HEALTHY MOTHERS HEALTHY BABIES

Micronutrient FORUM

AFRICAN REGIONAL MEETING ON MATERNAL NUTRITION AND MULTIPLE MICRONUTRIENT SUPPLEMENTATION (MMS)

Sharing Experiences in Policy, Advocacy, and Implementation

12-14 July 2023, Addis Ababa, Ethiopia

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The HMHB Consortium, hosted by the Micronutrient Forum, is a collective of more than 100 organizations and individuals that is working to raise awareness, drive policy change, and strengthen the implementation of women's nutrition interventions. HMHB also hosts Technical Advisory Groups focused on key women's nutrition interventions such as the MMS-Technical Advisory Group (MMS-TAG).

The Africa regional meeting on maternal nutrition and multiple micronutrient supplementation in progress at the African Union Commission Headquarters, Addis Ababa, Ethiopia.

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ABBREVIATIONS

ANC	Antenatal Care
AUC	African Union Commission
AUC HHS	African Union Commission Health, Humanitarian Affairs and Social Development
BMGF	Bill & Melinda Gates Foundation
CIFF	Children's Investment Fund Foundation
DRC	Democratic Republic of the Congo
DSM	dsm-firmenich
ECF	Eleanor Crook Foundation
EPHI	Ethiopian Public Health Institute
FMOH	Federal Ministry of Health
HMHB	Healthy Mothers Healthy Babies consortium
HKI	Helen Keller International
JHPIEGO	Johns Hopkins Program for International Education in Gynecology and Obstetrics
JHU	Johns Hopkins University
KH	Kirk Humanitarian
LSHTM	London School of Hygiene and Tropical Medicine
MNF	Micronutrient Forum
MMS	Multiple Micronutrient Supplementation
MOH	Ministry of Health
NCD	Non-Communicable Diseases
NI	Nutrition International
RHB	Regional Health Bureaus
SAL	Sight and Life
UNICEF	United Nations Children's Fund
UNIMMAP	United Nations International Multiple Micronutrient Antenatal Preparation
UNRWA	United Nations Relief Works Agency
VA	Vitamin Angels
WVI	World Vision International

INTRODUCTION

In recent decades, significant strides have been made to improve nutrition during the first 1,000 days of life in low- and middle-income countries. This progress is evident in child nutrition indicators, with a notable reduction in global stunting prevalence from 33% in 2000 to 22% in 2022 (UNICEF, 2023a), and an increase in exclusive breastfeeding rates from 35% in 2000 to 49% in 2019 (Neves *et al.*, 2021). The concept of the 'first 1,000 days' is widely recognized and well understood, serving as conceptual 'hook' that resonates with many stakeholders. However, maternal nutrition, particularly during the initial 270 days of this period (from pregnancy to birth) has often been overlooked (UNICEF, 2023b).

Poor nutrition is common among women of reproductive age and adolescent girls who, in many contexts, traditionally eat last and consume less nutrient-rich foods such as meat, fish, or eggs. This is particularly problematic during pregnancy and lactation when nutritional requirements are increased. Poor maternal nutrition is a major driver of maternal health risks, adverse birth outcomes, newborn morbidity and mortality, as well as poor postnatal growth and cognition. Yet, there has been insufficient attention to research, programs, policies, and financing for maternal nutrition, and while evidence-based interventions exist, such as antenatal multiple micronutrient supplementation (MMS)[1], these have not been brought to scale.

The Healthy Mothers Healthy Babies Consortium (HMHB), hosted by the Micronutrient Forum, was established with the specific mandate to foster collaboration and knowledge exchange among stakeholders, to raise awareness, catalyze policy changes, and strengthen the implementation of maternal nutrition interventions. HMHB generates and synthesizes scientific evidence; ensures public access to information on maternal nutrition and MMS activities, research, and policies; and brings actors together to drive collective action.

In July 2023, African leaders and public health experts gathered in Ethiopia to discuss critical nutrition issues impacting women across the continent. The three-day meeting, co-organized by HMHB, united diverse stakeholders from the African Union Commission (AUC), national governments, and other organizations. The goal was to identify new actions and recommendations for maternal nutrition policies and programs in Africa, with a specific focus on the challenges and opportunities of introducing MMS in the context of antenatal care (ANC) services to support maternal health and nutrition.

> *We want to seize this opportunity to establish meaningful collaborations and set the pace for concrete action to accelerate the women's nutrition agenda, implementing an MMS strategy and nutrition financing.*
>
> **Inas Mubarak, Africa Union Commission.**

A strong commitment to improving maternal nutrition was expressed in the opening statements of Ms. Inas Mubarak, the Head of Health Systems, Diseases and Nutrition, AUC. She underscored the need for targeted policies and strategies to address the pressing issues of women's nutrition and empowerment in Africa.

Her Excellency, Dr. Lia Tadesse, Minister of Health, Ethiopia, also emphasized the importance of maternal nutrition and MMS programs and policies in Ethiopia. She spoke to the ongoing study on MMS in 42 districts, reaching approximately 400,000 women, which will evaluate the effectiveness of providing MMS as part of routine ANC.

1 The recommended composition of MMS is the United Nations International Multiple Micronutrient Antenatal Preparation (UNIMMAP). In the context of this report, MMS refers to the UNIMMAP formulation.

> *We recognize that MMS is an entry point to improve the delivery of nutrition services among pregnant women attending antenatal care, generating demand for services and contributing to enhancing the quality of services.*
>
> **Dr. Lia Tadese, Minister of Health, Ethiopia.**

PARTICIPANTS

Over 120 representatives from governments, international NGOs, and implementing agencies concerned with maternal nutrition and MMS program and policy issues came together from across 12 countries: Burkina Faso, the Democratic Republic of Congo, Ethiopia, Jordan, Kenya, Madagascar, Malawi, Mali, Nigeria, Senegal, South Africa, and Uganda (see **Annex A** for a full participant list).

MEETING OBJECTIVES

The three-day technical meeting focused on two thematic areas: the sessions on the first day addressed maternal nutrition issues more broadly and the next two days provided a deep dive into the scientific evidence base, country implementation experiences, and lessons learned regarding the introduction and delivery of antenatal MMS. The meeting included ample time for plenary discussions and working sessions to allow exchanges across countries and participants.

The main objectives of the meeting were to:

1. Share information and exchange experiences and lessons learned on MMS policy, advocacy, and implementation.
2. Capture lessons learned from countries that have already introduced or scaled up MMS, and use these lessons to create tools that could be applied in other countries. This included lessons on how MMS demonstration projects could help strengthen existing maternal nutrition programs.
3. Establish a regional MMS network/Community of Practice.
4. Advocate for accelerated action at the country level regarding policy change and integration of MMS in ANC services through a call-to-action.
5. Ensure that gender considerations are integrated into all aspects of maternal nutrition/MMS policy, advocacy, and implementation.

For the complete meeting agenda, please see **Annex B**.

Micronutrient Forum's HMHB staff happy to kickstart the three day high level meeting in Addis Ababa, Ethiopia.

MATERNAL NUTRITION

FRAMING THE ISSUE

The first day of the meeting was appropriately hosted by the AUC. Africa is home to 54 diverse nations, with their own unique characteristics. Despite abundant resources, the continent grapples with pervasive poverty. In 2022, an estimated 460 million people (1 in 3 Africans) were living below the extreme poverty line of USD 1.90 a day, with women being affected most. Gertrude Kara (AUC) highlighted the importance of maternal nutrition for Africa and emphasized how the African Union's continental strategies provide a supporting framework for improving maternal nutrition. The African Union's health strategy, based on its "Agenda 2063 – The Africa We Want" (African Union, 2023), prioritizes ending hunger and malnutritionaddressing non-communicable diseases (NCDs), and promoting gender equality and women's empowerment.

On a global scale, Marti van Liere (MNF) spoke to the extent of maternal undernutrition. More than one billion women and adolescent girls worldwide suffer from undernutrition, resulting in underweight, short stature, anemia, and micronutrient deficiencies. The consequences of maternal undernutrition reverberate across generations, affecting not only the health and well-being of the mother but that of her child. For the child, it can cause irreversible damage to the developing brain, impair cognitive potential, hinder educational attainment, and set the stage for a host of future health challenges like obesity, diabetes, and chronic diseases, perpetuating an intergenerational cycle of malnutrition.

Yet, there is compelling evidence that investing in maternal nutrition is one of the best bets for global development. For example, the recent 2023 Copenhagen Consensus Nutrition paper by leading health economists highlighted the substantial economic return of replacing iron-folic acid (IFA) supplementation with MMS. This intervention had the highest benefit-cost ratio of $37 for every $1 invested (Larsen *et al.*, 2023).

KEY DATA MATERNAL NUTRITION INDICATORS IN LOW- AND MIDDLE-INCOME COUNTRIES

- In Africa, **8** in **10** (161 million) women of reproductive age are deficient in at least one micronutrient (Stevens *et al.*, 2022).
- **1** in **3** (570 million) women of reproductive age are anemic (UNICEF, 2022).
- **1** in **10** (170 million) women of reproductive age are underweight (UNICEF, 2022).
- Each year, an estimated **20 million babies are born with low birth weight** (Blencowe *et al.*, 2019).

Prof. Keith West emphasized that while there is ample evidence for maternal nutrition interventions, the implementation of these interventions depends on the local environment and needs to be adapted to the specific context. Implementation science identifies context-specific factors – such as food systems, behavioral, societal and political, climate, and environmental – and how these factors affect nutrition and health outcomes (e.g., infection, inflammation, poor growth, cognition, and motor development) in specific populations. Additionally, women's malnutrition is also an issue of inequity, and taking this perspective provides an opportunity for closer collaboration across various sectors, including youth engagement, reproductive health, education, gender, and economics.

MATERNAL NUTRITION IN HUMANITARIAN SETTINGS

Women and girls bear a disproportionate burden in humanitarian settings, yet pre-conceptional nutrition receives inadequate attention. Whether in routine care or emergency settings, women and mothers need access to nutrition services. However, different agencies, supply chains, and budgets are involved, complicating the provision of these services.

A panel discussion was held with representatives from Madagascar, Kenya, and Ethiopia to share experiences and highlight challenges in addressing women's and maternal nutrition in emergency contexts.

Main challenges:

- **Insufficient data.** There is a lack of data to inform decisions on budget allocation and nutrition interventions for women and adolescent girls, especially for those aged 10-14 years. This includes limited information on anthropometric indicators, micronutrient deficiencies, and food preferences and habits. Overall, the integration of maternal nutrition indicators in the existing information systems is weak.
- **Weaknesses in coordination.** Women's nutrition programs suffer from weak coordination and there is poor integration of maternal nutrition in national response and contingency plans.
- **Fragmented guidelines.** The absence of a comprehensive strategy for women's and adolescent girls' nutrition in humanitarian contexts has resulted in piecemeal guidelines, lacking a cohesive approach.
- **Lack of clarity on minimum packages.** There is a lack of clarity on the minimum package of interventions needed to prevent and treatment all forms of malnutrition in women and adolescent girls.
- **Disconnect between emergency and routine care.** The involvement of different agencies, supply chains, and budgets in emergency and routine care creates a disconnect that hampers the resilience of health systems.
- **Resource limitations in emergency settings.** In emergency settings, resources are typically prioritized for general services, often at the expense of addressing acute malnutrition in young children, and pregnant and lactating women.
- **Learning from stunting reduction efforts.** Efforts to address maternal malnutrition can benefit from lessons learned through efforts to reduce stunting, which requires a multisectoral approach.

> *Maternal nutrition cannot be addressed only through the health sector. The Seqota Declaration mobilized ten sectors to address stunting, and we can learn from this on how to respond to maternal malnutrition and address underlying barriers.*
>
> **Dr. Sisay Sinamo, Senior Program Manager for the Seqota Declaration, Ethiopia.**

ADVOCACY AND FINANCING FOR MATERNAL NUTRITION

There are compelling reasons to invest in maternal nutrition and it is critical that the nutrition advocacy community speaks with a unified voice about this investment opportunity. This includes addressing the extent and magnitude of the problem, the impact of the polycrisis on maternal nutrition, the evidence-based, high-impact solutions at hand, and the cost-effectiveness of these interventions, such as MMS.

These two related themes, advocacy and financing, were the focus of two panels. The first panel provided a global perspective, while the second panel offered a national perspective with panelists from DRC, Ethiopia, and Malawi.

Panelists stressed the necessity of a coordinated and harmonized advocacy approach to align global and national actors, and emphasized the importance of amplifying these efforts through civil society voices and community stakeholders, including women's groups (Asrat Tolossa, WVI). Clear and tailored messages are essential when engaging diverse audiences, from technical experts in the Ministries of Health to budget decision-makers in the Ministries of Finance (Alyson McColl, GMMB). The panelists also highlighted current global advocacy opportunities, such as the launch of the Women's Nutrition Action Agenda at Women Deliver 2023, UNICEF's Women Nutrition Acceleration plan, and the Nutrition for Growth event in France 2024, which serve as strategic entry points for national advocates to elevate maternal nutrition on policy agendas.

Chytanya Kompala (ECF) pointed to the sharpened toolkit of evidence-based, cost-effective interventions, including MMS, offering solid investment opportunities. The Child Nutrition Fund was mentioned as an innovative pooled funding mechanism aimed at mobilizing historic levels of funding for ready-to-use therapeutic food (RUTF). The Fund matches domestic resources and is expanding to include a broader spectrum of core interventions, including maternal nutrition interventions like MMS.

The panel of national actors emphasized the need for communities to understand this important agenda and articulate their demand to parliamentarians "from the ground up." Politicians can be held accountable by tracking investments and actions to implement the policies and strategies (Dr. Isaac Bashir, MoH, Kenya). Community service providers and mothers themselves need to be well-informed about the importance of maternal nutrition. At the community level, various sectors work together to address prenatal and postnatal health and nutrition issues (Dr. Marie-Anne Tumba, MoH, DRC). This point was strongly affirmed by Dr. Sisay Sinamo who noted that maternal nutrition requires multisectoral collaboration across women and family sectors, social protection, and food systems, with specific attention to determinants beyond nutrition.

> *We need strong community structures to support our ask to decision-makers: In DRC, when electoral candidates go to the community, the community speaks about nutrition for mothers.*
>
> **Dr. Mulamba Diese, Vitamin Angels, DRC.**

For advocacy resources, please visit the HMHB Advocacy Resource Center, which provides an adaptable advocacy slide deck, advocacy briefs, a brief on frequently asked questions, and an HMHB Consortium factsheet.

COMPELLING ARGUMENTS FOR MATERNAL MALNUTRITION COMMUNICATION

- **Undernutrition in women exacerbates gender inequalities** by limiting learning potential, income, and life opportunities.
- **Progress on women's and adolescent girl's nutrition has been far too slow** and is under threat, evidenced by a lack of improvement in the prevalence of adolescent underweight and anemia in women. Women and adolescents in poorer regions bear the heaviest burden of undernutrition.
- **Poor nutrition in women isn't just a temporary setback.** Its consequences reverberate throughout a woman's life and profoundly impacts the lives of her offspring. It increases the likelihood of disease, premature mortality, hampers cognitive development, impairs educational attainment, lowers earning potential, and increases the risk of future chronic diseases.
- **Outrage at inaction and slow progress.** Although the complexities of undernutrition can be overwhelming, it is important to strive for clarity and prioritize the most evidence-based and impactful interventions in each context. It is also important to remember that if we can't do everything, then let's do the best things first.

KEY TAKEAWAYS ON MATERNAL NUTRITION

- **Maternal nutrition needs to be addressed through multiple systems and channels.** Maternal nutrition is not an isolated issue – it is directly related to maternal health, reproductive health, and child health and nutrition. To effectively address this challenge, it is necessary to take a multisectoral approach. Maternal nutrition should be integrated into multiple systems, including health, social affairs, women and family sector, social protection, and food systems as key elements of prenatal and postnatal health and nutrition.
- **Better maternal nutrition policies and policy cohesion are required.** Many countries have policies, strategies, and guidelines "on paper" addressing maternal and women's nutrition. However, these often lack comprehensive cost assessments, sufficient funding, and successful implementation.
- There is a lack of consensus on **the "minimum package" of maternal nutrition interventions**, and there is a need to tailor and translate a minimum package to the local context, risk factors, and epidemiology associated with poor maternal nutrition and food culture.
- **Bottlenecks and gaps in maternal nutrition service delivery need to be overcome** to ensure better access, broader coverage, and higher-quality essential nutrition services. Despite utilization of service delivery platforms by women, a significant number of women miss out on vital nutrition services ("voltage drop"). These missed opportunities need to be investigated and addressed to ensure essential care is provided through the health system.
- **More (and better) data on maternal nutrition are needed** for program design and accountability. There is a dearth of data on status, reach, quality, and coverage, and the lack of agreed-upon indicators for maternal and adolescent nutritional status and diet reflects the low priority given to women's nutrition. This data gap hinders both program design and accountability.
- **A reliable supply of commodities is necessary for effective service delivery.** Most essential nutrition services (e.g., IFA, MMS, BEP, etc.) are dependent on commodities. If the supply is interrupted or absent, it directly impacts program continuity and disrupts essential services to women.
- **Maternal nutrition messages need to evoke urgency and highlight the generational and economic impact.** The framing of health and nutrition issues shapes the priority, level of attention, and resources they receive from global organizations and national governments.

Bilateral discussions and networking among delegates at the African Union Commission.

MULTIPLE MICRONUTRIENT SUPPLEMENTATION IN PREGNANCY

EVIDENCE OVERVIEW

> *We know much more than we knew two decades ago: we have more evidence, we have more interventions, but we are still not there; implementation is related to people's 'habitat' and needs to be translated to the context.*
>
> **Prof. Keith West, Johns Hopkins Bloomberg School of Public Health.**

There is solid evidence on maternal nutrition interventions such as IFA supplementation, MMS, and balanced-energy protein supplementation (BEP). For instance, a recent review of systematic reviews and meta-analyses including 20 trials on BEP (Ciulei *et al.*, 2023), reported that BEP improved birth weight and reduced the risks of being born stillbirth and small for gestational age.

An overview of the two decades of evidence for MMS and country case studies were presented by Prof. Keith West.

MMS has been consistently shown to improve maternal nutrition and reduce the risk of adverse birth outcomes, including preterm birth, stillbirth, low birth weight, and small for gestational age (Keats *et al.*, 2019; Smith *et al.*, 2017) (**Figure 1**).

The benefits of MMS are even more pronounced for children born to underweight and anemic mothers (**Figure 2**). There is also emerging evidence for the positive impact of preconception MMS, which significantly reduced miscarriages compared to the placebo group, as exemplified by the JiVita 5 study in Bangladesh (West *et al.*, 2022).

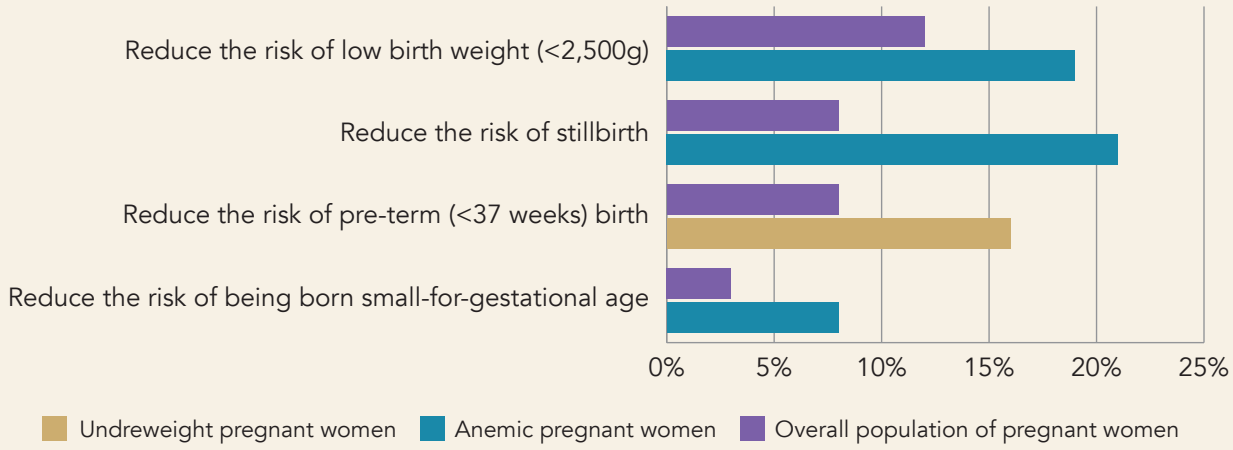
The session sparked numerous discussions and interesting questions on MMS safety, potential adverse effects, and the role of MMS in preventing and treating anemia. A list of these questions is provided in **Annex C**, including references to technical documents that provide more elaborate answers. Furthermore, these questions will be used to expand the Frequently Asked Questions on MMS (Healthy Mothers Healthy Babies, 2022), which is available on the HMHB website. An update on the scientific evidence on the benefits of prenatal MMS is published in 2023 Sight and Life Special Magazine on MMS (MMS TAG, 2023).

FIGURE 1: EFFECTS OF MMS VS. IFA: BIRTH AND INFANT OUTCOMES

Outcomes	Cochrane Review (15 RCTs) Relative risks (RR (95% CI))	IPD meta-analysis (17 RCTs) Relative risks (RR (95% CI))
Small for gestational age (<10th percentile)	**0.92 (0.88-0.97)[a]**	**0.97 (0.96-0.99)[b]**
Low birth weight (<2,500g)	**0.88 (0.85-0.91)**	**0.88 (0.85-0.90)**
Very low birth weight (<2,000g)	Not reported	0.78 (0.72-0.85)
Preterm birth (<37 weeks)	0.95 (0.90-1.01)	**0.92 (0.88-0.95)**
Very preterm birth (<34 weeks)	Not tested	0.87 (0.79-0.95)
Large for gestational age (>90th percentile Oken)	Not tested	1.05 (0.95-1.15)
Large for gestational age (>90th percentile INTERGROWTH)	Not tested	**1.11 (1.04-1.19)**
Stillbirth	0.95 (0.86-1.04)	**0.92 (0.86-0.99)**
Neonatal mortality (≤28 days)	1.00 (0.89-1.12)	0.98 (0.90-1.05
Infant mortality	Not reported	0.97 (0.88-1.06)

[a]SGA defined by authors of trials; [b]SGA defined by the INTERGROWTH-21 standard MMS, multiple micronutrient supplementation; IFA iron with or without folic acid; IPD, individual participant data; RCTs, randomized controlled trials. RR in blue show a significant decrease in RR.
Source: Keats EC, *et al.* Cochrane Rev 2019, Smith ER *et al.* Lancet Global Health 2017

FIGURE 2: BENEFITS OF MMS FOR DIFFERENT GROUPS



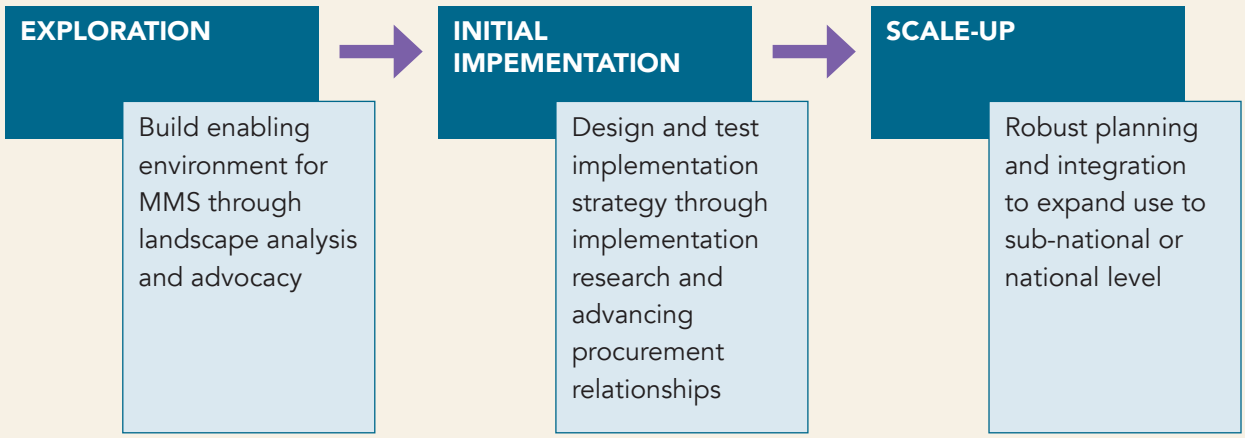
POLICIES AND GUIDING FRAMEWORKS ON MMS

Monica Fox (JHU) presented an overview of various policies and guiding frameworks for the implementation of MMS.

Over the past 15 years, WHO has released various context-specific recommendations for MMS. The most recent was published in 2020 (World Health Organization, 2020), when WHO updated its 2016 Antenatal Care recommendations for a positive pregnancy experience, which included the recommendation to use MMS in the context of rigorous research (World Health Organization, 2020). This means MMS is recommended in the context of ANC services informed by implementation research designed to optimize MMS introduction. Two recent publications have addressed the other clinical research gaps identified in the 2020 WHO recommendation on MMS (World Health Organization, 2020). The first publication, a meta-analyses published in 2022, showed that MMS with 30 mg of iron is comparable to IFA supplements containing 60 mg of iron in preventing maternal anemia (Gomes *et al.*, 2022); and the second publication demonstrated that MMS improves birth outcomes compared to IFA, regardless of the method used to determine gestational age (e.g., based on ultrasound, date of last menstrual period, or other method) (Gomes *et al.*, 2023).

Other recommendations for the use of MMS have been issued for use in populations affected by an emergency (World Health Organization *et al.*, 2007), and for populations experiencing an active tuberculosis outbreak (World Health Organization, 2013). In 2021, MMS was included on the WHO's Model List of Essential Medicines (World Health Organization, 2021), which is a significant step forward for procurement, supply, implementation research efforts, and ultimately for wider accessibility and use of MMS. The MMS-TAG published an Interim Guidance note in 2021 to help countries interpreting the WHO recommendation for introducing MMS for pregnant women (MMS TAG, 2020), and UNICEF published program guidance for maternal nutrition before and during pregnancy and lactation in 2022 (UNICEF, 2022).

FIGURE 3: IMPLEMENTATION RESEARCH PATHWAY FOR MMS



MMS COUNTRY IMPLEMENTATION EXPERIENCES

Experiences and insights were shared from countries where MMS pilot programs are being implemented. In each country, the approach and design of implementation research was tailored to their unique situations. Strategies addressing product, delivery, demand, supply, and reporting challenges were discussed.

Generally, the introduction and implementation of MMS follow three phases, as outlined in **Figure 3** (Monica Fox, JHU).

Emily Mates, Maternal Nutrition Specialist at UNICEF, presented lessons learned from Bangladesh, Burkina Faso, Madagascar, and Tanzania. Representatives from Ethiopia (Ramadhani Noor, UNICEF), Jordan (Masako Horino, UNRWA and JHU), and Mali (Assaita Ba, JHPIEGO) also shared their experiences in introducing MMS interventions to strengthen ANC systems in their respective contexts. The lessons learned from each phase of implementation are summarized below.

Exploration: building an enabling environment

- The initial work to build an enabling environment, including strong government leadership and political will, is crucial.
- This process is time-intensive and requires active engagement with key leaders in the field. For instance, in Jordan it took three years to get local stakeholders' buy-in (Ntambue *et al.*, 2023).
- During this phase, there is an opportunity for multiple policy discussions and thorough review of national policy documents and ANC packages. For instance, UNWRA's exploration of introducing MMS in Jordan led to a better understanding that anemia's etiology extends beyond iron deficiency.

Implementation: design and test implementation strategy

- Implementation science provides a structured approach to address questions concerning acceptability, affordability, feasibility, delivery, adherence, fidelity, and coverage. This approach enables contextualized and effective implementation (SISN, 2023; World Health Organization, 2020).

- Identifying and addressing bottlenecks in IFA supplementation, understanding why coverage remains low, and exploring the root causes of maternal undernutrition in the community, such as social norms and gender, are vital.
- MMS delivery must leverage existing systems and mechanisms such as health management information systems (HMIS) and national supply chains, while minimizing vertical approaches.
- Civil society, practitioners, and women can be changemakers by sharing their experiences and challenges with IFA compliance, including issues like work burden, fatigue, and anemia.
- Community and family involvement is important. Community events can help raise awareness and engage community health workers, including Traditional Birth Attendants (TBAs), for early pregnancy identification and referrals. Early involvement of family members, including husbands and mothers-in-law, is also valuable.
- To enhance comparability in implementation research studies, it is important to define the dimensions and metrics. For instance, adherence can be defined in different ways and assessed with different measurements (self-reported adherence, counting pills, weighing bottles).
- Utilize improved products to initiate discussions on actions for better pregnancy and birth outcomes. MMS can serve as a valuable entry point for improving the quality of ANC services.

Cross-sectoral collaboration

- Other sectors outside health must be considered and their resources leveraged. In both the humanitarian and development contexts, maternal nutrition needs to be integrated into and coordinated across maternal and newborn health and with other sectors such as WASH, gender, education, nutrition, social protection, agriculture & livelihood.

MALI: Preliminary results of a cluster randomized trial of adherence to and acceptability of antenatal multiple micronutrient supplements

Ntambue *et al.*, 2023. Aissata Ba, JHPIEGO and Adama Mamby Keita, Center for Vaccine Development

This study aimed to understand how adherence to prenatal supplements differs by type of supplementation (IFA vs. MMS) and by varying delivery strategies. It is a three-arm cluster randomized study with 450 women, comparing IFA + standard of care vs MMS 30 pills + novel counseling vs MMS 180 pills + novel counseling.

It used human-centered design to develop MMS delivery strategies (e.g., counseling and packaging strategies), and included post-intervention qualitative interviews with pregnant women, influential family members, and health providers to assess adherence and acceptability. The preliminary results suggest that novel counseling strategies have positive effects on adherence to MMS and demonstrate that husbands and mother-in-laws are allies in encouraging MMS uptake; therefore, all efforts should include their participation.

ETHIOPIA: Introducing MMS as an opportunity to improve the delivery and quality of maternal nutrition services in Ethiopia

Ramadhani Noor, UNICEF Ethiopia

A large, randomized implementation study was set up to generate evidence on the effectiveness of MMS as compared to IFAS, to design effective delivery and optimal coverage of MMS, and to address the issue of quality of health service delivery. The study targets 42 districts (Woredas) with a total of 400,000 women.

The MMS demonstration project has resulted in important lessons for Ethiopia already. Strong government leadership and strategic partnerships will be essential as Ethiopia designs and rolls out the largest MMS demonstration program. To ensure sustainability, investments must be aligned with existing systems and platforms, focusing on strengthening capacity in areas such as regulation and demand generation. Accelerating evidence generation will become critical, considering the broader benefits for mothers and babies. Ethiopia will have to harmonize its learning agenda with clear global and regional guidance to guide country and regional-level efforts.

As Ethiopia moves forward, it will need to identify approaches for scaling up, particularly addressing the cost and financing aspects, exploring market-based strategies, and local production as potential game-changers. Furthermore, prioritizing humanitarian settings with high food insecurity and multiple micronutrient deficiencies will be imperative. Leveraging local production and market-based approaches, drawing lessons from countries with established capacities, will become increasingly relevant given the global supply chain challenges.

JORDAN: Enabling, implementing, and evaluating antenatal MMS among Palestine refugees

Ntambue *et al.*, 2023. Masako Horino, UNRWA and Johns Hopkins Bloomberg School of Public Health

In a Palestine refugee communities in the Middle East, managed by UNRWA, micronutrient deficiencies amongst women are very high. In these communities, a three-year implementation project is being conducted to 1) modify the UNWRA health system to enable MMS delivery and 2) conduct a systems trial (enrolling 9,000 women) to compare antenatal MMS to IFA delivery with regards to acceptability, coverage, adherence, and fidelity.

The process of building an enabling environment was described. In the plan, the preventive role of MMS is complemented by UNRWA's standard clinical regimens for treating anemia with iron supplements. An Enablement Graph was presented as a learning tool to track and subjectively gauge effects that processes, events, and decisions have had on time to start-up and level of preparedness. The enabling environment was slower in the first two years (for early discussions, constituency building, organizing processes and program resourcing) but accelerated in the last year, when numerous supportive factors converged to accelerate progress.

Following the country presentations, representatives of the various organizations engaged in country group work. Each team discussed what was happening in their country and summarized experiences, challenges, opportunities, and next steps for integrating MMS in routine ANC services on their country poster. Posters were presented and offered additional opportunities for exchanges between participants (see Annex D for poster presentations).

TABLE 1: SUMMARY OF LESSONS LEARNT FROM THE UNICEF COUNTRY CASE STUDIES

Do's	Don'ts
Increase government leadership and ownership from the start	Set up MMS distribution as a stand-alone project
Integrate MMS into national policies, ANC packages, EML lists	Focus solely on the product, neglecting the opportunity to improve quality ANC services
Set up strong coordination mechanisms	Forget about community aspects
Mobilize sustainable funds	
Ensure supportive supervision is in place (as a follow-on from training)	
Implement context-specific and appropriate Social Behavior Change interventions and messaging	
Ensure regular supply chain	
Establish local/regional production (compatible with current IFA procurement)	

Engaged minds, united mission: Delegates captivated by discussions at the Africa Regional Meeting on Maternal Nutrition and Multiple Micronutrient Supplementation, held at the Africa Union Headquarters in Addis Ababa, Ethiopia.

UNIMMAP MMS MANUFACTURING AND SUPPLY

CONSIDERATIONS FOR DEVELOPING A NATIONAL MMS SUPPLY STRATEGY

Dr. Clayton Ajello (advisor to KH and VA) provided an overview and considerations for developing a national MMS supply strategy. In the last three to four years, at least 22 countries have begun to introduce MMS. The main MMS supply issues frequently voiced by national decision-makers can be categorized into four broad areas: 1) policy, 2) regulatory, 3) manufacturing and quality control, and 4) procurement, finance, and distribution issues.

For a more detailed exploration of these issues and guidance for global stakeholders in establishing a strategy to ensure the future supply of UNIMMAP MMS at the global, regional, and national levels to reach pregnant women most at risk of malnutrition, refer to a resource paper authored by Ajello and collaeagues in 2022 (Ajello *et al.*, 2022). **Table 2** also briefly summarizes the issues related to MMS supply, incorporating elements from other contributors on this theme.

Prof Keith West expounds on the state of the evidence and global policy related to antenatal MMS.

NATIONAL AND REGIONAL PERSPECTIVES

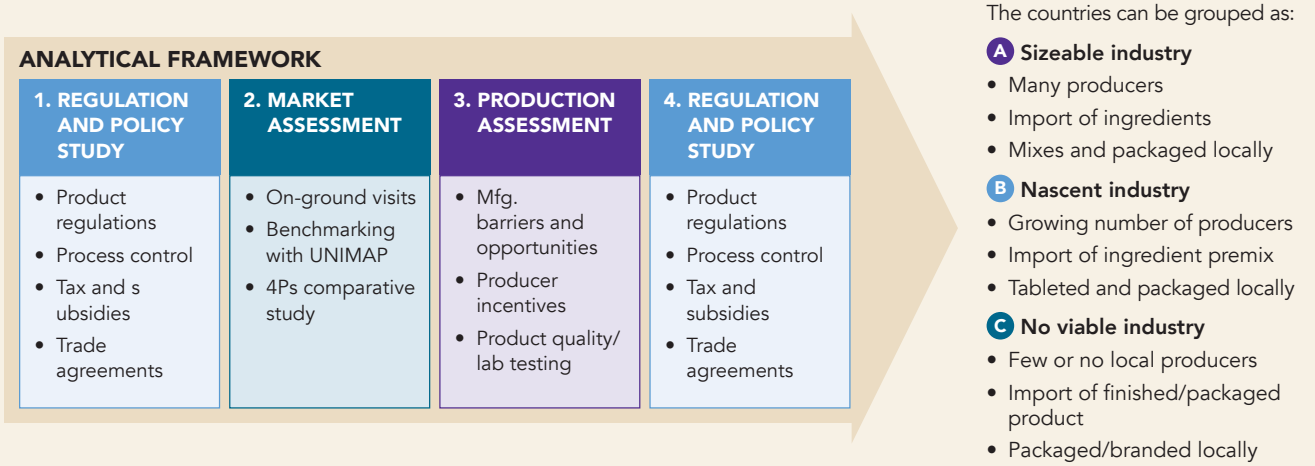
National perspectives from Nigeria and Ethiopia regarding regulation, sourcing, and financing of MMS supply were shared (Dr. Binyerem Ukaire MoH Nigeria, Dr. Kidist Woldesenbet MoH Ethiopia).

In Nigeria, the lessons learned from IFA procurement and implementation at the state level highlighted the importance of local government ownership for sustainable and continuous supply. For instance, this was done through efficient management of the Drug Revolving Fund in Kano State, and by ensuring campaign-like approaches during Maternal, Newborn, and Child Health (MNCH) weeks. Currently, Nigeria is in the exploratory phase, which involves raising awareness among key stakeholders, conducting implementation science research to assess how to optimize adherence (with the support of UNICEF and Nutrition International), and exploring local production possibilities, including addressing tracking and logistics questions.

In Ethiopia, one of the key challenges is the lack of in-country capacity to test micronutrients for regulatory clearance. In-country testing of MMS samples showed large variations, causing a six-month delay. Consequently, samples were tested outside the country, incurring additional costs and time. There is currently no plan for the sustainable financing of MMS supply, while at the same time there is a shortage of global support to meet local demand. Ethiopia will therefore explore whether building the capacity of in-country regulatory labs and local production, possibly as a regional hub, is the appropriate way forward.

TABLE 2: KEY MMS SUPPLY ISSUES	
1. Policy Issues	• Affordability varies for different stakeholders: – Price matters to Finance Ministry for resource allocation. – Cost-benefit is crucial for the Health Ministry when introducing interventions. • Benchmark pricing: $0.012 per dose under ideal conditions. – Achievable with high-volume orders (180-540 million tablets/year) for 1-3 million pregnancies. • Packaging is vital, but has cost considerations: – Ensures shelf life. – Affects adherence and the environment. – Can be over 50% of the product cost. • Challenges in achieving affordability for a single domestic market: – Limited production capacity. – Low demand (<1 million pregnancies). – Import taxes on ingredients increase costs.
2. Regulatory Issues	• International focus on regulating MMS emphasizes quality and interchangeability. • Regulating quality is complex due to varying global classifications of UNIMMAP MMS. • Major purchasers are adopting unified standards, including WHO GMP and USP quality standards. • National governments can choose their regulatory classification for locally produced or imported MMS. • Adhering to US Pharmacopeial Standards ensures equivalent quality, regardless of government classification.
3. Manufacturing and Quality Control Issues	• 12 MMS producers identified, 6 already delivering (e.g., in Bangladesh, India, Indonesia, South Africa). • Current MMS supply meets demand, but production capacity must increase. • New MMS development takes 2-3 years. • Sourcing/manufacturing options: full import, bulk import and local packaging, local contract manufacturing (pre-mix or raw ingredients), or a combination. • Success predictors for local MMS manufacturing: – Existing pharmaceutical/supplement manufacturing base with 10+ ingredient experience. – Ability to meet UNIMMAP MMS specs. – Effective national regulatory apparatus for consistent quality. – Access to capital for development, testing, and registration. – A ready buyer.
4. Procurement, Finance, and Distribution Issues	• Critical issue: MMS introduction and scaling require timely product supplies. • Short-term needs are met through in-kind product donations. • Long-term, sustainable supply strategy implementation involves: – Regularized government procurement if possible. – Subsidy programs from multi-lateral agencies as a backup. • Supply-specific activities take 3-5 years for national results. • Global stakeholders' actions include standards, purchase agreements, and technical assistance to engage new manufacturers.

FIGURE 4: SUPPLY READINESS ANALYTICAL FRAMEWORK (Lauren *et al.*, 2020)



REGIONAL PERSPECTIVES ON QUALITY AND AVAILABILITY OF MMS

Anirudh Poddar (Sight and Life) presented a framework for assessing the readiness of MMS supply and shared insights from a supply readiness assessment conducted in 20 countries (**Figure 4**). The study found that none of the products in these countries matched the UNIMMAP product formulation or met the claims on their labels. The conclusion is that not all countries will be ready to produce high-quality UNIMMAP MMS in the short term, and regional production hubs offer the best potential to increase MMS supply. There is wide variation across countries in the classification of MMS as a drug or a dietary supplement, which has consequences for production capability, cost, and distribution channels. Advocacy for regional harmonization of regulatory standards and product specifications, as well as trade incentives (e.g., import duty exemption) and support to potential producers, are needed to accelerate regional and local production of MMS.

A supply readiness assessment carried out in Ethiopia (Tamerayehu Gossaye, Sight and Life) concluded that most of the multivitamin products in the market were in the high price range and were missing micronutrients or included them in a higher or lower dosage than the UNIMMAP formulation. Among the manufacturing companies assessed, only one was WHO-GMP certified, had adequate production capacity (for 15 million+ tablets), and experience. Sourcing MMS locally is important to Ethiopia as this would result in high foreign exchange savings (40-60%).

UNICEF and Dsm-firminich (DSM) provided an international manufacturing perspective of UNIMMAP MMS. Monique Smorenburg explained that DSM's approach to producing UNIMMAP MMS for regional and national markets in Africa prioritizes strict adherence to formulation standards, careful selection of manufacturers, comprehensive analysis and quality control, and rigorous stability testing to ensure the product's quality, effectiveness, and long-term shelf life. Additionally, they consider environmental and cost implications when choosing packaging options and tablet counts. Identifying a manufacturer for production is a time-sensitive endeavor for DSM. It involves meticulously screening and selecting accredited, high-quality manufacturers. This selection process includes an in-depth audit, gap analysis, assessment of capital investment requirements, and pilot production trials to ensure cost-effectiveness.

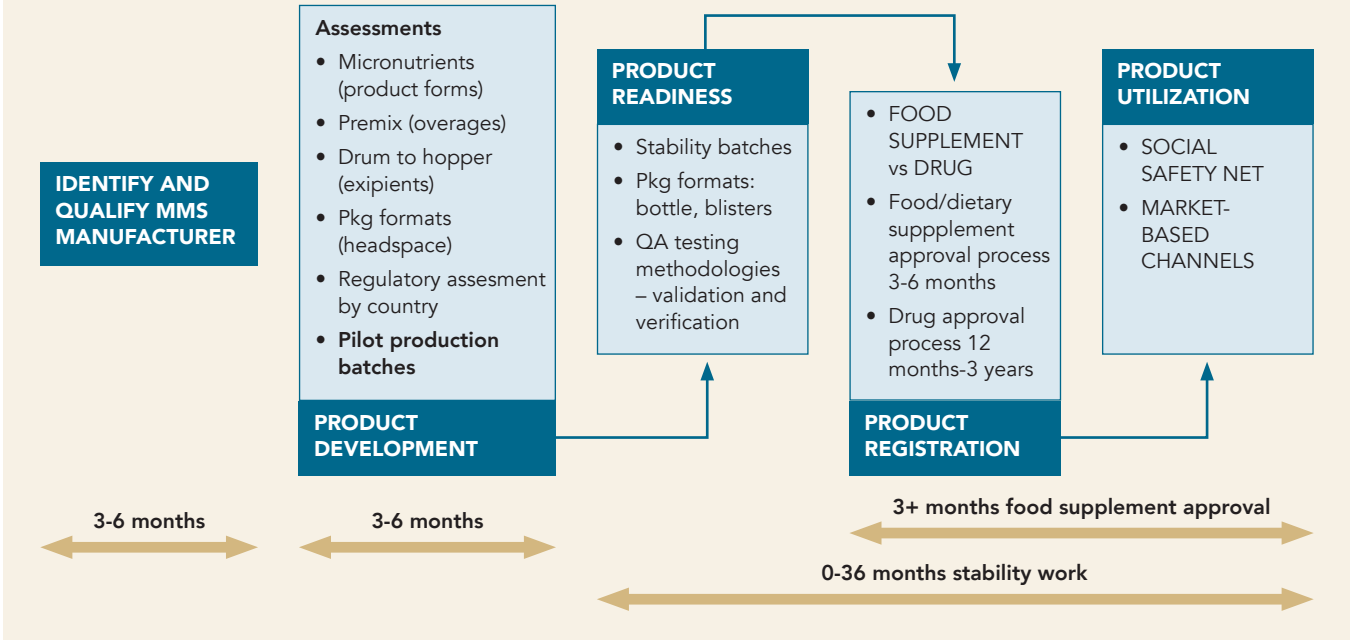
Alison Fleet of the UNICEF Supply Division then provided information on international manufacturing of UNIMMAP MMS and recent developments to strengthen the availability and accessibility of UNIMMAP MMS supplies from global organizations to support national introduction initiatives. The following key points summarize the discussion on UNIMMAP MMS supply for regional and global markets:

- UNICEF has established precise technical and manufacturing requirements. These include adherence to the UNIMMAP formulation, production in qualified facilities with expertise in vitamin and mineral formulations, adherence to stringent quality standards, a minimum 24-month shelf life, and specific packaging guidelines.
- To promote the success of local MMS production, UNICEF highlighted several key factors. There must be a clear national or regional demand to ensure long-term viability that is supported by local facilities possessing the technical expertise to maintain Good Manufacturing Practices (GMP) standards. Adequate capital investment is crucial for product development and potentially establishing production sites, alongside a reliable supply of ingredients and appropriate regulatory frameworks for oversight.
- In pursuit of scaling MMS usage, UNICEF recommends policy enablers such as inclusion of MMS in the national EML. Government support, particularly from the ministries of health and finance ministries, plays a vital role.
- There is need for adaptable approaches to navigate diverse regulatory landscapes in different countries. UNICEF acknowledges the varied regulations that apply to MMS distribution, depending on its classification as a prescription medication, over-the-counter product, food, or dietary supplement.

Both UNICEF and DSM emphasized the fact that production of MMS is a lengthy process and countries intending to introduce and scale up MMS should factor the MMS production timeline in their plans.

Regional production hubs have the potential to yield cost-effective, high-quality MMS, especially when product classification as a dietary supplement aligns with international standards. However, drug regulations, which are more stringent, incur higher registration and compliance costs, adding to the final product cost. Time considerations are also critical, as meeting product and site specifications, along with drug registration, can significantly delay MMS availability as a drug compared to a dietary supplement. To maximize the production and procurement for MMS, it is essential to have regional production support, cohesive regulatory policies, harmonization of standards, and trade incentives as integral components of a comprehensive strategy.

FIGURE 5: MMS PRODUCTION TIMELINE (illustration courtesy of Dsm-firminich)



IMPLEMENTATION RESOURCES AND TOOLS

During the meeting, several implementation resources, and tools to support the scaling up of antenatal MMS were highlighted.

Firstly, it is important to note that all country actors have access to the HMHB Consortium and its resources. HMHB supports and engages in extensive collaboration with country, regional, and global level actors on maternal nutrition and MMS. Its Knowledge Hub brings together existing knowledge, guidance, tools, and other useful resources related to women's nutrition, maternal nutrition, and evidence-based interventions targeting women, such as MMS. The HMHB Advocacy Resource Center houses a range of tools to help global and national actors communicate the evidence and benefits of MMS for pregnant women and their babies to decision-makers or those considering piloting, scaling, and implementing MMS.

Dr. Jennifer Busch Hallen, Nutrition International, demonstrated the MMS Cost-benefit tool. This tool aims to support organizations and governments in assessing the economic benefits of implementing MMS programs. It helps in advocating for and informing decisions when transitioning from IFA to MMS. Users can construct and test different scenarios by updating the assumptions within the tool or running a custom analysis. Up to eight health outcomes are included in the analysis and aggregated using disability-adjusted life years (DALYs).

Lastly, Monica Fox, Johns Hopkins Bloomberg School of Public Health and Technical Advisor for the Vitamin Angels Alliance, presented two tools that address important implementation science questions. The MMS Landscape Analysis Manual provides guidance on how to conduct a landscape analysis of programs, helping to understand existing programs and identify gaps and opportunities for the delivery of MMS. The Supply Context Assessment tool supports the assessment of four elements of the supply chain landscape: government policy and regulatory framework, manufacturing sector, government procurement and distribution system, and the current marketplace characteristics for MMS (Ntambue *et al.*, 2023).

The implementation science approach is crucial for successfully introducing and implementing MMS. The MMS-Technical Advisory Group is therefore working with the Society for Implementation Sciences on Nutrition (SISN) to develop an Implementation Science Guidance document on MMS for national actors.

Delegates from Uganda discussing the country MMS landscape and scale up roadmap

CONCLUSIONS AND WAY FORWARD

Participants call for stronger leadership and increased investments in maternal nutrition

Bolder leadership to mobilize institutions, resources, actions and elevate maternal nutrition as a political priority.

More money for maternal nutrition, but also more maternal nutrition for the money.

This meeting set a path forward for collective action and renewed momentum to improve maternal nutrition for healthier mothers and healthier babies across the African continent. The following conclusions and actions were recommended by meeting participants to advance maternal nutrition interventions, such as MMS, across the region.

1. **Develop a holistic, comprehensive strategy for maternal nutrition in Africa.** The continent urgently needs a comprehensive approach, including a minimum intervention package, to enhance maternal nutrition. The lack of research, programs, policies, and investments in maternal well-being is an equity, health, and economic concern. Investing in maternal nutrition yields substantial returns for both mothers and their children.
2. **Define a cohesive strategy for women and maternal nutrition across humanitarian and development contexts.** Coherent guidance on the continuum of care between development and emergency/humanitarian contexts, including the integration of adolescent girls and women's nutrition indicators in existing information systems, is required.
3. **Advocate with one voice for increased investments in maternal nutrition.** Global and national advocacy efforts are essential to secure increased domestic and donor investments in maternal nutrition.
4. **Use robust scientific evidence and international recommendations to introduce MMS.** Government decisions to introduce MMS for pregnant women should be guided by robust scientific evidence, international recommendations, and a phased, context-specific approach informed by rigorous implementation science.
5. **Broaden research on the potential use of MMS in diverse population groups.** Further research is required to explore the potential use of MMS in different population groups, including adolescent girls and lactating women.
6. **Foster collaborative partnerships among stakeholders to address remaining challenges.** Partnerships between global and national stakeholders are vital to address remaining challenges related to MMS, including supply, financing, and data management.

Meeting facilitator, Jane Badham, keenly steering the session on MMS manufacturing and supply

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ANNEX A: PARTICIPANT LIST

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INTERNATIONAL ORGANIZATIONS				
First name	**Last name**	**Organization**	**Position**	**Country**
Jennifer	Busch-Hallen	NI	Sr Technical Advisor, Maternal & Neonatal Health and Nutrition	Canada
Miriam	Chang	WVI	Nutrition Technical Specialist, Programs & Policy Div.	Canada
Asrat	Tolossa	WVI	Chief of Party, REACTS-IN, World Vision Canada	Canada
Yannick	Foing	DSM	Global Director – Nutrition Improvement	France
Marti	van Liere	MNF	Director of Programs	France
Anirudh	Poddar	Sight and Life	Manager – Nutrition Commodities	India
Manuela	Fava	MNF	HMHB Program Team	Italy
Maurine	Waudo	MNF	HMHB Program Team	Kenya
Martin	Mwangi	MNF	HMHB Program Lead	Netherlands
Jane	Badham	JB Consultancy	Managing Director & Meeting Facilitator	South Africa
Monique	Smorenburg	DSM	Market Development Manager, Nutrition improvement, EMEA	South Africa
Tanya	Marchant	LSHTM	Public Health Epidemiologist	UK
Clayton	Ajello	KH & VA	Senior Technical Strategic Advisor	USA
Monica	Fox	JHU	Senior Research Associate	USA
Rolf	Klemm	HKI	Vice President, Nutrition	USA
Chytanya	Kompala	ECF	Senior Program Officer for Research	USA
Alyson	McColl	GMMB	Senior Vice President & Managing Director	USA
Ronnie	Pankhurst	DSM	Regional Director	USA
Kalyani	Prasher	SAL	Head of Communications	USA
Yashodhar	Rana	ECF	Associate Director – Research	USA
Molly	Russ	VA	Senior Program Officer, Africa	USA
Keith	West	JHU	Prof. of Infant and Child Nutrition	USA

ANNEX B: MEETING PROGRAMME

DAY 1: WEDNESDAY 12TH JULY		
Morning	**BREAKING BARRIERS TO WOMEN'S NUTRITION, EQUITY, AND EMPOWERMENT AND SCALING UP EVIDENCE-BASED (MMS) POLICIES AND INTERVENTIONS THEME: Sharing Experiences in MMS Policy, Advocacy, And Implementation**	
	Welcome remarks	**Dr Hiwot Darsene** Chief Executive Officer Nutrition Coordination Office Federal Ministry of Health Ethiopia Inas Mubarak AUC
	Welcome remarks & overview of the overall objectives and importance of the technical meeting	**Dr Martin Mwangi** Program Lead Healthy Mothers Healthy Babies Consortium
	Framing of the Global Context of Maternal Nutrition	**Dr Marti van Liere** Director of Programs Micronutrient Forum
	Transformative Policies and Strategies for Advancing Women's Nutrition, Equity, and Empowerment in Africa	**Gertrude Kara** Technical Advisor – Nutrition Policy African Union Commission
	Maternal Nutrition: Significance, Opportunities, and Challenges	**Emily Mates** Maternal Nutrition Specialist UNICEF HQ
	Maternal nutrition interventions and what is known about them	**Prof Keith West** Johns Hopkins Bloomberg School of Public Health
	Importance and current status of maternal nutrition (in Africa)	**Dr Marti van Liere** Director of Programs Micronutrient Forum
Afternoon	Nourishing Hope – Maternal Nutrition in Humanitarian or Emergency Contexts	**Fatoumata Lankoande** Nutrition Specialist UNICEF Madagascar
	Maternal Nutrition in Recent Humanitarian Events: The Kenya country experience	**Julia Rotich** Micronutrient Deficiency Prevention and Control Program Division of Nutrition and Dietetics MOH Kenya
	Session reflections including key lessons	**Fred Grant** Senior Programme Officer Nutrition BMGF

DAY 1: WEDNESDAY 12TH JULY		
Afternoon	**ADVOCACY AND FINANCING FOR MATERNAL NUTRITION**	
	Smart investments in developmentFilm	**Bjørn Lomborg** Author & President Copenhagen Consensus Center on investing in tackling malnutrition
	Panel 1: Global view on maternal nutrition financing	**Alyson McColl** Senior Vice President & Managing Director GMMB **Asrat Tolossa** World Vision International **Chytanya Kompala** Eleanor Crook Foundation
	Panel 2: Country Perspectives	**Dr. Anne-Marie Tumba** Director of Reproductive Health MOH DRC **Dr. Isaack Bashir** Director Family Health, State Dep. Medical Services MOH Kenya
	Short Fim: A woman's voice from Ethiopia – Agurash's Story	
	Discussion: Country advocacy and financing plan for maternal nutrition	
	Reflections on Advocacy and Financing for Maternal Nutrition	**Prof Tanya Marchant** London School of Hygiene and Tropical Medicine
	Wrap-up and Summary of Maternal Nutrition Day 1 Take Home Actions	**Rolf Klemm** Vice President – Nutrition Helen Keller International **Miriam Chang** Nutrition Technical Specialist Programs & Policy Division World Vision International
Evening	**SIGHT AND LIFE MAGAZINE LAUNCH AND NETWORKING RECEPTION**	

DAY 2: THURSDAY 13th		
Morning	**ANTENATAL MULTIPLE MICRONUTRIENT SUPPLEMENTATION (MMS)**	
	Short Film: Women's voices video – DRC	
	UNIMMAP MMS SITUATION ANALYSIS, CONSENSUS BUILDING, POLICY ADVOCACY & IMPLEMENTATION SCIENCE	
	Objectives and scene setting	**Dr Martin Mwangi** Program Lead, Healthy Mothers Healthy Babies Consortium
	Overview of session agenda	**Aissata Ba** JHPIEGO (JP – IGO)
	State-of-the-Evidence and Global Policy Update: Impact of Antenatal MMS on Pregnancy Health	**Prof Keith West** Johns Hopkins Bloomberg School of Public Health
	COUNTRY CASE-STUDIES: Experiences Introducing UNIMMAP MMS within the context of implementation science and ANC system	
	UNICEF 4-Country Experience: Introducing MMS by strengthening community and health systems	**Emily Mates** Maternal Nutrition Specialist UNICEF
	Ethiopia Experience: Introducing MMS as opportunity to improve the delivery	**Ramadhani Noor** UNICEF Ethiopia
	UNRWA Experience in Jordan: Enabling, implementing and evaluating antenatal MMS among Palestine refugees	**Masako Horino** UNRWA and Johns Hopkins Bloomberg School of Public Health
	Mali Country Experience: Preliminary results of a cluster randomized trial of adherence to and acceptability of antenatal multiple micronutrient supplements	**Aissata Ba** JHPIEGO, Adama Mamby Keita, Center for Vaccine Development, Mali
Afternoon	**ADVOCACY RESOURCES AND TOOLS**	
	Short Film: A health worker's voice from Aurangabad, India	
	Translating evidence into action at the country level: a phased approach	**Dr Marti van Liere** Director of Programs Micronutrient Forum
	GROUP WORK: COUNTRY EXPERIENCES WITH MMS INCLUDING INTEGRATION OF MMS IN ANTENATAL CARE SERVICES	
	Group activity by country	

DAY 2: THURSDAY 13th		
Afternoon	Burkina Faso, DRC, Ethiopia, Jordan (UNRWA), Kenya, Madagascar, Malawi, Mali, Nigeria, Senegal, South Africa, Uganda	Experiences Challenges Opportunities Next steps
	Session reflections: Key lessons learnt, gaps, and needs	**Fabio Couto** Strategy Manager, JBJ Foundation
	Wrap-up and Summary of Day 2. **Implementation Science in Nutrition:** A summary and synthesis of methods used to introduce and scale MMS	**Monica Fox** Vitamin Angels and Johns Hopkins Bloomberg School of Public Health
Evening	SOCIAL EVENING AND NETWORKING	

DAY 3: FRIDAY 14th		
Morning	**ANTENATAL MULTIPLE MICRONUTRIENT SUPPLEMENTATION – Manufacturing, Supply, Implementation Resources & Tools**	
	Welcome note	
	UNIMMAP MMS MANUFACTURING AND SUPPLY	
	Overview: Considerations for developing a UNIMMAP MMS supply strategy for national programs	**Dr. Clayton Ajello** Senior Technical Advisor, The Vitamin Angel Alliance and Kirk Humanitarian
	NATIONAL PERSPECTIVES ON REGULATION, SOURCING, & FINANCING OF UNIMMAP MMS SUPPLIES	
	Nigeria: Building on lessons learned from IFA procurement	**Dr. Binyerem Ukaire** Federal Ministry of Health, Nigeria
	Ethiopia: Planning for accessing UNIMMAP MMS supplies	**Kidist W** Federal Ministry of Health, Ethiopia
	INSIGHTS ON SELECT PRODUCT MANUFACTURING/SUPPLY ISSUES AFFECTING AVAILABILITY & ACCESSIBILITY OF UNIMMAP MMS	
	Quality: The importance of quality control in local and regional manufacturing with a case study from Ethiopia	**Anirudh Poddar** Sight and Life Tamerayehu Gossaye, Sight and Life
	International Manufacturing: Producing UNIMMAP MMS for regional and national markets	**Monique Smorenburg** Market Development Manager SSA Dsm-firminich

DAY 3: FRIDAY 14th		
Morning	**UNIMMAP MMS Supplies:** Recent developments to strengthen availability and accessibility of UNIMMAP MMS supplies from global organizations to support national introduction initiatives.	**Alison Fleet** UNICEF Supply Division
	Panel discussion Q&A	**Dr. Clayton Ajello** **Anirudh Poddar** Sight and Life **Tamerayehu Gossaye** Sight and Life **Monique Smorenburg** Dsm-firminich
	Session reflection	**Alyson McColl** Senior Vice President & Managing Director
	IMPLEMENTATION RESOURCES AND TOOLS	
	Showcasing the extensive collaboration on MMS at country, regional, & global levels	**Martin Mwangi** MNF HMHB
	Demonstration of Nutrition International MMS Cost-benefit tool	**Dr. Jennifer Busch Hallen** Senior Technical Advisor Maternal and Neonatal Health and Nutrition, Nutrition International
	MMS Landscape Analysis Manual	**Monica Fox** Johns Hopkins Bloomberg School of Public Health and The Vitamin Angel Alliance
Afternoon	**CLOSURE OF THE AFRICA REGIONAL MATERNAL NUTRITION**	**NUTRITION AND MMS TECHNICAL MEETING**
	Meeting reflections by country	Country discussion and feedback
	Final overview of lessons learned, and way forward/next steps	**Martin Mwangi** MNF – HMHB
	Closing speech	**Dr Sisay Sinamo** Federal Ministry of Health, Ethiopia
	Closing remarks	**Dr Marti van Liere** Micronutrient Forum
	TREE PLANTING ACTIVITY BY DELEGATES	

ANNEX C: QUESTIONS ON MMS

The presentation of the evidence led to a myriad of questions. The answer to many of these questions can be found in the Frequenly Asked Questions on MMS (Healthy Mothers Healthy Babies, 2022), which is available on the HMHB website and regularly updated when new evidence becomes available. An update on the scientific evidence on the benefits of prenatal MMS is published in the 2023 Sight and Life Special Magazine on MMS (MMS TAG, 2023).

SAFETY/TOXICITY OF MMS

- What are the known adverse effects associated with MMS?
- Are there specific micronutrients within MMS that have a higher risk of toxicity, and if so, what are the recommended safe upper limits for their consumption?
- How does MMS compare in terms of safety with IFA?
- Are there any contra-indications or interactions with medications that need to be considered when administering MMS?

There are no known adverse effects associated with MMS, and MMS is safe – as safe as IFA.

In 2019, an analysis examined the risk of exceeding the tolerable upper intake level (as set by the National Academy of Medicine) of any micronutrient in the UNIMMAP formulation when paired with a balanced diet (i.e., already including the recommended intake of the 15 micronutrients) (Gernand, 2019). The results revealed that for most micronutrients, this combination was substantially below the tolerable upper intake level, and for the three micronutrients that met or exceeded the tolerable upper intake level (folate, iron and niacin), there were no health risks associated with these levels. If the analyses had been performed with IFA (paired with a nutritionally balanced diet), the results would be similar.

The MMS-drug interactions would be expected to be the same as the IFA-drug interactions. For example, antacids (indigestion medicines) can interfere with the absorption of iron, so iron containing supplements (being MMS or IFA) should not be taken at the same time as antacids; instead, we should allow at least a 2h gap between the iron containing supplements and antacis consumption.

IRON DOSAGE

- Is 30 mg iron sufficient compared to 60 mg: Has there been any comparative research on the effectiveness of different iron dosages within MMS in improving iron status and related health outcomes?

Recent analyses conducted by the MMS TAG compared the effect of different iron doses in MMS and IFA on third trimester maternal anemia. The analyses were based on all trials included in the 2019 Cochrane review and showed that, compared to IFA, MMS results in comparable hemoglobin concentration and protection against anemia during pregnancy, independently of iron dose (Gomes *et al.*, 2022). In particular, there was no difference on the effect of providing MMS with 30 mg of iron versus IFA with 60 mg or iron (RR for maternal anemia was 0.99; 95% CI: 0.92–1.07), and the included studies had high mean baseline anemia levels (from 27% to 49%).

ANEMIA TREATMENT

- How to treat anemia when MMS is given: Is there evidence supporting the use of MMS in preventing anemia from developing in at-risk populations, and how does this differ from its role in treating existing anemia?

The MMS-TAG has prepared an interim guidance document for concurrent antenatal MMS and anemia treatment in pregnant women. Click here (add link) to read the guidance document. https://hmhbconsortium.org/new-release-guidance-on-mms-and-anemia-treatment-during-pregnancy/

ADOLESCENT GIRLS AND MMS

- What are the unique nutritional needs of adolescent girls, and how does MMS address these needs?
- Have there been studies specifically assessing the impact of MMS on the health and well-being of adolescent girls?
- Does MMS have any influence on menstrual health, and is it safe to administer to girls of reproductive age?
- Are there any potential cultural or social barriers to implementing MMS interventions for adolescent girls, and how can these be addressed?

A recent individual patient data meta-analysis of 13 trials with 15,283 adolescents and 44,499 adult women in LMICs showed that adolescents who received MMS (vs those who received IFA) had a significantly reduced risk of low birthweight by 19%, preterm births by 14%, and SGA births by 14% (Keats *et al.*, 2022). This syudy confirms that MMS also has benefits and does not evidence any harm to adolescent mothers or babies in LMICs.

The use of MMS for non-pregnant adolescent girls is less studied and in the next couple of years the MMS TAG will be assessing the evidence about the benefits and safety of MMS in this population.

MEASURING ADHERENCE AND COMPLIANCE TO MMS

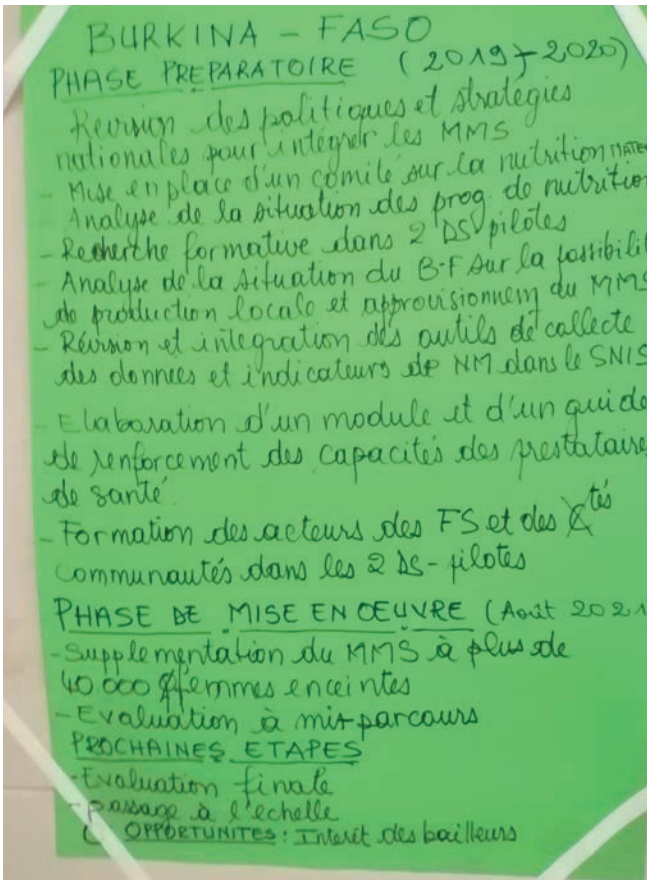
- What are the current methods used to assess adherence or compliance with MMS regimens in research or public health programs?
- Are there any successful strategies to improve adherence to MMS in different populations, and can these approaches be scaled up for broader implementation?

Several methods have been used to assess adherence to MMS in clinical trials, including pill count, direct observation and the use of electronic counting devices.

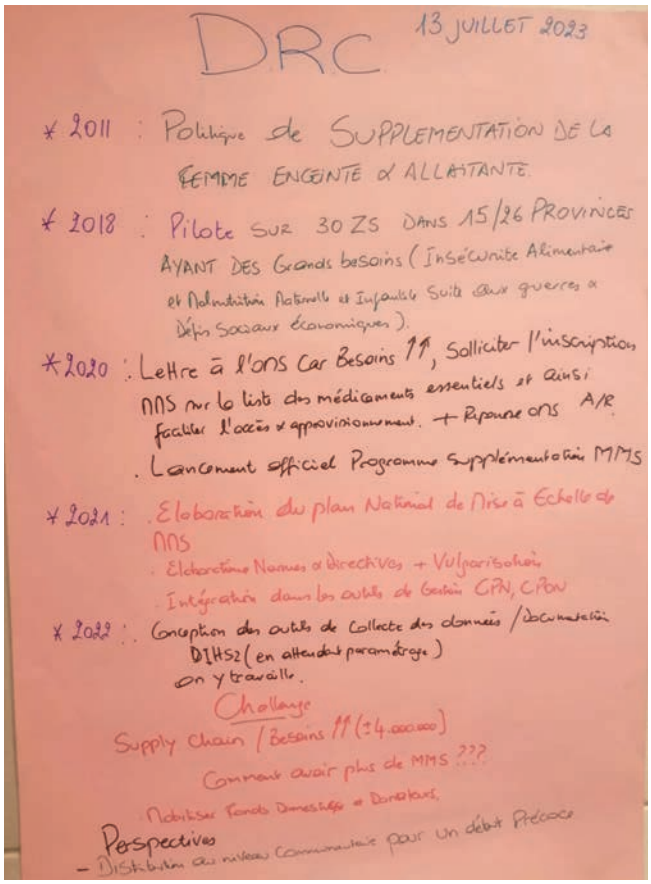
A recent systematic review (Gomes *et al.*, 2021) showed there are different interventions that can be used to increase adherence to micronutrient supplementation during pregnancy, such as: education-based strategies (including individual counseling from midwives at ANC, pharmacists at the health center, or community health workers at home, as well as education sessions, pictorial handbooks, leaflets, and videos), consumption monitoring by volunteer health workers or family members, SMS reminders, free provision of supplements, a multicomponent intervention with community mobilization, and a participatory action research intervention (with three visits for assessment, negotiation to support behavior change, and evaluation).

ANNEX D: COUNTRY POSTERS

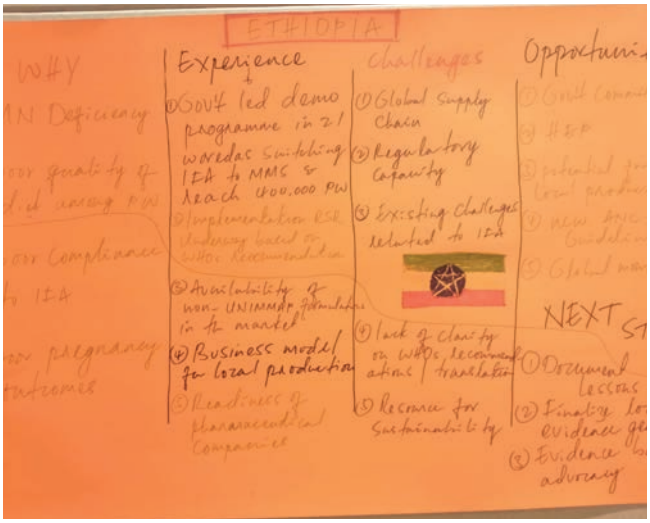
BURKINA FASO



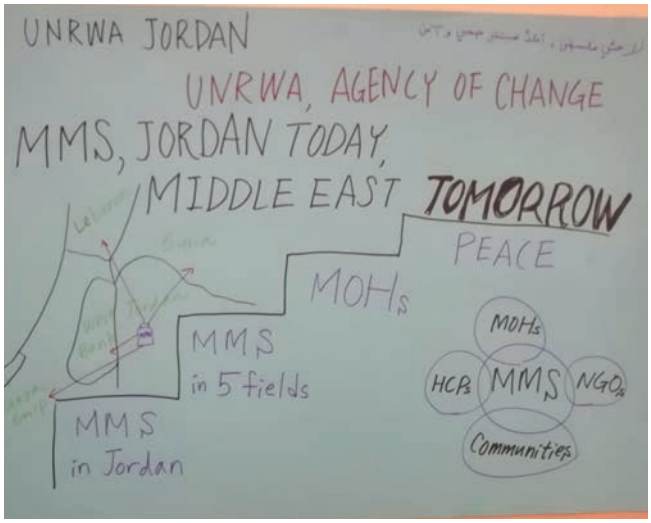
DEMOCRATIC REPUBLIC OF CONGO



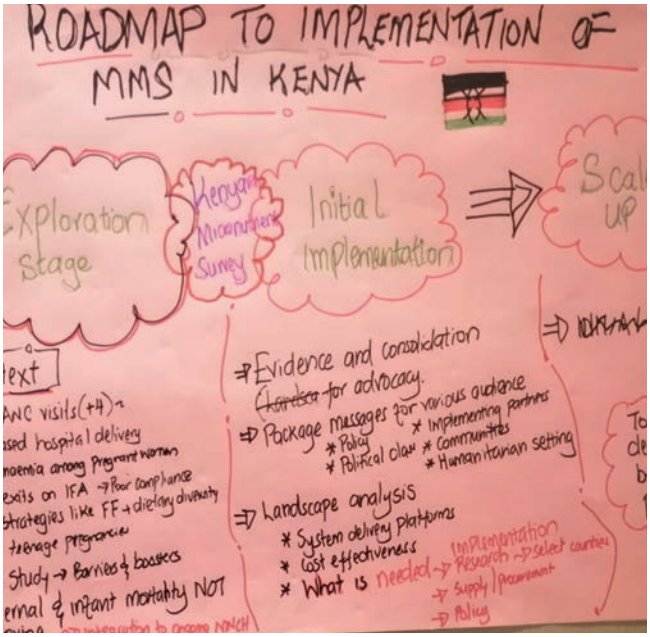
ETHIOPIA



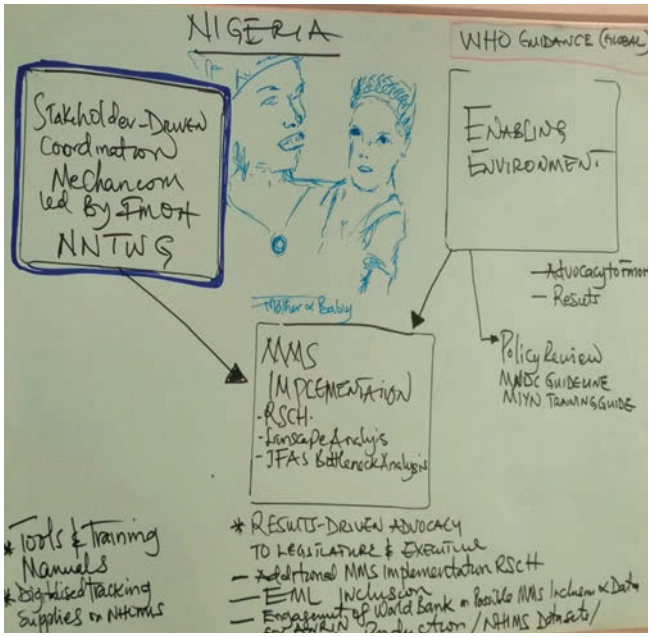
JORDAN (UNRWA)



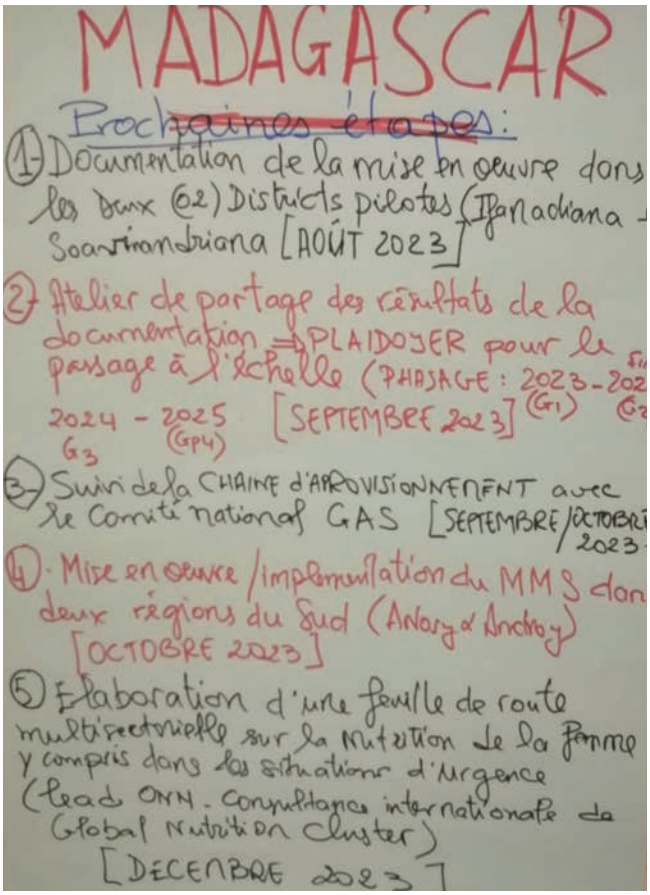
KENYA



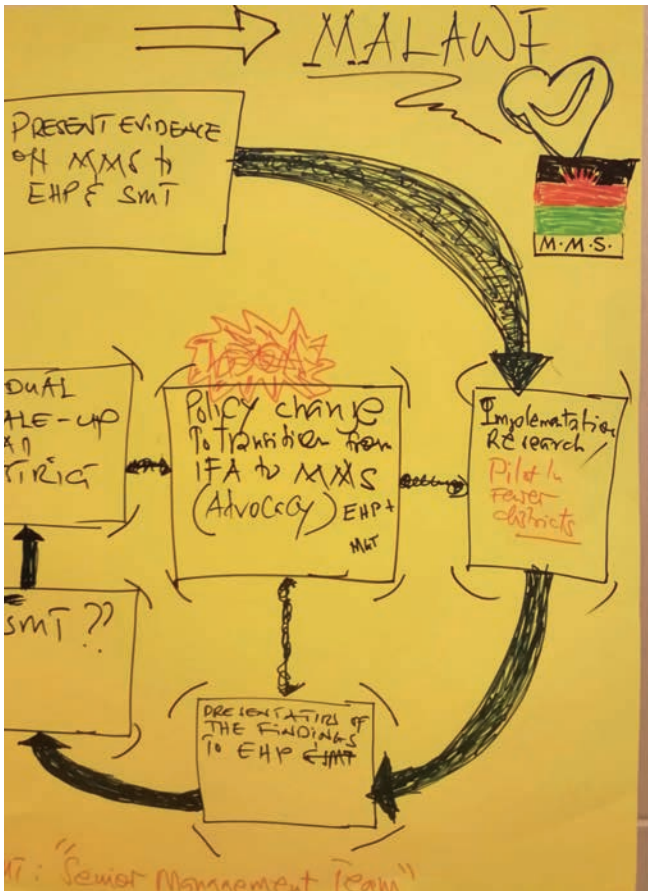
NIGERIA



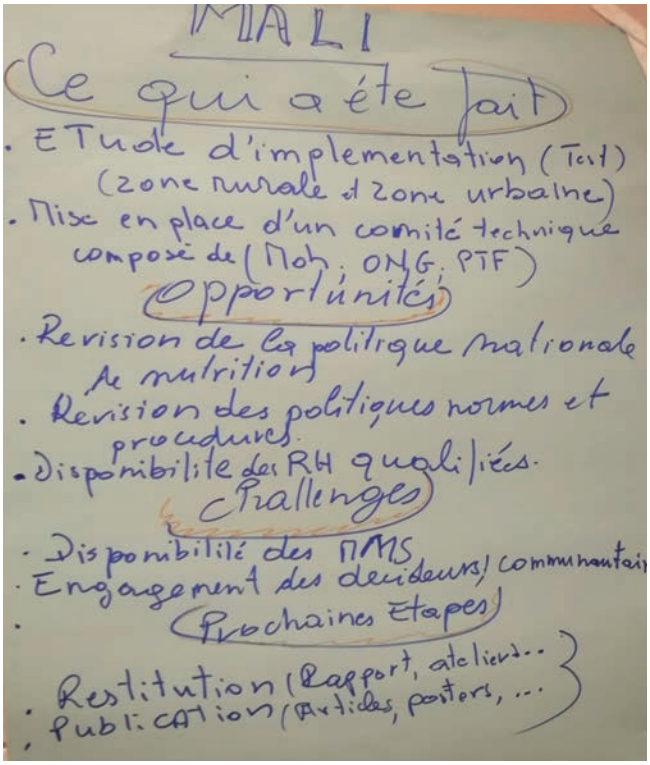
MADAGASGAR



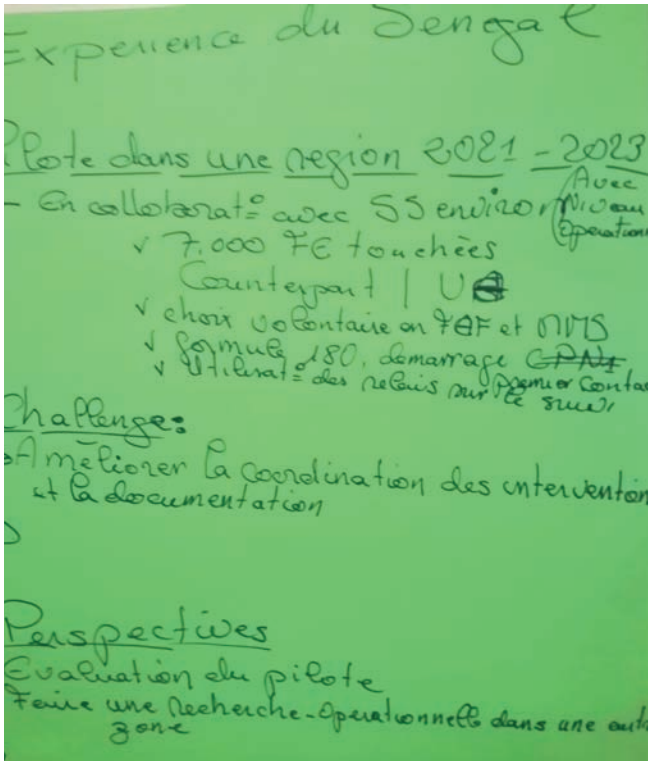
MALAWI



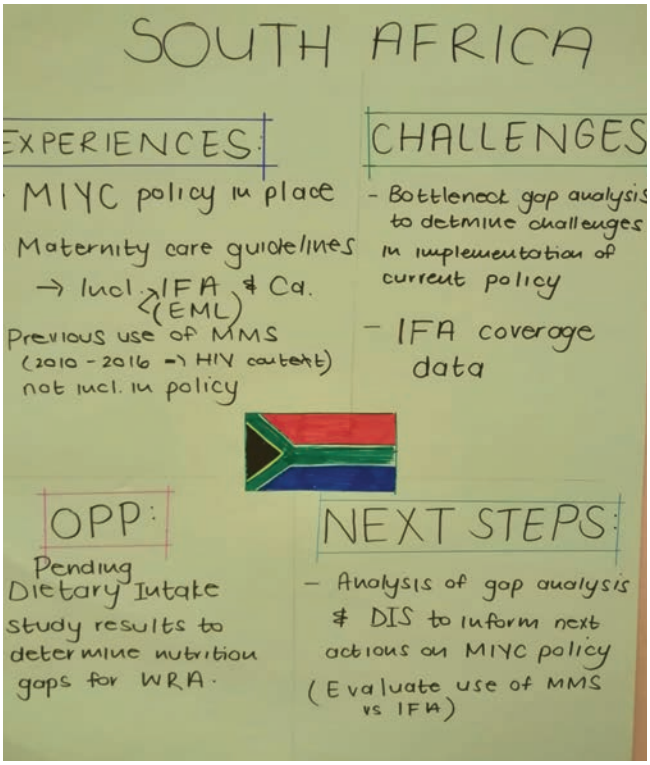
MALI



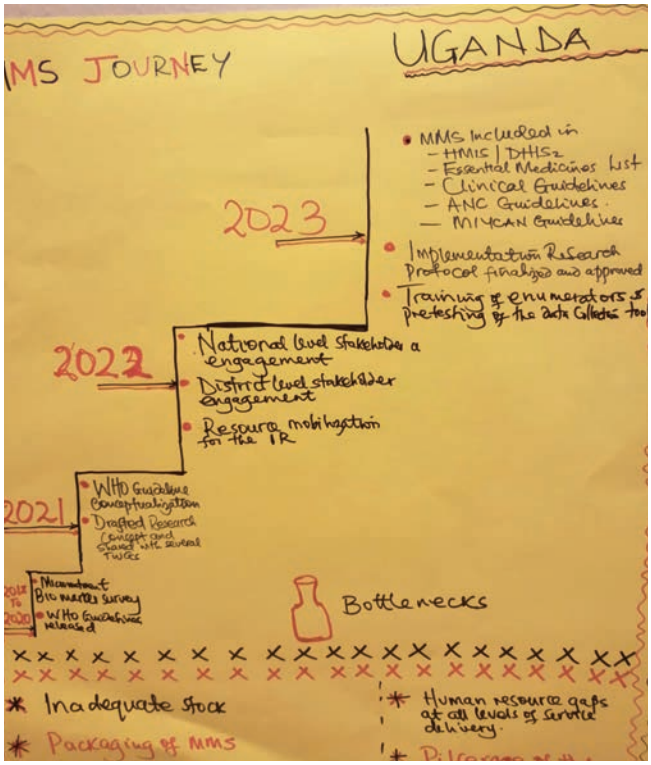
SENEGAL



SOUTH AFRICA



UGANDA



HEALTHY MOTHERS
HEALTHY BABIES

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