:</b> MMS is included in ANC guidelines and other policies; a costed roadmap for transition to MMS has been completed, and national task forces have been formed; capacity building for healthcare providers is underway, but supply chain infrastructure and MMS integration into health information systems need improvement.		Sufficient funding committed by governments and donors for procurement and delivery of product
<b>Quality product</b>	<b>Kenya:</b> An MMS Task Force has been established and is planning to conduct implementation research.	<b>Ethiopia:</b> MMS is included in ANC guidelines; a costed roadmap is being developed, and an analysis of the local production of MMS has been completed; health worker training has been initiated in MMS research areas; there are plans to register UNIMMAP with the Food and Drug Authority and to address supply chain strengthening and manufacturer engagement.		Sufficient volumes of quality product are manufactured, available and procured
<b>Delivery channels</b>	<b>Senegal:</b> MMS has been integrated into national strategies supported by a technical working group and roadmap, and planning is underway for conducting implementation research that includes an assessment of supply chains. <b>Somalia:</b> MMS is provided free to pregnant women (heavily dependent on donor funding), and future efforts will focus on advocacy for increased nutrition funding and capacity building.	<b>Madagascar:</b> MMS has been included in national guidelines, EML, and ANC guidelines but is yet to be included in recurring budget allocations and procurement plans at federal/local government levels; MMS is currently distributed free of charge in intervention districts, with UNICEF as the sole supplier, and ongoing discussions for the supply from the World Bank Project in over 10 regions; supply chain strengthening and healthcare provider capacity building remain ongoing priorities. <b>Malawi:</b> An MMS Task Force was established; ANC guidelines were revised to include MMS, and advanced steps were taken toward MMS inclusion in the EML; MMS-specific social behavior change materials have been developed and pretested; capacity building for healthcare providers and formative research are planned.		Product is available and accessible, and pregnant women receive product during ANC and use as recommended
	<b>Zambia:</b> A Technical Advisory Group has been created to support advocacy for incorporation of MMS into national policy, and planning is underway for a feasibility study.	<b>Nigeria:</b> MMS is included in the National Plan of Action for Food and Nutrition and the EML; discussions to mobilize funds for MMS procurement are ongoing; delivery channels are being strengthened through health worker training and integration into national logistics and data systems. <b>Rwanda:</b> A national advisory group has been established; MMS has been integrated into maternal nutrition guidelines and national policies, with plans to include it in the national EML and to develop a costed roadmap; current implementation research is donor-funded, with plans to explore government co-financing; future steps include the generation of local evidence on coverage, adherence, and barriers and integration of MMS into health insurance under universal health coverage. <b>Sierra Leone:</b> An MMS Working Group is in place; MMS was included in ANC guidelines, in the EML, and integrated into national health systems (DHIS2 for monitoring); capacity building has been conducted for over 1400 health workers; future steps include advocating for long-term funding, training central and district staff on distribution and reporting, and revising health facility forms to track MMS uptake. <b>Tanzania:</b> A national MMS Technical Advisory Group is leading policy implementation; MMS has been integrated into the logistics system for better tracking; MMS introduction has strengthened ANC nutrition services; the continued use of IFA for anemia treatment has hindered full MMS adoption; innovative funding mechanisms are needed to accommodate higher cost of MMS. <b>Uganda:</b> An MMS Advisory Group is in place; MMS is included in the ANC register, and a costed roadmap for scaling up is being developed; MMS is not yet in national guidelines or the government budget; local manufacturing is being explored; formative research has informed development of provider training; implementation research in 8 districts will begin in 2026.		

Abbreviations: ANC, Antenatal care; DHIS2, Data Health Information Survey 2; EML, Essential medicine list; IFA, Iron and folic acid; MMS, Multiple micronutrient supplementation; UNIMMAP, United Nations International Multiple Micronutrient Antenatal Preparation.

convenings and development of national policy and guidance documents. High-level advocacy from regional leaders can amplify these efforts, creating the political will necessary for effective integration.

#### #4: Strengthening the supply chain

Ensuring an adequate, quality, and sustainable supply of quality MMS product, such as UNIMMAP MMS, is one of the key challenges faced by African countries. Since the July 2023 meeting in Addis,

MMS manufacturing capacity has increased significantly. Today, the global production capacity for MMS is sufficient to meet the current demand, and efforts to boost regional and local manufacturing to meet anticipated future demand are ongoing. Continued investment in regional manufacturing and logistics infrastructure is critical. Donors have been collaborating on a cost-effective approach to managing the amount, quality, and cost of MMS supplies by supporting the establishment of a network of high-volume regional manufacturing hubs approved to produce MMS. In addition to active manufacturing of MMS in South Africa, Nigeria has manufacturers targeted for prequalification (i.e., an assessment process to help identify manufacturers that are qualified and competent to produce MMS). Other countries in Africa interested in exploring local production of MMS can access technical resources that are available to assist local manufacturers in assessing the feasibility of and the business case for building local production capacity by contacting HMHB. While local manufacturing is often preferred, building adequate capacity takes time, the initial investment required is substantial, and high levels of demand are needed to ensure profitability. Solidification of regional supply chains will ensure MMS availability aligns with national strategies and demand forecasts. A consortium of donors is working to identify and resolve supply chain issues related to procurement and shipping of MMS product, and a dashboard hosted by UNICEF has been developed that will monitor supply and demand across the globe [27].

Finally, even with an available supply of MMS, countries are utilizing implementation science to identify and address supply chain issues that have contributed to low coverage of and adherence to IFA. Strategies to improve the accuracy of supply forecasting and quantification, as well as support appropriate storage and management, are needed to ensure that a quality MMS product arrives in the hands of pregnant women who need it.

#### *#5: Sharing knowledge and resources (comprehensive tools and funding mechanisms for MMS)*

With assurances from donors that sufficient quality UNIMMAP MMS product will continue to be available as demand multiplies, countries are advised to take advantage of the global community's existing commitment and momentum for MMS by planning and costing an MMS introduction and scaling strategy that includes a long-term sustainable plan for supply that gradually reduces reliance on donations. Countries endeavoring to begin introducing MMS have identified the importance of having a costed roadmap to guide national introduction and scale-up, as well as financing and resource mobilization, and several countries identified financial and technical support to develop "costed roadmaps" as key support needed. This emphasis on supporting country-led agendas cannot be overstated. Countries are at different stages in the process and following their individual paths, and while partner interest and support is high, it must be utilized to support the country-led agenda as laid out in the costed roadmap.

Currently, financing mechanisms are available to help countries advance and scale-up women's nutrition programming, including MMS. For instance, UNICEF and partners launched the Improving Maternal Nutrition Acceleration Plan [1], designed to prevent anemia and malnutrition in 9.3 million pregnant women by "fast-tracking" the delivery of a package of essential nutrition services, including MMS in 7 African priority countries (Burkina Faso, Ethiopia, Madagascar, Nigeria, Rwanda, Somalia, and the United Republic of Tanzania) by the end of 2025. Additionally, the Child Nutrition Fund (CNF) [28] aims to reach at least 70 million women and girls with essential nutrition products every year by 2030 by collaborating with national governments to strengthen their

policies, programs, practices, and supplies. The CNF mechanism, with support for UNIMMAP MMS product from Kirk Humanitarian, provides governments with the opportunity to double their investment in MMS programming and other essential nutrition interventions by co-financing a catalytic one-to-one match that fosters sustainable government-led and funded scale-up and ensures equitable coverage for pregnant women. Kirk Humanitarian has committed USD34,400,000 of in-kind product donations (equivalent to 16 million 180-count bottles of UNIMMAP MMS) to the CNF in support of UNICEF's 2024 to 2025 Improving Maternal Nutrition Acceleration Plan.

Even with incentives such as the CNF match, securing ongoing domestic financing for MMS is an uphill task for many African countries, but one that is critical to ensuring sustainability. Governments should find and set aside domestic resources that will support the introduction and scale-up of MMS programming. Countries without sufficient domestic budgets dedicated to nutrition need additional efforts and resources to advocate for prioritization of domestic nutrition financing and to secure additional donor support for scale-up plans that allow for a multi-year transition period. Further, countries that have secured budgets for the national delivery and coverage of IFA that can be partially transitioned to support MMS will need to identify additional resources via a "costed roadmap" to support the various transition activities described above. Comprehensive tools for MMS funding needs, such as the Global Investment Roadmap [24], Results for Development (R4D)'s MMS Roadmap Costing Tool [29], Nutrition International's MMS Cost-Benefit Tool [30], and Cost of Inaction Tool [31], are now available to provide critical support for countries in estimating what funding will be required. HMHB can facilitate linkages with technical resources [25] available to support the development of comprehensive "costed roadmaps" and other advocacy materials as needed.

#### *#6: Integrating MMS into ANC services and community-based delivery platforms*

MMS introduction and scale-up is an opportunity to improve the delivery of maternal nutrition services within ANC, thus complementing existing frameworks, and it should not be introduced as a standalone intervention. MMS is one critical evidence-based intervention that should be integrated into a comprehensive ANC program (e.g., nutrition counseling, appropriate weight gain tracking, identification and treatment of anemia, etc.). Ensuring strong collaboration and partnerships between nutrition and reproductive/maternal health stakeholders from the beginning and throughout the process is critical to ensuring that MMS is not introduced or delivered as a stand-alone intervention.

In most countries, IFA supplementation is the standard of care for pregnant women. Policies and programs for supplementation vary from one country to the next, as do the percentage of pregnant women receiving this intervention (i.e., coverage) and the percentage of pregnant women consuming 90 tablets or more of IFA (i.e., adherence). Introduction of MMS is a prime opportunity to improve the health delivery system to avoid the implementation challenges contributing to poor IFA coverage and adherence in any given country context. Further, given high rates of maternal anemia across much of Africa and the UN Sustainable Development Goal target of halving anemia prevalence among women of reproductive age by 2030, many countries are looking to MMS as a potential solution for closing this gap. However, given the evidence of an equitable impact of MMS and IFA on preventing maternal anemia, substantial reductions in anemia must be accompanied by improved delivery of and adherence to a "full-dose" of MMS as well as other context-specific preventive measures (e.g., antenatal

deworming and intermittent preventive treatment of malaria along with insecticide-treated bed nets) [32]. During anemia treatment, guidance from the Global MMS Technical Advisory Group explains how MMS should be continued [32], but future clinical research should determine the ideal dose of additional iron required for anemia treatment during pregnancy, when the likely cause of anemia is iron deficiency [33].

Each country has their own set of barriers and facilitators influencing effective delivery of MMS to pregnant women and their adherence to MMS. These context-specific factors that often vary across different geographies, socio-economic, and cultural groups within countries, need to be identified, and appropriate strategies for implementing MMS developed to address them. For instance, in settings with substantial barriers associated with facility-level delivery, community-based platforms should be considered with effective referral to higher-level facilities for appropriate ANC and proper recording to enable reporting with other facility-delivered interventions. Another example is the need to assess acceptability of MMS within a certain culture. When assessing the barriers to the acceptability of MMS by family members of pregnant women in Mali, researchers found that husbands were skeptical of MMS, perceiving it as a drug and believing that medicines should be avoided during pregnancy. Tailored training packages for midwives and other healthcare professionals, as well as counselling materials, are required to help address these concerns and the perceived harm of MMS [34]. Implementation strategies that address barriers to effective service delivery and adherence to MMS can be evaluated and adapted as part of a broader introduction and scale-up plan, but their importance cannot be overstated.

Countries must be supported to summarize and disseminate their learnings quickly and widely so that others might build off lessons learned rather than replicating the challenge faced in other settings. One common question that is garnering attention as countries begin to introduce and scale-up MMS is MMS packaging (e.g., bottle vs. blister pack; tablet count; etc.). For example, the 180-count bottle is a concern in the context of some African countries, particularly those heavily impacted by HIV/AIDS, that have antiretroviral medications that utilize a similar bottle. The bottle itself or the sound of the pills moving within the bottle has been reported as potentially stigmatizing. In addition, the practice of dispensing IFA in much smaller quantities in blister packets, sealed sachets, or other re-packaging options are common in many African countries for a variety of reasons. Although there seems to be mixed evidence surrounding the optimal quantity of tablets provided at once, some providers worry that giving pregnant women the full 180 tablets at their first ANC visit will dissuade them from returning to ANC. Several implementation research studies in Africa, Southeast Asia, and the Middle East are investigating these questions, and, in some cases, emerging evidence have been presented related to the successful use of the 180-count bottle [34,35]. For example, in Cambodia, a recent study showed that providing MMS for 180 d via one 180-tablet bottle resulted in similar adherence rates and ANC attendance as compared to pregnant women receiving two bottles of 90 tablets at two time-points in their pregnancy [35]. In Sierra Leone, a study with 533 women showed that they value ANC beyond the receipt of MMS and therefore do not perceive that receiving 180 tablets once would limit ANC attendance [36].

Participants in the Nairobi meeting were eager to hear these results and seemed receptive to accepting findings coming out of other settings. Regardless, implementation strategies including provider training and social behavior change communication activities will need to be designed and monitored in settings where questions regarding optimal number of tablets to be given are raised.

By approaching the introduction of MMS in a systematic way that informs and supports the necessary policy and regulatory adjustments, quantifies and plans for procurement of a sustainable supply of quality MMS product, secures the necessary financial commitments to support introduction and scale-up, and addresses the existing challenges hampering effective delivery of ANC services generally, and prenatal supplements more specifically, countries stand to ensure a healthier future for pregnant women and their babies.

#### *Call for sharing of evidence and lessons learned*

The Nairobi meeting country delegates expressed clear interest in ongoing information sharing across countries (within and beyond the African continent). For some countries, there is continued need for sharing and discussion of the existing global evidence for MMS. As countries engage key stakeholders in building their enabling environment for MMS programming, additional, more nuanced questions arise that must be acknowledged and addressed. Making global and regional experts available for the presentation of and dialogue around global evidence continues to be a critical step informing policy change recommendations. A growing array of resources—including evidence-based advocacy materials [37] by HMHB and FurtherWith15 [38] can accelerate learning among countries by exchanging evidence and implementation science research, delivery strategies, and insights on demand-generation.

Beyond the global evidence, there is a need to “fast-track” sharing of evidence being produced at the country level, including lessons learned. Convening such as the meeting in Nairobi are a critical element of this dissemination, but there is also a need to ensure that country experiences and lessons learned are documented and disseminated more broadly and expeditiously, including publications in both peer-reviewed and gray literature, presentations at global and regional conferences, communication through regular community of practice webinars and electronic mailings, and bilateral exchanges between countries.

As more countries progress through the framework, implementation science findings that communicate lessons learned through case studies of delivery strategies, social and behavior change, and other demand generation strategies that can inform MMS programming are of particular interest. Countries see an opportunity for accelerating introduction by building on and adapting existing resources (e.g., training materials and social and behavior change resource materials) developed and assessed by other countries with similar contexts.

#### *Moving MMS forward as a community of practice*

As an outcome of the Nairobi Meeting, a 3-page “Call to Action” [39] outlining the six key recommendations discussed in this paper was published for use by all stakeholders involved in maternal nutrition programming. Importantly, HMHB committed to serve as a “global connector,” coordinating requests from countries for, e.g., technical assistance, MMS product, financial support, etc., with available resources from implementing organizations and philanthropic agencies. These efforts are aimed at closing the gaps that typically curtail the introduction and scale-up interventions such as MMS. In addition, HMHB will continue to collect and disseminate the lessons learned from MMS introduction and scaling efforts in Africa and globally by making resources available on the HMHB Resource Hub, sponsoring webinars, and other MMS

Community of Practice events, and by exploring ways to summarize findings on similar questions (e.g., acceptability of MMS).

## Conclusion

In summary, this position paper synthesized the outcomes of the 2<sup>nd</sup> Africa Maternal Nutrition and MMS Technical Meeting: A Path Toward Introduction and Scale-up of MMS in Africa (Nairobi, Kenya, October 2024). Government delegates from 17 African members states, along with donors and experts, joined and supported the transition from IFA to MMS and its scale-up in the ANC context with the common goal of improving maternal and child health. There are many challenges ahead, but the progress made by African countries on MMS implementation since the last meeting in 2023, represents a significant opportunity to consolidate maternal nutrition services across Africa, ensuring improved health outcomes for pregnant women and their babies. The six key recommendations outlined in this position paper provide a comprehensive roadmap for achieving this goal, emphasizing the need for global advocacy, country-specific approaches, government ownership, supply chain strengthening, resource mobilization, and MMS integration into ANC services and delivery platforms. The unquestionable benefits of MMS, coupled with the current commitment of the global community to support its introduction and scale-up, presents a unique opportunity and momentum to collectively improve the health, survival, and nutrition of mothers and babies in Africa and beyond. This consensus sets the stage for coordinated regional action and lays the foundation for lasting improvement in maternal nutrition.

## Data availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current position paper.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article. All authors read and approved the final manuscript.

## CRediT authorship contribution statement

**Martin N. Mwangi:** Writing – review & editing, Conceptualization. **Elisabeth T. Mukendi:** Writing – review & editing, Investigation, Data curation. **Carolina Pereira:** Data curation. **Filomena Gomes:** Writing – review & editing, Formal analysis, Data curation. **Mihaela C. Kissell:** Writing – review & editing, Formal analysis, Data curation. **Rijuta Pandav:** Writing – review & editing, Data curation. **Maurine N. Waudou:** Writing – review & editing. **Tarik Taye Birhanu:** Writing – review & editing. **Abeba Ayele:** Writing – review & editing. **Alyson McColl:** Writing – review & editing.

**Marti J. van Liere:** Writing – review & editing. **Saskia J.M. Osen-darp:** Writing – review & editing. **Monica J. Fox:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization.

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## References

- [1] United Nations Children's Fund (UNICEF). Improving maternal nutrition: an acceleration plan to prevent malnutrition and anaemia during pregnancy (2024–2025). New York: United Nations Children's Fund (UNICEF); 2024.
- [2] United Nations Children's Fund (UNICEF). Undernourished and overlooked: a global nutrition crisis in adolescent girls and women. New York: United Nations Children's Fund (UNICEF); 2023.
- [3] Smith ER, Shankar AH, Wu LS-F, Aboud S, Adu-Afarwuah S, Ali H, et al. Modifiers of the effect of maternal multiple micronutrient supplementation on still-birth, birth outcomes, and infant mortality: a meta-analysis of individual patient data from 17 randomised trials in low-income and middle-income countries. *Lancet Glob Health* 2017;5:e1090–100. [https://doi.org/10.1016/S2214-109X\(17\)30371-6](https://doi.org/10.1016/S2214-109X(17)30371-6).
- [4] Keats EC, Haider BA, Tam E, Bhutta ZA. Multiple-micronutrient supplementation for women during pregnancy. *Cochrane Database Syst Rev* 2019;3: CD004905. <https://doi.org/10.1002/14651858.CD004905.pub6>.
- [5] Nutrition International. Cost-effectiveness analyses for the WHO review on multiple micronutrient supplements during pregnancy: technical report. Ottawa: Nutrition International; 2020.
- [6] Liu E, Wang D, Darling AM, Perumal N, Wang M, Ahmed T, et al. Effects of prenatal nutritional supplements on gestational weight gain in low- and middle-income countries: a meta-analysis of individual participant data. *Am J Clin Nutr* 2022;116:1864–76. <https://doi.org/10.1093/ajcn/nqac259>.
- [7] Larsen B, Hoddinott J, Razvi S. Investing in nutrition: a global best investment case. *J Benefit Cost Anal* 2023;14:235–54. <https://doi.org/10.1017/bca.2023.22>.
- [8] Nutrition For Growth. Nutrition for growth summit 2025. <https://nutritionforgrowth.org/> (Accessed January 8, 2025).
- [9] Scaling Up Nutrition. SUN global gathering 2025 2025. <https://scalingupnutrition.org/events/global-gathering/sun-global-gathering-2025> (Accessed January 8, 2025).
- [10] Gomes F, Agustina R, Black RE, Christian P, Dewey KG, Kraemer K, et al. Multiple micronutrient supplements versus iron-folic acid supplements and maternal anemia outcomes: an iron dose analysis. *Ann N Y Acad Sci* 2022;1512:114–25. <https://doi.org/10.1111/nyas.14756>.
- [11] Wang D, Liu E, Perumal N, Partap U, Cliffer IR, Costa JC, et al. The effects of prenatal multiple micronutrient supplementation and small-quantity lipid-based nutrient supplementation on small vulnerable newborn types in low-income and middle-income countries: a meta-analysis of individual participant data. *Lancet Glob Health* 2025;13:e298–308. [https://doi.org/10.1016/S2214-109X\(24\)00449-2](https://doi.org/10.1016/S2214-109X(24)00449-2).
- [12] Gomes F, Adu-Afarwuah S, Agustina R, Ali H, Arcot A, Arifeen S, et al. Effect of prenatal multiple micronutrient supplementation vs iron and folic acid supplementation on size at birth and subsequent growth through 24 months of age: a systematic review and meta-analysis. *Am J Clin Nutr* 2025;122:185–95. <https://doi.org/10.1016/j.ajcnut.2025.04.022>.
- [13] Cheong JLY, Hunt RW, Anderson PJ, Howard K, Thompson DK, Wang HX, et al. Head growth in preterm infants: correlation with magnetic resonance imaging and neurodevelopmental outcome. *Pediatrics* 2008;121:e1534–40. <https://doi.org/10.1542/PEDS.2007-2671>.
- [14] Prado EL, Alcock KJ, Muadz H, Ullman MT, Shankar AH. Maternal multiple micronutrient supplements and child cognition: a randomized trial in Indonesia. *Pediatrics* 2012;130:e536–46. <https://doi.org/10.1542/PEDS.2012-0412>.
- [15] Prado EL, Sebayang SK, Apriatni M, Adawiyah SR, Hidayati N, Islamiyah A, et al. Maternal multiple micronutrient supplementation and other biomedical and socioenvironmental influences on children's cognition at age 9–12 years in Indonesia: follow-up of the SUMMIT randomised trial. *Lancet Glob Health* 2017;5:e217–28. [https://doi.org/10.1016/S2214-109X\(16\)30354-0](https://doi.org/10.1016/S2214-109X(16)30354-0).
- [16] Zhu Z, Cheng Y, Zeng L, Elhoumed M, He G, Li W, et al. Association of antenatal micronutrient supplementation with adolescent intellectual development in rural western China: 14-year follow-up from a randomized clinical trial. *JAMA Pediatr* 2018;172:832–41. <https://doi.org/10.1001/JAMAPEDIATRICS.2018.1401>.

- [17] Perumal N, Perumal N, Blakstad MM, Fink G, Lambiris M, Bliznashka L, et al. Impact of scaling up prenatal nutrition interventions on human capital outcomes in low- and middle-income countries: a modeling analysis. *Am J Clin Nutr* 2021;114:1708–18. <https://doi.org/10.1093/ajcn/nqab234>.
- [18] World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: World Health Organization; 2016.
- [19] World Health Organization. WHO antenatal care recommendations for a positive pregnancy experience: nutritional interventions update: multiple micronutrient supplements during pregnancy. Geneva: World Health Organization; 2020.
- [20] World Health Organization. World Health Organization model list of essential medicines – 22nd list. Geneva: World Health Organization; 2021.
- [21] Healthy Mothers Healthy Babies Consortium. Micronutrient Forum. African regional meeting on maternal nutrition and multiple micronutrient supplementation (MMS): sharing experiences in policy, advocacy, and implementation. 2023, Addis Ababa, Ethiopia. Washington, DC; [https://impekacd.n3.us-east-2.amazonaws.com/hmhbcconsortium.org/content/user\\_files/2023/10/13153935/HMHB-Africa-Regional-Meeting-Report.pdf](https://impekacd.n3.us-east-2.amazonaws.com/hmhbcconsortium.org/content/user_files/2023/10/13153935/HMHB-Africa-Regional-Meeting-Report.pdf).
- [22] Africa Regional Nutrition Strategy 2015-2025; 2015. <https://au.int/en/documents/20220401/africa-regional-nutrition-strategy-2015-2025>.
- [23] Healthy Mothers Healthy Babies Consortium. Using implementation science to support the introduction and scale-up of multiple micronutrient supplementation. Washington, DC: Healthy Mothers Healthy Babies Consortium; 2024.
- [24] BMGF, CIFF, ECF, Kirk Humanitarian. Healthier pregnancies and brighter futures for mothers and babies: a global investment roadmap for multiple micronutrient supplementation. 2024. <https://hnhbconsortium.org/knowledge-hub/mms-global-investment-roadmap/>.
- [25] Healthy Mothers Healthy Babies Consortium. Resources archive 2025. <https://hnhbconsortium.org/knowledge-hub/> (Accessed January 8, 2025).
- [26] The Healthy Mothers Healthy Babies Consortium. Report of the 2nd Africa Maternal Nutrition and Multiple Micronutrient Supplementation Technical Meeting. Washington, DC; 2025 <https://hnhbconsortium.org/knowledge-hub/report-2nd-africa-maternal-nutrition-and-multiple-micronutrient-supplementation-mms-technical-meeting/>.
- [27] UNICEF. Nutrition market dashboard 2025. <https://www.unicef.org/supply/nutrition-market-dashboard> (Accessed January 8, 2025)
- [28] Child Nutrition Fund | UNICEF Child Nutrition Fund 2025. <https://www.child-nutritionfund.org/> (Accessed January 8, 2025).
- [29] R Singh, S Shah, A Roberts, B Morgan, B Gowda. Multiple micronutrient supplements (MMS) introduction and scale-up roadmap costing tool | Results for development 2024. <https://r4d.org/resources/multiple-micronutrient-supplements-costing-tool/> (Accessed January 8, 2025).
- [30] Nutrition. International. The MMS cost-benefit tool user interface and interpretation guide. 2022. <https://www.nutritionint.org/wp-content/uploads/2021/04/MMS-Cost-Benefit-Tool-User-Guide-2021-04-19.pdf>.
- [31] Nutrition International. The cost of inaction tool 2025. <https://www.nutritionint.org/learning-resource/cost-inaction-tool/> (Accessed January 8, 2025).
- [32] Multiple Micronutrient Supplementation Technical Advisory Group (MMS TAG). Interim guidance for concurrent antenatal multiple micronutrient supplementation and anemia treatment in pregnant women. Washington DC: Multiple Micronutrient Supplementation Technical Advisory Group (MMS TAG); 2023.
- [33] Dewey KG, Zlotkin SH. Antenatal multiple micronutrient supplements: time for alignment to support country action. *The Lancet* 2025;405:1033–5. [https://doi.org/10.1016/S0140-6736\(25\)00411-8](https://doi.org/10.1016/S0140-6736(25)00411-8).
- [34] Ba A, Fox MJ, Keita AM, Hurley KM, King SE, Sow S, et al. Qualitative evaluation of a package of implementation strategies codesigned to support the introduction of multiple micronutrient supplementation (MMS) for pregnant women in Bamako, Mali. *Matern Child Nutr* 2025;21:e13712. <https://doi.org/10.1111/mcn.13712>.
- [35] Sauer C, Hoang MA, Kroeun H, Gupta AS, Ngik R, Sokchea M, et al. Assessing the adherence and acceptability to iron and folic acid compared with multiple micronutrient supplements during pregnancy: a cluster-randomized noninferiority trial in Cambodia. *Am J Clin Nutr* 2025;122:166–73. <https://doi.org/10.1016/j.ajcnut.2025.04.033>.
- [36] Toure D, Jalloh U, Moses F, Shमित Koroma A, Juneja S, Bangura M, et al. Advancing maternal nutrition: evaluating multiple micronutrient supplement acceptability. Sierra Leone's ANC services; (personal communication).
- [37] Healthy Mothers Healthy Babies Consortium. Advocacy Resources Center 2025. <https://hnhbconsortium.org/advocacy-resource-center/>. (Accessed January 8, 2025).
- [38] Healthy mothers healthy babies consortium. #FurtherWith15 2025. <https://hnhbconsortium.org/furtherwith15/> (Accessed January 8, 2025).
- [39] HMHB. Micronutrient Forum. Call to action | 2nd Africa maternal nutrition and multiple micronutrient supplementation (MMS) technical meeting. Nairobi, Kenya. Washington, DC. p. 2024. <https://hnhbconsortium.org/knowledge-hub/call-to-action-2nd-africa-maternal-nutrition-and-multiple-micronutrient-supplementation-mms-technical-meeting-nairobi-kenya-16-18-october-2024/>.