Introduction and up-scale of Multiple Micronutrient Supplementation (MMS) among antenatal and lactating mothers in Zambia

Formative Research Report: Qualitative Findings

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Vitamin Angels

This report was prepared for World Vision International, LLC by Chinyama Lundu (World Vision Zambia), Benter Owino (Vitamin Angels Alliance), and S. Riley Auer (Vitamin Angels Alliance). Authors conducted the data analysis described within the report; data was collected by the Tropical Disease Research Center. Dr. Lucy Kanya (Vitamin Angels Alliance), Dr. Shannon King (Vitamin Angels Alliance), Kathryn Reider (World Vision US), Megan McNerney (World Vision US), Miranda Mihone (World Vision Zambia), and Benjamin Mwanaumo (World Vision Zambia) reviewed and edited this report.

Acronyms

ANC	antenatal care
ART	antiretroviral therapy
CBV	community-based volunteer
DHIS2	District Health Information System 2
EHT	Environmental Health Technologist
ELIMS	electronic logistics information management system
FGD	focus group discussion
GMP	growth monitoring and promotion
HIA	health impact assessment
HIV	Human immunodeficiency virus
HMIS	Health Management Information System
IDI	in-depth interview
IEC	information, education, and communication
IFA	iron and folic acid
NGO	non-governmental organization
LBW	low birthweight
MCH	Maternal and Child Health
MMS	multiple micronutrient supplements
MoH	Ministry of Health
PNC	postnatal care
PrEP	pre-exposure prophylaxis
SBCC	social and behavior change communication
SMAG	Safe Motherhood Action Group
SUN	Scaling Up Nutrition
TB	tuberculosis

TDRC	Tropical Diseases Research Center
TTC	timed and targeted counseling
WASH	water, sanitation, and hygiene
WV	World Vision
ZAMMSA	Zambia Medicines & Medical Supplies Agency

Executive Summary

Introduction.

Despite notable progress, high maternal and infant morbidity and mortality remain a challenge in Zambia. To address this, World Vision (WV) has collaborated with the Ministry of Health Zambia to introduce multiple micronutrient supplements (MMS) within the existing antenatal care (ANC) platforms. This initiative has been funded by Kirk Humanitarian and The Power of Nutrition. World Vision, and partners Vitamin Angel Alliance and the Tropical Diseases Research Center (TDRC), conducted a formative research study between April and June 2024 to inform implementation strategies which will support the introduction of MMS within a strengthened ANC platform.

Methods.

The study used a mixed-methods approach, employing quantitative surveys and qualitative interviews [i.e., focus group discussions (FGDs) and in-depth interviews (IDIs)] to gather information from a representative sample of respondents including pregnant women, influential family members, health care providers and key stakeholder at community, district, regional and national levels.. This report presents the findings from the qualitative component of the study. Insights from the quantitative surveys are attached as an appendix. A supply context assessment and economic analysis will be conducted to generate further evidence and insights for the programmatic transition from iron and folic acid (IFA) to MMS.

Results.

ANC attendance is facilitated by women's interest in monitoring their health status and that of their fetus' during pregnancy, availability of comprehensive services and key commodities, and activities to increase awareness of the benefits of ANC attendance. Additional facilitators included community-driven strategies, access and participation in education on maternal health, male involvement, quality care and positive interactions with providers, and financial and material incentives. ANC attendance is hindered or diminished by social and cultural barriers, distance, limited reliable health information and education, and time tradeoffs.

Service availability in health facilities, sometimes referred to as "static", is facilitated by data collection and use, facility-driven strategies to improve service delivery, district-supported capacity strengthening, and effective collaboration with external stakeholders, such as international nongovernmental organizations. Barriers to service delivery in health facilities included stockouts of essential medicines and limited other resources required for service provision, variable quality of data collected, and low capacity for data use, and human resources.

Service availability in communities, including outreach, are critical to providing services to hard-to-reach populations. These services are facilitated by effective mobilization and community relationships, supervision and training of community-based volunteers (CBV), household-level counseling, and effective data collection and use. Barriers included CBV attrition and other volunteer-specific challenges, and resource limitations.

The **availability and management of medicines and supplements** is a critical component of service delivery, and was underexplored in this research due to a limited sample of actors who could speak to the entire supply chain. Participants described effective use of monitoring tools and provincial and district pharmacy hubs as facilitators, and logistics challenges and ineffective distribution procedures as barriers. This will be further explored in the supply context assessment that will be conducted.

The most salient demand-side facilitators of **supplement (i.e., IFA) uptake** included perceived benefits of supplements, education and counseling for uptake, and affordability (free) of supplements. Barriers included cultural factors (such as traditional practices and beliefs, etc.) and cost of supplements when clients are asked to purchase during facility stockouts.

Demand side factors of **supplement (i.e., IFA) adherence** included factors associated with uptake. This is expected as uptake is a precursor to adherence. Adherence among women is also facilitated by positive past-experiences taking supplements, counseling for adherence, and community- and household-level support. Barriers included forgetting to take supplements, negative past-experiences taking supplements, and insufficient counseling.

Conclusions.

Existing efforts to bolster the ANC system and supportive perceptions of supplements among health workers and women offer potential for the successful introduction of MMS as part of the ANC service package in Zambia. However, this formative research demonstrates that challenges persist for supply management and variable skills among health workers (e.g., care providers, officers, pharmacists, etc.) to collect or use data in particular. Key strategies to strengthen ANC attendance and supplements uptake alluded to or described by participants include community mobilization and sensitization, improved counseling through ANC platforms, continued awareness creation for household and community members, increased availability and access to information education and communication materials (including job aids for use by health providers), and regular "refresher" training for facility staff and community-volunteers (e.g., on the importance of ANC attendance and maternal supplementation, technical information on supplement content, skills building for interpersonal skills, etc.).

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Introduction

Zambia's maternal, newborn and child health program has undergone significant improvement in the past decades, in parallel with global, regional, and local strategic efforts. However, considerable progress to reach targets on maternal health and birth outcomes is needed. The *Mid-Term Review of the Zambia National Health Sector Plan for 2017-2021* (2020) reports anaemia prevalence of 31% among women of reproductive age (15-49 years) and 41% among pregnant women. The estimated rates of preterm birth and low birthweight (LBW) in 2020 were 7.4% and 11. 2%, respectively (Ohuma, et al., 2023). Further, for LBW in particular, the Ministry of Health reported the highest prevalence burden in Lusaka Province (17%) followed by Southern (10.8%) and Northern Provinces (8.2%).

Maternal malnutrition, a risk key factor, underscores the need for targeted nutritional interventions during pregnancy to reduce the burden of maternal anemia and the risk of poor birth outcomes. Zambia has implemented iron and folic acid (IFA) supplementation to promote positive health and birth outcomes in pregnant women, including reduction of LBW. However, emerging global evidence shows that antenatal MMS is superior to IFA supplementation in improving birth outcomes and has equivalent benefits for preventing maternal anemia (Keats EC, et al., 2021).The WHO recommends the use of MMS for pregnant women in countries with high prevalence of micronutrient deficiencies within the context of implementation research (WHO, 2020). Further, Nutrition International estimates that transitioning from IFA supplementation to MMS in Zambia will avert disability-adjusted life years, prevent the death of an additional 2,390 children, and yield benefits that are 331 times greater than the costs (Nutrition International, 2020).

World Vision is supporting the Ministry of Health Zambia to introduce multiple micronutrient supplementation (MMS) within the context of strengthened ANC services. This will include building the capacity of health workers and community-based volunteers (CBVs) to deliver MMS and support pregnant women to take the supplements as advised while also attending ANC services regularly. Further, World Vision is supporting the broader MMS introduction efforts in Zambia by advocating for and supporting the government to take the necessary steps to officially adopt MMS within the national policy, including updating guidelines, reference documents and its incorporation in the national essential drug list.

In partnership with Zambia's federal Ministry of Health (MoH), World Vision with its supporting partners—Vitamin Angels and Tropical Disease Research Center (TDRC)—conducted this formative research (Phase I) to inform the implementation strategies for the introduction of MMS. In Phase II, the project will distribute MMS to approximately 329,378 pregnant women in the targeted provinces (i.e, Lusaka, Northern, and Southern) while evaluating the impact of different implementation strategies on key outcomes such as acceptability of MMS, adherence and fidelity to the designed processes. As a key project partner, the MoH has assigned three of its units to drive the project: a)

the Child Health and Nutrition Unit; b) the Reproductive Health Unit; and c) the MoH Pharmacy. The MoH considers this as a pilot project which will generate the relevant evidence to inform a decision by the Zambian government whether or not to adopt MMS as the primary supplement offered to pregnant women, and switch from IFA for the entire country.

Objectives and Methodology

Study Objectives

A cross-sectional mixed-methods approach was used. This approach combined a quantitative survey and qualitative interviews [i.e., focus group discussions (FGDs) and in-depth interviews (IDIs)]. Specific objectives are outlined in **Table 1**. This report presents findings of the qualitative component of the study while quantitative survey (results presented in Annex 2).

Table 1: Study Objectives Purpose, Output, and Process

Purpose (Study Objective)	Output (Method)	Process
To review the current policies, guidelines, and coordination mechanisms related to ANC and IFA supplementation in pregnancy.	**Landscape Analysis*** to summarize ANC and IFA supplementation policies, guidelines, and coordination mechanisms, including eligibility criteria, recommended dosage, service delivery protocols, and monitoring and evaluation mechanisms.	Review of relevant policy documents, guidelines, and coordination frameworks from government health departments, international health organizations, and academic sources.
To identify enablers and/or barriers resulting in uptake and adherence to ANC attendance, and IFA during pregnancy.	**IDIs and FGDs** with pregnant women, health facility-based providers, community members, and stakeholders involved in ANC and IFA supplementation programs. **Quantitative surveys*** with health facilities, health facility-based providers, and pregnant and postpartum women.	Thematic analysis to identify common themes, patterns, and factors influencing uptake and adherence to ANC and IFA supplementation Characterization of demographic characteristics of key stakeholders, ANC attendance rates, and adherence to IFA supplementation.
To assess ANC commodity availability, accessibility and adequacy at all points	**Quantitative survey*** was conducted with structured questionnaires administered to facility-based staff, including health	Identification of gaps, bottlenecks, and challenges in the procurement, distribution, and storage of ANC

Purpose (Study Objective)	Output (Method)	Process
along the supply chain (procurement, distribution and storage up to end user).	workers. **Supply Context Assessment**** including site visits to health facilities to assess the availability, storage conditions, and stock levels of ANC commodities, including IFA supplements. Data were collected through structured observations, inventory checks, and questionnaires with health facility staff responsible for inventory management.	commodities and inform recommendations for improving supply chain management.
To determine knowledge, attitudes and practices of IFA supplementation in the targeted health facilities among health workers, pregnant women, partners/mothers/mothers-in-law, and other influential community members.	**Quantitative survey*** was conducted with structured questionnaires administered to health workers and pregnant women. **IDIs and FGDs** with pregnant women, health workers, and community members to assess their knowledge of ANC services, attitudes towards ANC attendance, and practices related to ANC utilization.	Descriptive statistics and thematic analysis to identify practices related to ANC attendance and inform targeted interventions and training programs for health workers and pregnant women. Thematic analysis to identify common themes, patterns, and factors influencing uptake and adherence to ANC and IFA supplementation
To determine the current health promotion strategies for increasing IFA uptake.	**IDIs and FGDs** with pregnant women, health facility-based providers, and CBVs involved in ANC and IFA supplementation programs.	Thematic analysis to identify key messages, channels, and approaches used in health promotion efforts and assess their effectiveness in increasing IFA uptake.
To determine the roles CBVs play in ANC service provision and associated enablers and barriers	**IDIs and FGDs** with CBV, health workers, and community members were conducted to explore the roles, responsibilities, and challenges faced by CBVs in delivering ANC services.	Thematic analysis to identify the key roles, enablers, and barriers experienced by CBVs and inform strategies for strengthening their engagement in ANC services.
To understand existing monitoring and evaluation systems for ANC and IFA supplementation.	**Document analysis**** of monitoring and evaluation frameworks, tools, and systems, and **IDIs** with program managers, health information officers, and monitoring and evaluation specialists.	Collated insights into the strengths, weaknesses, and gaps in existing monitoring and evaluation systems

**indicates complimentary research. Findings of these inquiries are not included in this report, and are available as separate documents.*

***indicates proposed study components that were not completed.*

Sampling sites and strategy

Purposive sampling was used to select participants from a variety of backgrounds, including pregnant and postpartum women, influential family members, health workers, community leaders, policymakers, and other key stakeholders. The sampling process took into account geographical distribution, urban and rural location, and socioeconomic status, ensuring a broad representation across different segments of the population. **Table 2** presents the sites selected for the formative research, categorized by province, district, and geographic classification.

Table 2: Formative Research Sites

Site Name	Province	District	Rural / Urban Designation
Chilenje Level 1 Hospital	Lusaka	Chilenje	Urban
Matero Main Health Clinic	Lusaka	Matero	Urban
Chongwe District Health Office	Lusaka	Chongwe	Peri-urban
Katoba Rural Health Post	Lusaka	Chongwe	Rural
Chisanga Urban Health Center	Northern	Kasama	Urban
Kakungu Health Post	Northern	Mbala	Rural
Shimumbi Rural Health Centre	Northern	Luwingu	Rural
Mbayamusuma Health Center	Southern	Mazambuka	Rural
Siatwinda Health Center	Southern	Sinazongwe	Rural

In-depth interviews (IDIs) explored health-related practices, including health seeking behaviors, among program participants' and communities. The discussion guide explored participants' thoughts about IFA/MMS implementation, their understanding and interpretation of the objectives of the IFA/MMS, and the related benefits and constraints, as well as patients' perception of health provider behavior, provider attitudes and practices related to ANC services including provision of supplements and related counseling, as well as the quality of IFA/MMS services, and the motivation/demotivation of clients in IFA/MMS.

Focus group discussions (FGDs) were used to explore perceptions, thoughts and impressions regarding ANC attendance, IFA/MMS, community knowledge, attitudes, and practices towards IFA/MMS, benefits and constraints of IFA/MMS services, changes desired for effective implementation of IFA/MMS.

Description of tools and field procedures

Interviews with health providers and key stakeholders at facility-, district-, and national-levels were conducted in English. All data collection instruments for discussions with pregnant women, influential family members and CBVs were translated to the local languages (i.e., Bemba, Nyanja, Tonga, and Tumbuka). Trained research assistants who were fluent in the local languages moderated all the discussions under the supervision of TDRC researchers.

Only participants who consented were invited to participate in the interviews. All interviews were audio recorded in the language in which they were conducted and transcribed verbatim. Transcripts in local languages were translated to English during the analysis stage.

Ethical review

Ethical approval for conducting the study was obtained from the TDRC Research Ethics Committee in July 2023, and subsequently amended in November 2023 and April 2024 (IRB REgistration Number 00002911; FWA Number 00003729; Study ID: TDREC/090/07/23).

Data management and analysis

A codebook of inductively and deductively generated codes was developed to facilitate a descriptive analysis of data from FGDs and IDIs. Codes were collaboratively refined and finalized by the coding team. To establish intercoder reliability, all coders coded the same initial transcript and participated in a detailed review aimed at gaining alignment on the understanding and application of codes. To maintain intercoder reliability, all coders participated in weekly briefings to discuss coding questions and ensure alignment. Between meetings, coders used memos to describe rationale for code application.

Coding and subsequent thematic analysis were facilitated by the Dedoose software. A subset of coders were selected to conduct the analysis. Analysis was structured using co-occurrence tables. Codebook themes were compiled into co-occurrence tables to address research questions.

Analysts reviewed data captured in the co-occurence tables to identify themes, patterns, and emerging concepts in an iterative process until theoretical saturation was achieved. Preliminary findings emerging from the analysis were collaboratively discussed with the wider study team throughout the process; these discussions aimed to guide subsequent analysis on emergent themes, patterns, and concepts.

Limitations

Limitations in the sample of facility-based staff restricted the depth of findings on policies and procedures for data collection, management, and use for decision-making.

Similarly, programmatic barriers and enablers to service delivery and health-seeking behaviors were not explored in much depth by the interviewers, thus associated findings were limited.

Sample Characteristics

219 individuals participated in 17 FGDs and 45 IDIs. Across respondent types, 38% (n=85) were from Northern Province, 26% (n=56) were from Southern Province, and 36% (n=78) were from Lusaka Province (**Table 3**). No mothers, mothers-in-law, husbands, or partners from Southern Province were included in the sample.[1]

Over half (60%) of the sample were from rural communities and facilities, followed by urban communities and facilities (39%) and periurban facilities (1%). Of these the largest proportion of rural participants resided in Southern Province (26%) and the largest proportion of urban participants resided in Lusaka Province (22%). Periurban participants were only sampled in Lusaka Province.

Nearly two fifths of respondents were pregnant (33%, n=66) or recently postpartum women (06%, n=14); nearly one quarter of respondents were community- (21%, n=47) or facility-based staff (e.g., MCH coordinators, officers, nurses, midwives, etc.; 13%, n=28); and the remainder of participants were key supporting actors, including community leaders (14%, n=31), husbands or male partners (7%, n=15), and mothers or mothers-in-law (8%, n=18) (**Table 3**).

Table 3: Stakeholders by Province (N=219)

Stakeholder Type	Northern	Southern	Lusaka	TOTAL
Health Facility-based Staff	11	7	10	**28**
Community-based Volunteers	23	9	15	**47**
Community Leaders	9	20	2	**31**
Husbands and Partners	6	-	9	**15**
Mothers and Mothers-in-law	9	-	9	**18**
Pregnant Women	21	19	26	**66**

[1] Plans for the sample did include these stakeholders in Southern Province. It is possible that data were collected by TDRC, but not transferred to WV. WV is continuing to follow up as of the writing of this report.

Stakeholder Type	Northern	Southern	Lusaka	TOTAL
Postpartum Women	6	1	7	**14**
TOTAL	**85** (39%)	**56** (26%)	**78** (36%)	**219**

Types of health facility-based staff included specialized nurses (18%, n=5; such as registered nurses, midwife nurses, and facility in-charge nurses), midwives (14%, n=4), specialized doctors (4%, n=1), MCH coordinators (4%, n=1), pharmacists (11%, n=3), nutritionists (18%, n=6), environmental health technologists (EHTs) (4%, n=1), District Health Officers (4%, n=1), other officers (11%, n=3; such as health nursing officers and clinical officers), nurse practitioners (4%, n=1), and unspecified providers (7%, n=2). Data on the number of years of experience for each provider was captured for roughly 30% (n=9) of the health facility-based providers. Of these, the greatest number of years of experience (31 years) was held by a nutritionist and the least experience was held by a registered nurse (7 years).

71% (n=156) of participants were female (Annex 1**, Table 4)**. Females were the largest proportion of the health facility-based staff (71%, n=20) and CBV (70%, n=33) samples. By contrast, over three quarters (80%, n=25) of community leaders were male.

62% (n=136) of participants were married (Annex 1, **Table 5**). 88% (n=58) of pregnant and (94%) of postpartum women were married. Very few pregnant (12%, n=8) and only 1 postpartum woman was single, divorced or not married at the time of the interviews.

Characteristics of participant age are described in Annex 1, **Table 7.**) The sample of pregnant and postpartum women was an average of 11 years younger than their male counterparts (e.g., husbands and partners) with a mean age of 28 years, 24 years, and 39 years respectively.

More than half of participants had at least a secondary education (56%, n=122) (Annex 1**, Table 6**). All facility-based providers (100%, n=28) had completed tertiary education, including college and university level education. Most CBVs had at most either primary (36%, n=16) or secondary education (36%, n=17). Similarly, most pregnant women had at least primary (47%, n=31) or secondary education (42%, n=28), and most postpartum women had at least primary (36%, n=5) or secondary education (57%, n=8). Husbands and male partners were typically more educated with 53% (n=8) attaining secondary and 47% (n=7) attaining tertiary education.

Overall, there were notable differences in participants' educational attainment which may have implications for the project especially the design and delivery of SBCC. Health providers were the most educated (100% tertiary; n=28), followed by husbands and partners (53% secondary, n=8 and 47% tertiary, n =7) and CBVs (34% primary, n=16 and 36% secondary, n=17) (Annex 1, **Table 6**). Mothers, mothers in law and pregnant or

postpartum women had lower education, with about half of them having only primary level education. There were no significant differences in education attainment within groups (e.g., male health facility-based staff compared to female health facility-based staff). However, husbands and partners attained higher levels of education than female community members, including mothers, mothers-in-law, pregnant women, and postpartum women.

Findings

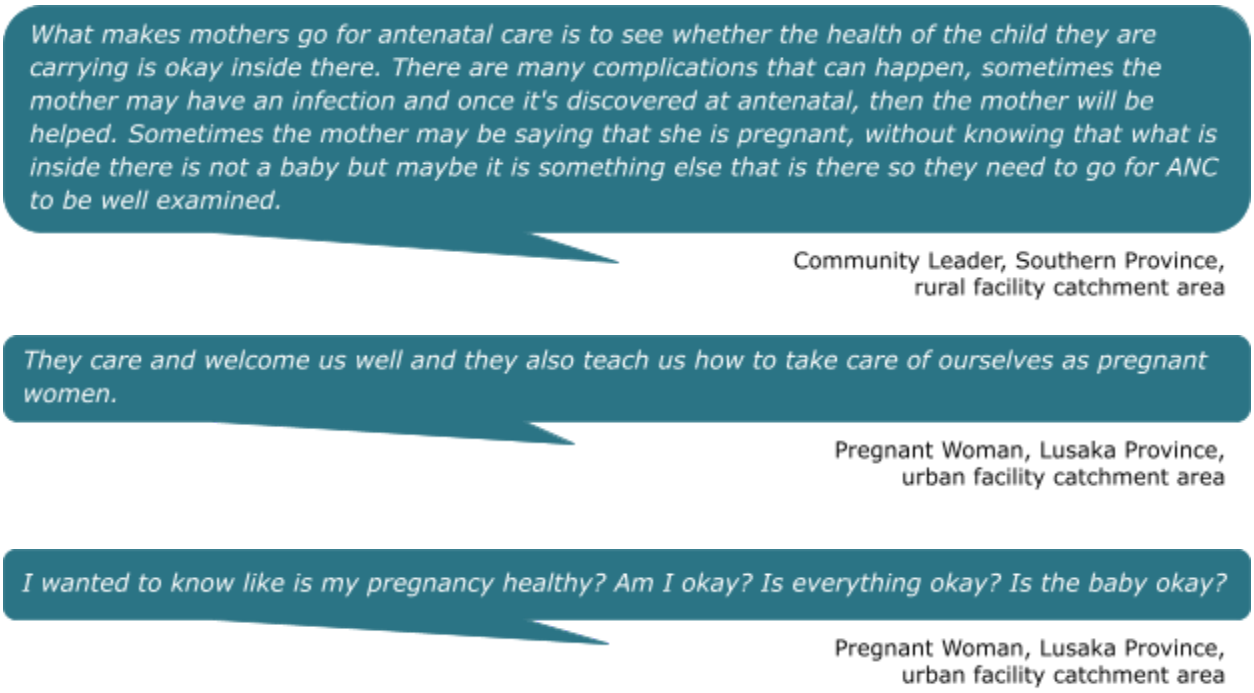
ANC Attendance

Facilitators

Effective ANC is a cornerstone of maternal and child health, offering a critical opportunity to deliver interventions such as multiple micronutrient supplementation (MMS). This section presents findings of the facilitators at programmatic, facility, community, and individual levels.

Monitoring of mothers' and fetal health.

Overall, the participants reported that ANC attendance is widely valued for monitoring maternal and fetal health, identifying complications such as anemia, high blood pressure, and infections to prevent severe outcomes like stillbirths or maternal deaths. Respondents noted that it also offers mothers the opportunity to learn about their unborn baby's development and to receive education and guidance on proper diet, rest, and care from healthcare providers.



Comprehensive ANC services.

Participants reported that the integrated healthcare services provided during facility visits offer significant value by addressing multiple needs in a single visit. This "supermarket approach" combines services such as HIV prevention [i.e., pre-exposure prophylaxis (PrEP)], nutritional supplementation, and screening for critical conditions during ANC and other care platforms. Though not typically a part of ANC service provision, additional

offerings may include under-five clinics and family planning. Some also mentioned that the availability of essential supplies, like folic acid and iron supplements, enables consistent, high-quality care and ANC attendance.

> *The fact that we offer comprehensive care when they come we do this, we even have male involvement, that is it's working well, it's really working well. We even give PREP to those who are pregnant but they are at high risk to prevent them from getting HIV and also protecting their child that is working well*
>
> Facility-based provider, Lusaka Province, urban facility

Consistent access to essential commodities and services including medications, supplements, and specific counseling on maternal nutrition, childcare, hygiene, and self-care practices were cited as key to improving overall satisfaction with care and enhanced ANC uptake.

For more on information service delivery see Service Availability in Health Facilities and Service Availability within Communities. For more information on the supplement supply chain see Availability and Management of Medicines and Supplements.

Community-driven strategies.

Participants noted that community-driven strategies incentivize facility-based care. Local leaders enforce the strategies communities devise through fines and rewards for use of ANC services.

> *It is there one way is through the village head man, so in the community if there is a man who does discourages his wife to register for antenatal care services there is a penalty fee to pay for that attached*
>
> Community Leader, Northern Province, rural facility catchment area

In addition, pregnant women are exempted from community work which in turn encourages them to uptake ANC services.

> *Us as community leaders we have made it a role to exempt pregnant women from any community work such as field work called "songambela" and women will not participant until the child is 4 months old and that's when she will start participating and this in return motivates women to book for antenatal.*
>
> Community Leader, Northern Province, rural facility catchment area

Community and facility education and awareness initiatives.

Most participants reported that community-level education and awareness initiatives play a big role in encouraging ANC attendance. Participants cited the use of health talks, outreach programs, and radio campaigns as useful channels for dispelling misconceptions

while fostering informed decision-making and community trust. Peer learning motivates mothers to seek early and consistent healthcare. Peer educators and trusted community figures were reported to dispel misconceptions and encourage early registration for ANC and continuous support to build trust.

Outreach activities, led by CBVs [including Safe Motherhood Action Groups (SMAGs)], were noted to ensure women are encouraged to register early, and supported through home visits. These efforts were said to be reinforced by local leaders and peer educators through sensitization meetings. For more information refer to Service Availability within Communities.

They are taught how they should take extra care of their pregnancy, yes and also for them to get encouragement there is a small group of people called SMAGs, these people visit them a lot in their villages, visiting and teaching them and they also ensure that pregnant women are buying small small items in preparation for the incoming baby, also to see whether the instructions that they receive are being followed when they are in the village.

Community Leader, Southern Province, rural facility catchment area

We do call for meetings within zones, to discuss information on the benefits and importance of attending ANC, goodness of giving birth from the health facility, benefits of taking the baby for postnatal and under-five clinics, until the baby is five years old. Each zone conducts these meetings every three months or quarterly and then in churches, we give them time, maybe every after two weeks for them to provide health education to members or in short there is provision for health education or health talk in the church.

Community Leader, Southern Province, rural facility catchment area

Male partner involvement.

Support for pregnant women by male partners was reported to significantly enhance ANC attendance by encouraging shared responsibility for pregnancy care. Some examples were given of men reminding their spouses to attend ANC services, accompanying them to the clinics, and promoting adherence to medical advice which reduces hesitancy and boosts women's confidence in accessing services. Education initiatives targeting men strengthen their involvement while engaging extended family members further reinforces the importance of consistent ANC attendance.

The first thing is that it starts with me. I have to be the first to remind her of the next appointment at ANC. "Tomorrow is your next ANC visit appointment, so we are going together", so when we come together she will not be discouraged to, you know, when you come with her she will not be troubled, even the clinic staff will treat her well because she is with her partner, so she will actually be attended to in the fast track so that you can get back home quickly.

Husband/partner, Lusaka Province, urban facility catchment area

So, during our meetings, we teach all of them that it's important for men to accompany their pregnant women for ANC at the clinic, especially when they go for their first ANC booking.

Community Leader, Lusaka Province,
rural facility catchment area

Quality of care and positive interactions with providers.

Pregnant women generally considered positive interactions with providers and availability of services as '*good quality services'*. Respectful and supportive interactions with healthcare providers foster trust and confidence in the services provided. Clients believe it is important for providers to demonstrate empathy and respect and promote a welcoming environment.

Pregnant women also cited other factors that improve overall satisfaction with care including consistent access to essential medications and supplements, specific counseling on maternal nutrition, childcare, hygiene, and self-care practices.

Financial and material incentives.

Free or subsidized services, including ANC visits and nutritional counseling, were reported to motivate women to attend ANC clinics. Social welfare programs, such as cash transfers by government and partner nongovernmental organizations (NGOs) were cited as facilitators that reduce financial barriers, particularly in economically vulnerable areas.

Material incentives like *'chitenge materials'* (also known as 'wrappers'), mosquito nets, and soap play a role in improving uptake of ANC and encouraging facility-based deliveries, particularly among low-income households. Provision of under-five cards[2] similarly incentivize postnatal care (PNC) seeking. Participants shared concerns alluding to the lack of sustainability of these incentives between periods of NGO implementation.

[2] The Ministry of Community Development and Social Services describes "under-five cards" as documentation of an individual child's developmental milestones against "what is 'normal' for a particular age range". These cards may also be referred to as "road to health" cards and generally provide a record of health services received by an individual child between birth and five years of age.

I think, back then people did not really understand the importance of hospital delivery, there was a time when they introduced the provision of incentives such as Chitenge materials (wrappers), soap or any other gift to women who delivered from the health facilities, this enticed women to say "if I go and deliver from the facility I will be given something" then there is a penalty that has been put in place and that is if a woman does not deliver from the health facility she will not be given an under-five card and those who deliver from the health facility there and then will be given an under five card, this makes women to go and deliver from the health facility so that they can get their under-five card for their child, so on that part it has really helped and so if the provision of incentives was to be resumed and continued it can help get numbers to come and register for antenatal as most of these women from the community are less privileged, some can't even afford a Chitenge material for carrying their baby, so this can make even help those who can't afford to come and book.

Community Leader, Northern Province,
rural facility catchment area

Barriers

Despite listing the importance of ANC, participants also mentioned several barriers that hinder its accessibility and utilization. These challenges span social and cultural norms, financial constraints, inadequate facility infrastructure, and systemic gaps in service delivery, creating obstacles for pregnant women seeking timely and comprehensive care.

Social and cultural barriers to ANC uptake.

Reluctance to attend ANC services was observed to be a more significant challenge among girls and younger women. This was due to fear of judgment or intrusive questioning about their pregnancies, especially in rural communities. This reluctance is compounded by limited awareness of the importance of early ANC, with some women discouraged by peers from seeking care in the initial stages of pregnancy.

Some fear that people will laugh at them, especially the young ladies who are 17 years old. They hide their pregnancies, by the time elders discover that they are pregnant, the pregnancy may almost be due for delivery so this portrays a bad picture to their parents when they actually never knew that their child was [pregnant].

Pregnant woman, Southern Province,
rural facility catchment area

Maybe some do not get ill like we do. Because, even myself, I start attending ANC early and my friends would tell me that it's too early for me to start and even say that it was better to register at seven months so that you could only attend twice then you give birth.

Pregnant woman, Lusaka Province,
urban facility catchment area

Cultural norms in some communities promote **late disclosure of pregnancy.** In such settings, pregnant women disclose their pregnancies only once the pregnancy is visibly apparent which is typically in the third trimester. Participants described this practice as being driven by fear of potential harm to the unborn child, such as through witchcraft or

'*inchilla'*. Where women uphold such norms, they delay care seeking of ANC and, as a result, miss out on other essential interventions including maternal nutrition education and preventive healthcare services. While these traditions persist in many rural or conservative settings, they are reportedly less prevalent in more urban areas.

> *We hear that when a woman is pregnant, that pregnancy shouldn't be known to the public early because they believe that the witches can use magic to steal the baby in the womb.*
>
> Community leader, Lusaka Province, rural facility catchment area

> *There is also a belief known as "Inchila" it is believed that when a woman is pregnant and the spouse goes out and have an affair or have sex with another woman the wife may fail to deliver and may die while on the delivery bed especially when she looks at the baby when giving birth, so the elders use traditional medications on this woman to open the delivery way to help her deliver quickly and safely.*
>
> Husband/partner, Northern Province, rural facility catchment area

Participants noted that some elderly women in the community discourage pregnant women from seeking ANC care, favoring traditional methods of supporting pregnancy. The participants reported that in certain communities, a pregnant woman must first receive approval from an "Aunt," who symbolically grants permission before she can book an ANC appointment.

> *It's like like traditional Bemba, when someone is pregnant, they have to wait until maybe they call them (bana senge) aunty point at the pregnancy that's when they can go and book. So if she doesn't point at that mother, that mother cannot book. Hence, it leads that mother to book late instead of booking in the first trimester. And when they come and book like in the in the second or third trimester they will reduce the dates.*
>
> District Health Officer, Lusaka Province, Luwingu District

Fear and social stigma surrounding certain health issues, like HIV and syphilis, also discourage ANC attendance.

> *Some don't come for ANC, they fear that they may be found positive for HIV*
>
> Pregnant woman, Southern Province, rural facility catchment area

Gender dynamics at the health facility level further complicate use of ANC services. In some cases, male partners described discomfort with male healthcare providers attending to their wives.

Again where we face challenges is that the woman books her pregnancy late for antenatal because the spouse was not willing to accompany her to the clinic for ANC, then that's where we come in now, yes, that's the real problem that we have

Community leader, Southern Province, rural facility catchment area

Facilities require pregnant women to be accompanied by a male partner. Women who get pregnant outside wedlock and those whose husbands work away from home may be denied services if they are unaccompanied.

The other challenge is if a woman or a child gets pregnant outside wedlock and there is no one to accompany her to go to the health facility to book for antenatal as now it is a policy that at booking individuals should go as a couple so that they get counseled and examined together but in such an instance it's challenging for us parents now to start looking for means on how to get this pregnancy booked because we know that when we go to the facility the health care providers will ask for a couple and not only that but also there is fine charged by the community leaders for such and also home deliveries which is about K50 and you don't have the money, so it will take you the parent to get that money for you to get the letter from the headman and in case you don't have it becomes a challenge.

Mother/mother-in-law, Northern Province, urban facility catchment area

What makes us fear is the need for you to go with a husband, this is what makes others to book late for antenatal, you go there early alone, you will be told that we need your husband and even if you tell them that he is not around, he went for work, they won't still understand that. This will prompt you to go home and sit until the pregnancy is five months old, now how are you going to be protected? Nothing.

Pregnant woman, Southern Province, rural facility catchment area

Distance and related accessibility challenges.

Government health facilities offer free or subsidized ANC services. However, the financial burden related to the costs of accessing the health facilities presents a barrier for many low-income families. This is even worse when such women are referred to far-off facilities which require additional funds for travel and accommodations required for extended stays away from home.

In addition, for pregnant women, the physical and emotional strain of long journeys adds to the difficulty of accessing care. Traveling while experiencing pregnancy-related discomfort is burdensome.

So one is about the distance which they cover to go at their respective health post as well as some coming at the facility

Facility-based provider, Northern Province, rural facility catchment area

Common reasons for missing ANC health. Um some uh for other its distances yes, they have to walk along distances because some uh as I mentioned earlier on they have to walk like from here to Tungati yes, and your pregnancy because even uh even a normal a normal a person can't cover that distance yes, to seek antenatal services and we and here we are talking about going and going and coming back. Yes, long distances

District Health Officer, Northern Province, Luwingu District

Limited reliable health information and education.

A significant barrier to maternal health is the limited access to accurate and timely information, particularly in remote areas. Poor aerial and internet network reception often renders radio communication and other channels for disseminating health messages unreliable. While community leaders and SMAGs play a vital role in spreading awareness, their methods—such as drum beating to mobilise community members or late-night announcements—are often inefficient and fail to reach all community members effectively.

Health education and counseling provided by healthcare staff also determine uptake. Pregnant and postpartum women noted that although staff are generally approachable, they may have limited time to ask questions. Similarly, providers described limited time with patients as reducing their ability to provide comprehensive or tailored counseling on important topics such as nutrition, medication, and ANC scheduling.

Pregnant women felt unsupported, particularly whenever they were late for appointments and/or when providers expressed frustration instead of offering constructive guidance. Such interactions may discourage women from seeking timely care during subsequent pregnancies.

The other thing is when the woman is not educated or counseled so these things determine the woman's decision whether to attend antenatal care or not

Community leader, Northern Province, rural facility catchment area

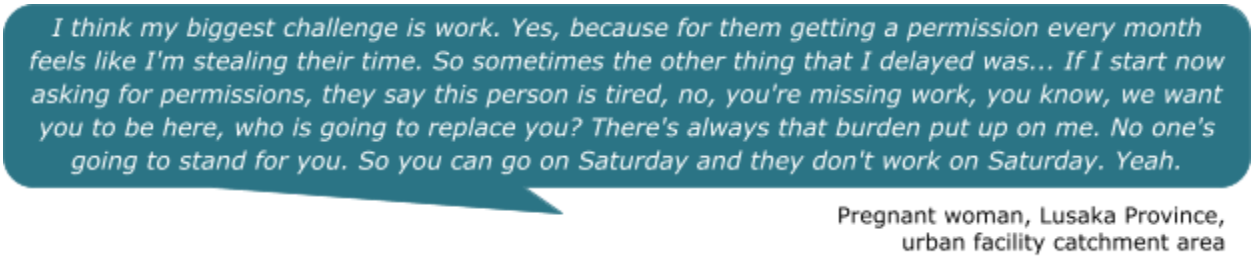
In addition, high levels of illiteracy in many communities further hinder the understanding of information on maternal health. Many women struggle to comprehend medical instructions or health literature, contributing to a lack of awareness about the importance of early ANC attendance and the use of essential supplements like folic acid and ferrous sulfate.

Lack of sustainability of incentives.

Pregnant women and care providers described the discontinuation of incentives for pregnant women, likely related to the end of partner-implemented programming, as contributing to a decline in early bookings.

Time tradeoffs.

Some pregnant women reported that they face challenges at their workplaces when requesting time off for ANC visits. They reported that some employers are unsupportive, considering time off as lost productivity, which can discourage women from seeking care. This issue was raised by women working in the private sector.



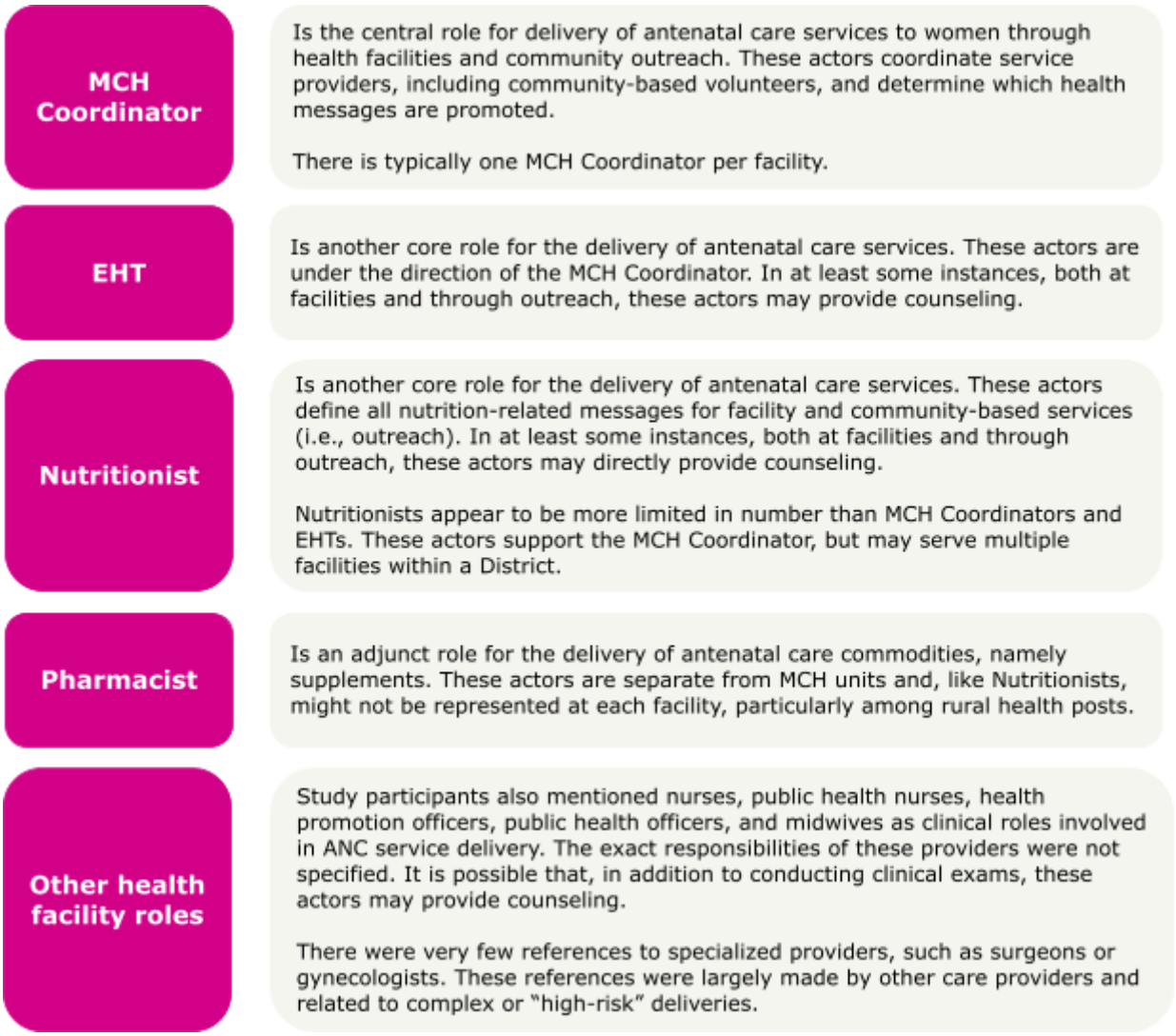
Pregnant woman, Lusaka Province, urban facility catchment area

Similarly, women and their families may prioritize household labor, including gardening or farming activities such as planting, weeding, and harvesting, over ANC attendance. This challenge is particularly salient in rural communities and zones with distant facilities or outreach posts.

Service Availability in Health Facilities

Health facilities are the primary platform for ANC service delivery. Facilities employ different categories of health care workers that directly engage with clients at the facility and during outreach. These include Maternal and Child Health (MCH) Coordinators, Environmental Health Technologists (EHT), nutritionists, pharmacists, public health nurses and officers, health promotion officers, nurses, and midwives (**Figure 1**).

Figure 1: Health Facility-based Staff Titles and Roles



My role is just to make sure that IEC is given every morning because we see antenatal mothers in the morning. So every morning, as we are giving IEC, there should be a component on nutrition. Before they start giving out any service, the first thing that is done is giving out IEC. So as they are giving out IEC, they should talk of the benefits of all the types of foods, the proteins and which foods belong to the proteins. They also talk about vitamins and which foods belong to the vitamins and everything; they tackle everything. That's my role, it's just to make sure that right information is given to the people concerning nutrition.

Health Facility-based Staff, Lusaka Province, urban facility

So in terms of information and dissemination, the facility through the MCH department is solely responsible for disseminating information. So at facility level, like during antenatal clinics before the mothers they are attended to, there's usually health talks that are provided and sometimes we put up some posters in designated areas and then at community level as well and during UCI (Universal Child Immunization). Though, it's sometimes usually integrated with other maternal related services like for example antenatal. So health talk also is given at that level and then even as I mentioned earlier on the SMAGS also help in disseminating this information even as they are going through conducting their business in the community.

Health Facility-based Staff, Northern District, peri-urban facility

The nutritionist, health promotion officer as well as the public health officer [are responsible at the district level] when it comes to maternal [health] issues. **Then when you go down to the facilities, under facilities there we have an MCH coordinator who manages the pregnant women and they are also working as a team with EHT, Environmental Health Officer, and public health nurses in the facilities.** Then Under community, we have trained, we trained community based volunteers, we have SMAGs. We also have those who trained in maternal adolescent infant and young child nutrition at least to help with the counselling and availability like consuming locally available foods that will be nutritious for a pregnant woman.

Health facility-based staff, Southern Province, rural facility

In addition to counseling on supplements, maternal health, and fetal health and development, counseling on maternal diet, recommended 'lifestyle' during pregnancy, and how to prepare for delivery are core topics covered during ANC visits. In at least one instance, a health provider described dietary counseling as inclusive of counseling that discourages 'pica'[3] and associates the practice with soil transmitted helminth infections. Generally, dietary counseling is described as 'what the mother should eat during pregnancy'. This may include discouraging common myths impacting maternal diets, encouraging increased consumption of specific locally available foods, and cooking demonstrations.

Facilitators

Data collection and use for decision-making is a key facilitator of ANC service delivery. Data on service delivery and supplement distribution are used to facilitate district-driven strategies to improve ANC attendance and service delivery. There is also evidence that, in at least some facilities, staff with decision-making authority are using data to inform

[3] Pica is generally defined as a disorder wherein individuals crave and/or consume non-food items. In Zambia, individuals with pica commonly consume soil.

facility-driven strategies to improve service delivery. Capacity to manage and use facility-based data is supported by district-facilitated capacity strengthening initiatives (such as quarterly data reviews, on-the-job training, and mentoring) and effective collaboration with external actors.

Data collection and use.

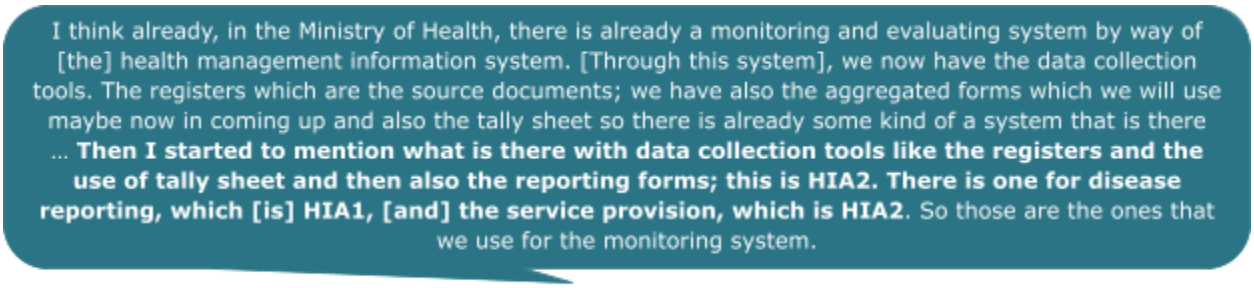
Facility registers and tally sheets were the most commonly referenced tool for monitoring ANC service delivery. Data captured in these tools are duplicated in client ANC cards and books to facilitate follow-up and promote client awareness of their health status. Generally, facility-based health workers provide weekly reports to their supervisors. These reports may include details on ANC services delivered as well as supplement stocks and distribution; performance assessments are based on these reports. Facility-based health workers may also use data to inform counseling messages.

Officers within health facilities, referred to as "focal points" by study participants, are trained to use the national health management information system (HMIS), called the District Health Information System 2 (DHIS2), and are able to analyze indicators for trends. These officers described being empowered by these skills. Participants noted that, instead of waiting for data reviews, they can independently log into the system to retrieve specific indicators. This access allows for real-time monitoring, making it easier to adapt programs and activities based on current data trends. By reducing delays in accessing data, this functionality enables timely, evidence-based action in program implementation.

Facility-based focal points tabulate and report facility and community-based data to the district on a monthly basis using national HMIS tools referred to as health impact assessments (HIA and HIA2). Focal points for data tabulation and reporting do not appear to be role-specific and may include a group of staff who discuss reporting needs and submit information to the HMIS which is aggregated in the District Health Information System (DHIS2).

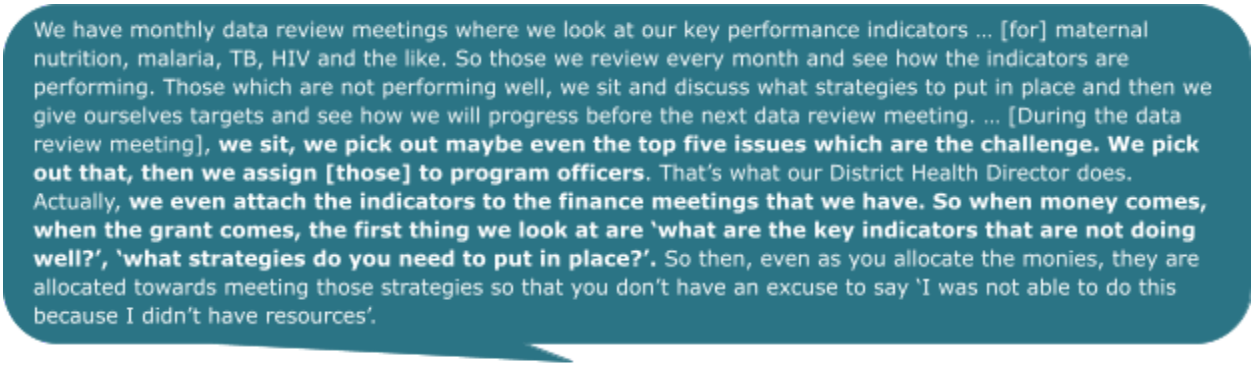
> **So I think that Is working quite well and the fact that [we], as officers, are also trained in how to log into the system and look for things. We are looking for how indicators are doing and stuff like that**. I think that is working very well because at the end of the day, [you] will not just [work] haphazardly, you will implement well informed activities because they will be driven by how indicators are doing. … It's only worked quite well like for the past three to four years because initially we would just depend on the information provided by the health information department. Like, when you come data review, there are the ones who will go into the system and get this information and give us. **But from the time I was trained to access this information myself, I will not even wait for data review, I will just go into the system and check for what I want to check.**
>
> Health Facility-based Staff, Northern Province, peri-urban facility

The HIA tools collate information collected using tally sheets, various registers, and pharmacy stock control cards. Services tracked include HIV testing and treatment, TB treatment, maternal nutrition, syphilis testing and treatment, and anemia testing.



Health Facility-based Staff, Northern Province, urban facility

Quarterly data review meetings offer an opportunity for comparative analysis across facilities, where officers identify trends and discrepancies, share best practices, and prioritize challenges, and set new targets for the next performance period This collaborative approach helps with troubleshooting challenges and redistributing resources based on data-driven insights. This data-driven decision-making is assumed to foster equity and quality improvement across facilities.



Health Facility-based Staff, Southern Province, rural facility

Facility-driven strategies to improve ANC service delivery.

Facility-based strategies to facilitate ANC service delivery were primarily focused on counseling provision and included task sharing (esp. counseling responsibilities) across health provider cadres, and/or allotting one hour each day to group counseling on a pre-defined or rotating topic.

In many facilities, tailoring of counseling is limited by the number of staff who are able to facilitate counseling and the number of clients requiring the service. To compensate for limitations in heavy workloads and specialized skills, some facility-based staff adopt task sharing approaches. Task sharing includes sharing responsibilities for counseling such that one provider discusses one specialized topic before another provider begins discussing the next topic. Task sharing may also include engaging CBVs, like Safe Motherhood Action Group members (SMAGs), to assist with record keeping (e.g., maintain facility registers) and facilitation of group counseling.

So the **counselling is usually done on contact with the mothers.** Sometimes there are group discussions, like group counselling. Then the people who do the actual [counseling], the people in contact with the community are the facility staff as well as the CBVs, the community based volunteers, who work with the facility. I will talk about the SMAGs, even those who are trained in MAIYCN, like maternal adolescent infant and child nutrition. So what happens is once a pregnant woman comes, they are given days on which they are supposed to come at the facility for antenatal. So when they come on that particular day, they are given [counseling] before [providers] start attending to them. There is first health education which is given in a group, then there are times as you interact with the client there are those of course who might need special attention depending on how they are presenting themselves with [being an at risk pregnancy] so those are identified and then there are also one-on-one counselling, those who might need extra attention. **Just to add on, the counselling is basically done by health care providers themselves and also the community based volunteers who are trained.**

Health Facility-based Staff, Southern Province, rural facility

Facility-based staff are cognizant of the time burden ANC services place on women and their partners. To reduce this burden and streamline workloads, facility-based providers may offer select services, such as ANC registration (often referred to as "booking") on a specific day of the week, and/or limit counseling sessions to one hour out of consideration of the time burden that ANC services are to pregnant women.

District-supported capacity strengthening.

District staff provide training and mentoring to facility-based staff on monitoring and evaluation skills and processes. As part of this support, district staff meet with facility staff quarterly to review register data, discuss decisions, clarify reporting procedures, and determine next steps. In addition to district staff, NGO staff may support data review and use for decision making. This hands-on support was appreciated by participants for supporting staff who may have varying levels of experience or familiarity with data collection protocols.

We have got the district who come to mentor us. They do come maybe quarterly to see how we are doing, how we are working. They [look at] the registers; if there are any gaps, they mentor us to say 'this is the way you are supposed to do, what has happened here?' We sit together around the table [and] we discuss, then [determine] what will be the way forward. They help us to forge ahead.

Health facility-based staff, Southern Province, rural facility

At the district-level, Program Officers lead data reviews during regularly scheduled finance meetings, and may use the five lowest performing indicators to prioritize challenges and inform strategic decisions, such as budgeting. Indicators and resulting actions span health topics and, while not exclusively nutrition-specific, can include nutrition if nutrition indicators are among the lowest performing indicators.

Effective external collaboration.

District and facility-based staff collaborate with NGOs and community leaders to foster continuity of services, access supplementary resources, and generate buy-in and demand within communities.

Close collaboration between facilities, NGOs, and government ministries reduces duplication of efforts, promotes continuity of services, increases access to resources for service delivery and capacity strengthening, and is generally described as improving service delivery. NGO and government staff participate in quarterly reviews of district-level data to inform their programming and other decision-making. Some NGOs, such as UNICEF, partner with the Ministry of Health to access coverage and supplement disbursement data, rather than creating NGO-specific or parallel platforms.

A multistakeholder forum that includes community leaders also participates in quarterly data reviews. During these forums, community leaders typically meet with health facility staff to review key performance indicators, discuss trends, and identify challenges.

> **We usually hold quarterly meetings here at Katoba RHC, so, there they show us how the indicators are [doing].** Especially when they show us that in the past three months, the statistic shows how many home deliveries were done versus those who delivered at the health facility. So far, we have seen a great improvement because most of the mothers are able to go to the facility and deliver at the facility. So, looking at the percentage so far at least the number is increasing.
>
> Community Leader, Lusaka Province, rural facility catchment area

Barriers

Health facility-based providers face a number of on-the-job challenges related to service delivery within facilities. By far, the greatest challenge described was stockouts of supplements; however, a number of other challenges were also raised by providers and recipients of care. These included resource limitations (such as ambulances, fuel, and information, education and communication (IEC) materials), high workloads, and limited time and opportunity for tailoring counseling sessions to suit client needs.

Limited resources for service provision.

Resources are limited in most facilities that participated in this study. In many instances, these limitations result in prioritizing budgeting for commodities needed for curative care over preventative care. Pharmacists and care providers associated some limitations in supplement availability with this prioritization strategy. Limited availability of supplements creates a significant gap within service delivery. See Availability and Management of Medicines and Supplements for more information on the supplement supply chain.

In addition to supplement stockouts and limited resources for distribution, such as ambulances and fuel for transporting commodities and clients, facility- and district-level staff described insufficient access to IEC or social and behavior change communication (SBCC) materials and other tools to support counseling. Providers and recipients of care, particularly in peri-urban and rural settings, described the specific needs of low-literacy clients and appreciated IEC materials and other visual tools for illustrating key messages. Similar challenges were also described for community-based service provision.

At present we don't have any of these [counseling aids / IEC materials] **due to the same resources constraints. So we don't have any IEC material and we don't have any food supplements, but by-and-large we endeavor to give information to the mothers so that they are well equipped.**

District-level staff (nutritionist), Southern Province, Mazabuka District

No, the brochures are obviously not there because they are expensive. But ideally that [is] how it's supposed to be, [to have brochures for counseling]. So if you are discussing anything about nutrition, I should be able to provide [brochures]. There should be a table there with brochures where you can pick, but it's not there. So we don't give any materials unless a [NGO] partner comes and which is usually for a period of time and it [then] ends.

Health facility-based staff, Lusaka Province, urban facility

Even the mothers [benefit from picture-based counseling tools], because when they see [images on IEC materials], it's difficult to forget them rather than just talking.

District Health Officer, Northern Province

Facility-based providers who have had access to IEC and SBCC tools in the past described client-facing pamphlets or leaflets with photos of locally available foods. These providers also described provider- and client-facing posters for placement in designated areas within facilities and public areas respectively.

That time **you only used to receive them [counseling aids] from World Vision** when they were in the district. Now that they have closed their area programme, they have gone, so we rarely see them. We never even used to know how they used to buy them.

Health facility-based staff, Southern Province, rural facility

So in terms of information and dissemination, the facility through the MCH department is solely responsible for disseminating information. So at facility level, like during antenatal clinics, before the mothers are attended to **there's usually health talks that are provided and sometimes we put up some posters in designated areas** and then at community level as well and during UCI (Universal Child Immunization). Though, it's sometimes usually integrated with other maternal related services like, for example, antenatal. So health talk also is given at that level and then even, as I mentioned earlier, on the SMAGS also help in disseminating this information even as they are going through conducting their business in the community.

Health facility-based staff, Northern Province, peri-urban facility

Similar to counseling-focused monitoring tools, SBCC materials were associated with NGO partners, like World Vision, and initiatives, like Scaling Up Nutrition (SUN). Client-facing SBCC materials, like pamphlets or leaflets, may be retained by providers as counseling tools after NGO implementation periods end. Very few stakeholders were aware that these materials could be obtained through the District Health Office or the National Food and Nutrition Commission when SBCC materials are not available at the health facility level. Some health-facilities promoted recommended behaviors through community discussion, demonstrations, and/or drama or role-playing performances.

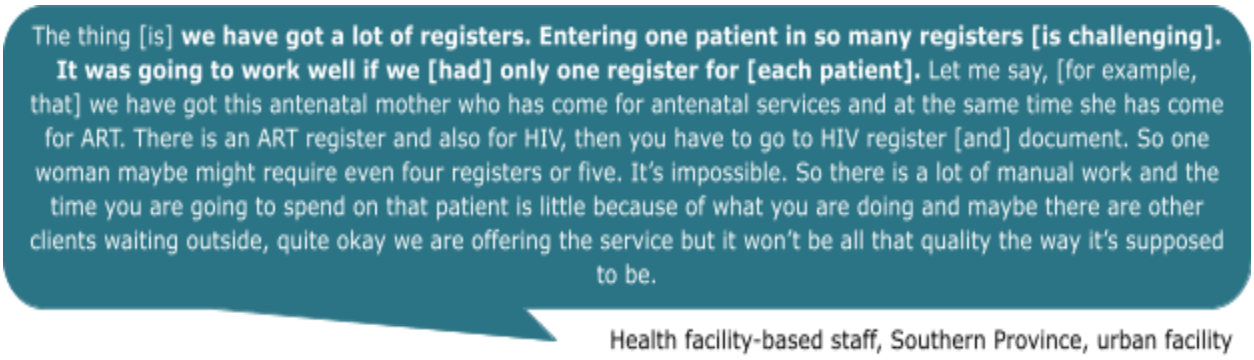
> The pamphlets no. We only have ample time to discuss these things. **There will be discussions, demonstrations and drama. We take them to the local context of the mother support them.** We do a demonstration to say have you seen what has happened here? What has happened to this pregnant women? What have you seen? She has collapsed. What caused this? Then they respond to say because they threw the IFA away and had severe anemia. So, **usually, you do a role play to depict what we are talking [during counseling] about because they easily grasp the message.**
>
> Health facility-based staff, Southern District, rural facility

Data collection and use.

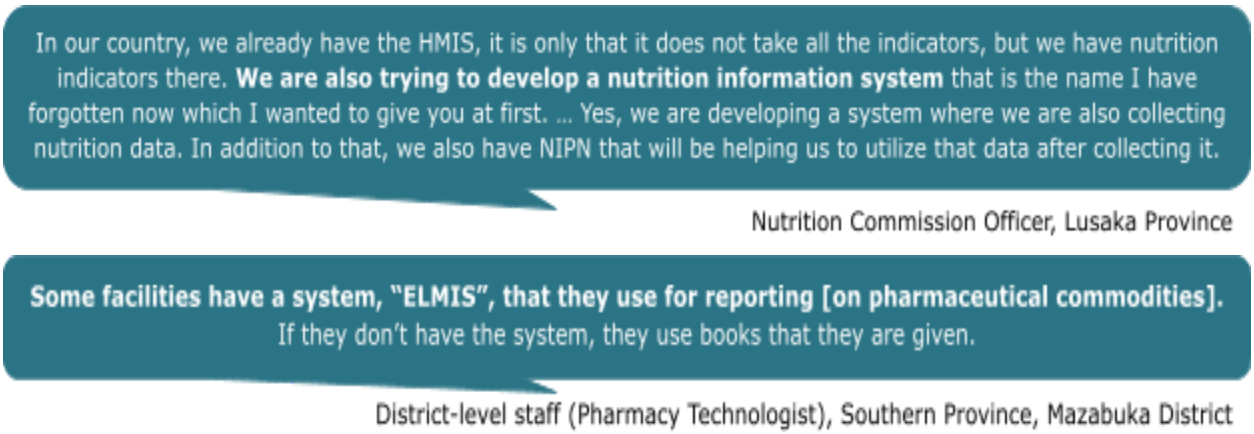
As described, data collection and use for decision-making is a facilitator of service delivery; however, capacity strengthening efforts for these skills need to be maintained to further strengthen existing capacity of staff and to build capacity for new staff and those with less developed skills. Beyond skills strengthening, providers mentioned two key concerns for data collection and use to inform service delivery: inability to monitor adherence within households, and difficulty maintaining registers and reporting.

Facility-based providers described relying on supplement distribution records and SMAGs for monitoring adherence within community settings. While SMAGs are a key facilitator and arm of service delivery in communities and households, high rates of attrition, and limited capacity of health facility-based staff to provide supervision may reduce the reliability of their services, inclusive of counseling services and community monitoring. CBVs fill many roles within their communities; high volume workloads may also contribute to these challenges.

Health facility-based staff described being overwhelmed by the number of registers they need to maintain, and challenges transferring the data to the HMIS. Facilities use multiple types of registers to document service delivery, including general registers, ANC registers, labor/delivery registers, postnatal care (PNC) registers, and nutrition registers among others. These registers are typically paper reporting forms which are collected and entered into the HMIS by staff at higher-level facilities. The transition of registers between facilities may contribute to discrepancies if registers are misplaced or damaged. Additionally, as an electronic system, the HMIS is subject to power and other system outages which may delay data entry and result in backlogs. Other causes of discrepancies include data entry errors, such as missing or incorrect values, and insufficient time to dedicate to data entry due to higher priority tasks, such as service delivery. Discrepancies between the HMIS and supplement stock make it challenging to align program resources with demand.



In addition to registers, a limited number of participants described using tools for monitoring counseling in the past. These participants noted that the tools were provided by NGO partners but only for the duration of the specific projects. It is not clear whether counseling is monitored as part of routine monitoring by facilities. If facilities are monitoring counseling with nationally standardized registers, provision of additional, counseling specific tools by NGO partners is a duplication of effort and potentially unnecessary increase in workload. Similarly, district-level participants described two additional HMIS platforms: a nutrition-specific information system supported by the National Information Platform for Nutrition (NIPN) and Electronic Logistics Management Information System (ELMIS). Linkages between these systems and the DHIS2 were not described and may not be present.



Human resources.

Many facilities are understaffed. The factors contributing to understaffing were not discussed by study participants and are outside of the scope of this formative research. However, participants indicated that the hub structure of some facilities may be intended to address understaffing challenges albeit insufficiently. Within a hub, individuals in key roles, such as nutritionists, support multiple facilities within a district. This strategy is a stopgap measure which increases the workload for these specialized-providers.

So for our facilities, **they are usually nutritionists that are found in the facilities, maybe not all of them**, but especially the bigger facilities, nutritionists are there. Maybe where they are not, at least a nutritionist will be tasked to look at the number of facilities in the particular zone.

Facility-based staff (MCH Coordinator), Lusaka Province, Kusaka District

While task-sharing between providers with different expertise may help facilitate service delivery by making workloads more manageable, this approach may inadvertently reduce the quality of services provided including ANC counseling. For example, nutritionists may be excluded from critical decision-making and service provision, limiting or altogether removing their ability to inform messages and approaches to nutrition intervention delivery.

Facility readiness.

One participant described "supermarket"-style availability of services, wherein a participant could come to a facility to receive all of the care they needed across technical areas (e.g. ANC, child health, etc.) in a single visit. While this participant described this capacity as an ideal, they noted that this style of service availability is limited by staff shortages and restricted space within health facilities. These barriers were salient in many facilities regardless of urban, peri-urban, or rural distinctions.

Limited physical space in facilities restricts the ability to conduct thorough examinations and the privacy clients and providers desired for tailored counseling.

Yes the only problem is that this time they [pregnant women] are too many [that come to receive ANC services at the same time] and there is not that personal touch and they explain to them in a group. Now, there are people who don't understand some things and there are people even if they someone is talking if they don't understand something, instead of asking, they shy away they don't ask, they just get [supplements] and then they fail to [take them] because they didn't understand the explanation and they are just too many.

Community Leader, Northern Province, peri-urban facility catchment area

So during our antenatal care, our services usually [and] **especially for big facilities, you will find that there are a lot of women coming through, such that it is difficult for you to give IEC. one on one. Most of our health talks are actually group health talks,** so when the women come you are going to give a group health talk. But other than that, there are certain women that just need more than that group health talk. They may not disclose some certain information in a group. When you are attending to them one-on-one you can get more information, so that they can give you whatever challenges they are having, and then now you are going to attend to them one-on-one, **not everything can be attended to in public**. That's the individualized care that I am talking about. So now, you look at that woman as individual, of course there is a package for everyone, but then there will be others who may need more attention, so we give such attention to them.

Health Facility-based staff, Lusaka Province, rural facility

Some rural health facilities are unable to provide comprehensive services, such as the processing of hemoglobin tests, and must refer pregnant women to other facilities for

testing and/or care. When lab testing is not available, some facilities diagnose anemia using visual (pallor) tests.

Service Availability within Communities

"Outreach" services are coordinated by MCH departments to deliver child health, ANC services, immunization, and environmental health services within community settings. These community-based services engage a number of core actors to plan, facilitate, and monitor service delivery and adherence to recommended health behaviors (**Figure 2**).

Figure 2: Community Actors

Community outreach is a stop-gap measure to provide services to individuals who lack access or other forms of opportunity to attend ANC at a health facility. These services are implemented within communities farther than five kilometers from a facility. These communities are organized into "zones" with variable numbers of villages in each.

> **There has been a strategy of late that has been put in place which engages both community leaders and the community members, this strategy is about the division of villages into zones, other zones have five villages, others seven, while other three.** So where the health workers meet the people from their villages in their respective zones and the headman for that village has to be there when these activities are taking place, such as the universal child immunization. This enables the community leaders to interact with the people and the health workers and learn the lessons together with the community members who have attended the occasion.
>
> Community Leader, Northern Province, rural facility catchment area

> **So the furthest health-post from our catchment [zone] is about 42 kilometers, then the nearest is five kilometers.** So covering a distance of five to 42 kilometers, these people we follow them in their respective communities. ... So looking at our total population, we have about seventeen zones which we target. So every day, we should cover four zones. So it is in the space of three hours at each health post, so we interact with these pregnant mothers in less than three hours.
>
> Health facility-based staff, Northern Province, rural facility

Upcoming services are coordinated with community leaders and announced in advance. Services may include Vitamin A supplementation, deworming, ANC, family planning, and growth monitoring and promotion. Implementation of outreach activities varies by facility. The most common implementation options were once-per-month and targeted outreach days by technical topic.

CBVs, most commonly SMAGs, provide household level counseling on hygiene, maternal and child nutrition, ANC attendance, delivery preparedness, danger signs, childcare, family planning, malaria prevention, and TB screening and prevention. Maternal and child nutrition includes breastfeeding and complementary feeding practices, and several participants described counseling on maternal diet that promotes three food groups: protective, energy giving, and body building. SMAG counseling compliments counseling received at health facilities.

> On nutrition. We teach them [pregnant women] to be eating foods that are divided into 3 groups and we also teach them that these foods are not to be bought but the same foods that we produce in our farms. **These foods are divided into three groups; energy giving , body building and protective foods** so a pregnant woman should manage to eat foods from these groups so that she can have good health.
>
> Community-based volunteer (SMAG), Northern Province, rural facility catchment area

In some responses, health facility-based staff do not differentiate SMAG activities from health facility-led outreach—both of these approaches may be referred to as "following" women within their communities. Facility-based providers and SMAGs feel confident that

community-based health education is contributing to the number of women who "book early" for ANC. Counseling delivered at facilities and in communities is appreciated by women.

Facilitators

Linkages between health-facilities and communities, especially through SMAGS and outreach services, are critical to ensuring ANC services are provided to women, particularly those residing in hard-to-reach zones. Key facilitators of community-based service delivery were effective mobilization and community relationships, household-level counseling, and data collection and use.

Effective mobilization and community relationships.

Across stakeholder types, participants described mobilization and efforts to build relationships between facilities and communities as effectively improving ANC attendance and facilitating increased acceptability of supplementation.

A zone-based structure for community engagement facilitates involvement of community leaders in outreach activities. Facilities notify headmen and chiefs of community outreach sessions in advance and appreciate these leader's support for mobilizing community attendance.

Though outreach services may be delivered in unsheltered, open spaces, some facilities coordinate with headmen, chiefs, faith leaders, and school authorities to facilitate the use of school or church buildings for the provision of services. These buildings provide shelter from the elements and some, albeit limited, privacy.

> Okay, **we do call for meetings within zones to discuss information on the benefits and importance of attending ANC, goodness of giving birth from the health facility, benefits of taking the baby for postnatal and under-five clinics, until the baby is five years old.** So each zone conducts these meetings every 3 months or quarterly and then in churches, we give them time, maybe every after two weeks for them to provide health education to members or in short there is provision for health education or health talk in the church.
>
> Community Leader, Southern Province, rural facility catchment area

Supervision and training of CBVs.

CBVs may be trained by a range of actors, such as health facility staff or various NGO partners. Similarly, CBVs may be supervised under variable structures, including reporting to a community-based supervisor who then reports to a specific facility-based staff member, or direct reporting to a facility-based staff member.

SMAGs and other CBV cadres appreciated training for equipping them with the knowledge and skills needed to provide and support service delivery within their communities. While

participants appreciated training and supervision as facilitating their roles, participants did not describe the variable structures for training or supervision as barriers or facilitators except in instances where that training and supervisory support ended as part of the end of partner-implemented programming.

Household-level counseling.

SMAGs are the primary mechanism for delivery of household-level counseling. This counseling is often described by health care providers and pregnant women as part of SMAG "follow ups". SMAG-provided counseling compliments that provided health facilities and outreach, and was appreciated by all stakeholder types for facilitating male involvement and support of ANC and associated health behaviors.

Counseling topics generally include the importance of ANC attendance (including improved health status and consequences of non-attendance), maternal diet, supplement uptake and adherence, WASH (especially handwashing), delivery preparedness, postpartum danger signs, and breastfeeding.

Data collection and use.

In addition to counseling, SMAGs monitor and report on pregnancies, supplement adherence, neonatal deaths, home deliveries, and abortions in their communities. SMAGs report this information to MCH coordinators or departments, typically weekly or monthly. This reporting is key to forecasting demand and requesting commodities and human resources needed for service provision.

Barriers

The primary barriers to community-based service delivery were high rates of CBV attrition and other role-specific challenges and resource limitations.

CBV attrition and other volunteer-specific challenges.

SMAGs and other CBVs face a number of on-the-job challenges. These include the great distances some needed to travel in their role as critical linkages between communities and health facilities. Other challenges include long hours, insufficient supervision and/or support from health facility staff, lack of resources needed to perform their role, lack of financial or other types of incentives, and difficulty tracking clients. One SMAG reported concerns about attacks by dogs or human assailants.

SMAGs described inadequate resources for transportation, SBCC materials for counseling, and tools for monitoring. Like the provision of incentives, these resources were commonly associated with NGO partners and limited to the duration of partner-implemented programming.

> **We've had a challenge ever since World Vision left in terms of report tools.** Usually, we used to be given report tools and that would encourage us to bring reports every month but at the moment, you just draft for yourself on a piece of paper so that's a challenge we are facing because at the moment we don't any support in terms of reporting tools.
>
> That is really giving us problems. When we come to the facility, we are given pieces of paper to draw up a report. In these same reports, others make mistakes in the way they align them. They are not aligned according to the way World Vision used to align them and others don't know how to write properly. We have been lobbying from the facility to help us with the reporting tools but we haven't been helped at all.
>
> Community-based health workers (SMAGs), Northern District, rural facility

Resource limitations.

Outreach ANC service delivery faced similar challenges to those of facilities. These include limited resources (e.g., inconsistent availability of fuel grants from the government), limited staff, and inadequate infrastructure for service provision.

In many rural communities, outreach may be conducted in open spaces, such as under trees. Providers and clients spoke about the lack of privacy as a concern limiting the feasibility of physical examinations and tailored counseling provided during ANC.

Availability and Management of Medicines and Supplements

As described in the executive summary, a supply context assessment will expand upon the findings below to provide more robust insights on the existing supply chain for IFA and opportunities to transition the supply chain for MMS.

Facilitators

Effective use of pharmacy scorecards in the health facilities is critical to ensure consistent availability of essential supplements at health facilities. Effective use of monitoring tools and the creation of provincial and district pharmacy hubs were the most salient facilitators of the supplement supply chain.

Effective use of monitoring tools.

Pharmacy scorecards are widely used by pharmacists to monitor the availability of supplement stocks. These tools enable health facilities to track the current inventory of supplements, assess the rate of usage, and predict when supplies may run low. The scorecards also help the pharmacists to estimate and prepare for the next order of supplements in advance. This proactive approach helps track stock and try to minimize stockouts and support uninterrupted service delivery.

Zambia Medicines and Medical Supplies Agency (ZAMMSA) has rolled out an electronic pharmacy management system, referred to as an ELMIS, that has revolutionized supply chain operations and allowed more accurate tracking of distribution trends. Pharmacy electronic systems have also facilitated coordination between health facilities and district or provincial hubs by providing real-time data on demand and use. These systems facilitate demand forecasting by district and provincial health offices, enabling better resource allocation and reducing delays in supply.

Data captured by monitoring tools, like stockcards, and curreated in the ELMIS are reviewed by health facility actors during monthly meetings. These reviews improve forecasting of supplement demand for static (health facility-delivered) and outreach services.

Provincial and district pharmacy hubs.

The establishment and strengthening of provincial and district pharmacy hubs has streamlined the distribution process by reducing lead times for receiving ordered supplements. Expanded storage capacities in some district pharmacies are able to accommodate larger quantities of medicines and supplements which has reduced supplement shortages overtime.

Participants appreciated these hubs for improving the overall efficiency of the supply chain via better logistics management, coordination, and reduced cost.

Barriers

Logistics challenges.

Supply chain issues, especially the inconsistency in the availability of supplements (e.g., iron, folic acid, MMS), were one of the most salient challenges to service delivery and supplement uptake and adherence. Participants noted that facilities often experience stockouts, and without a reliable resupply system, pregnant women sometimes go without necessary supplements; for women with greater financial means, supplements may be purchased from private pharmacies. Transportation challenges make it difficult for some facilities to procure supplies from central stores, especially when district-level transportation resources are scarce.

I also want to talk about the medicine. **From the time we started antenatal, when my pregnancy was two months, each time I came for ANC, I was not finding any of the drugs here and they kept telling us that we should go to buy in pharmacies.** So when they told me to buy I used to forget instead I went straight to see who to go and sit. Last time I even asked them that each time I come here I don't find drugs, so what's really the problem? But they just told me that I came late so the following month I went very early and that's when I was given these that I'm taking now. So I'm appealing to the clinic to be stocking enough drugs to cater for us all. In the first trimester we were told that there is no medicine and we were told to go and buy and most cases I used to forget buying them.

Pregnant Woman, Lusaka Province, rural facility

So yeah, [there are challenges]. Maybe for the district [level, it is] transport, [it is] inadequate transport [for] moving the things, especially ordering from DHO. How do we move the commodities from there to here?

Facility-based provider, Northern Province, urban facility

Further, disruptions in supplies (like micronutrient supplements and essential testing kits) limit service delivery reliability. Frequent interruptions create additional strain as health facilities attempt to manage with inconsistent resources, which could decrease client confidence in the program.

So basically, stockouts are one of the challenges that we encounter. There is no consistency in terms of the supplies. So sometimes you have stockouts of folic, the other time you have stockouts of ferrous.

Facility-based provider, Lusaka Province, rural facility

Ineffective distribution procedures.

Larger facilities face more frequent stockouts because the health center kits are distributed based on population rather than demand, leading to shortages. Smaller facilities may maintain stock but may not serve the same high volume of clients.

Infrastructure for storing supplements, especially in pharmacies, is generally adequate; however, storage may be limited at ANC service delivery points.

ZAMMSA rolled out the ELMIS improve supply management. The health facility pharmacists are required to order via the ELMIS. New orders can only be processed once the previous stock is fully distributed and the report is sent indicating the stock levels and usage.

Facility-based provider (Pharmacist), Lusaka Province, rural facility

Demand-side Factors of Supplement Uptake

Facilitators.

Demand-side factors, including knowledge, cultural beliefs, and social norms, play a critical role in shaping the acceptance and utilization of nutritional supplements during pregnancy.

Perceived benefits of supplements.

Motivators cited for taking supplements include their perceived benefits, such as improved blood levels, increased strength during labor, and reduced pregnancy complications such as anemia or excessive bleeding. Additionally, some women strongly support their use based on positive personal experiences. Participants also expressed a willingness to adopt multiple micronutrient supplementation (MMS) for its comprehensive nutritional value, particularly for women with limited access to diverse diets.

> Yes, we are willing to take because IFA is only able to boast blood and make the baby strong but mms has other added nutrients because some of us are not able to meet all the required nutrients needed by a pregnant woman. For example you want oranges, potatoes, chicken, beef, you want all that but not able to afford. So when you take one tablet of MMS in the morning, it means you have taken all that you wanted.
>
> Pregnant woman, Northern Province, urban facility catchment area

Education and counseling.

Education and counseling play an important role in promoting nutritional health and supplement adherence among pregnant women. Respondents mentioned that health workers sensitize the community on the benefits of supplements like IFA, emphasizing their role in preventing anemia and strengthening bones. For more information on education and counseling refer to sections on Service Delivery in Health Facilities and Service Delivery in Communities.

> So in our counseling sessions or the health talks, we also talk about the challenges that women may face when taking those drugs, we also give them information on how best they can tolerate those drugs. We make sure that every situation is covered in the health talk. We know some women they vomit especially during their first pregnancy, I mean the first three months, what we call the first trimester. So, for folic, it is actually advisable to take starting in the first trimester coz that one helps in the fetal development. The other thing is that we advise women to start antenatal early so that they can also access those services. Then we talk of the dangers of not taking those drugs, and then the challenges they may have and how they can go round those challenges to ensure that they are taking those drugs
>
> Facility-based staff, Northern Province, urban facility catchment area

Affordability.

Folic acid and ferrous sulfate supplements are provided free of charge to pregnant women, reflecting the government's commitment to improved maternal care. Participants noted

that women have not been asked to pay for supplements, indicating a general expectation that the supplements remain free.

> So for the cost there is no cost of because folic and ferrous is being given at our facility. We order.... uh those commodities from the district pharmacy, and then we give those folic and ferrous at a free basis. These pregnant mothers do not buy it.
>
> Facility-based staff, Northern Province, rural facility catchment area

Barriers

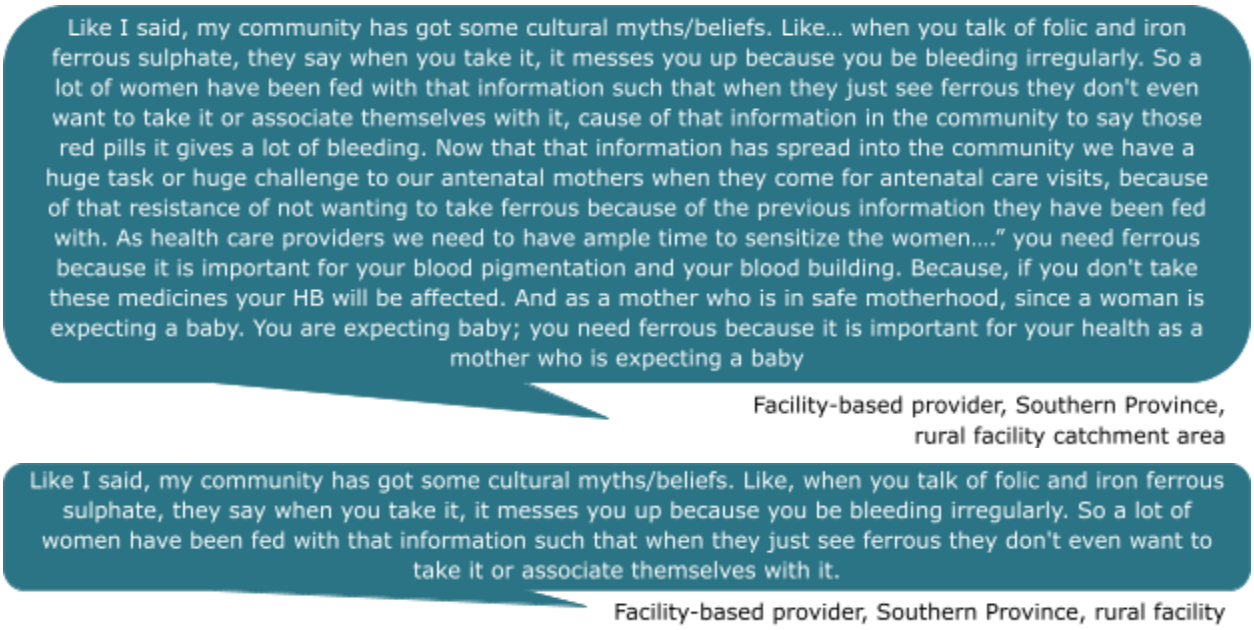
Cultural factors.

Cultural practices and beliefs often are barriers to recommended maternal health behaviors. Resistance from influential community members, especially elderly women, may result in pregnant women being discouraged from uptaking medical interventions and promote reliance on traditional practices.

Traditional practices included remedies for health conditions, like anemia where women may be encouraged to drink animal blood. Practices also included herbal remedies to ease delivery or address pregnancy-related issues. While some of these traditional or indigenous remedies may have benefits, their use can discourage pregnant women from seeking professional healthcare and create risks for maternal and fetal health.

Traditional perceptions and misconceptions hinder the uptake of supplements. These included concerns about giving birth to large babies, which are feared to cause complications like difficult deliveries or stillbirths. Additionally, some women hold the misconception that supplements like folic acid and ferrous sulfate could result in heavy bleeding during labor.

> That's true they cheat each other [i.e, foster misconceptions that rob one another of the benefits of IFA], saying that if you take these tablets the baby in the womb will grow very big and that will cause complications during delivery
>
> Community leader, Southern Province, rural facility catchment area



Nutritional practices during pregnancy are also heavily influenced by cultural beliefs, with certain foods being avoided due to taboos. For instance, the belief that consuming eggs leads to a child with a bald or big head causes many women to exclude them from their diets. Similarly, pregnant women are advised to avoid foods like carbonated drinks and spicy dishes due to concerns about their effects on the baby. While these dietary restrictions may be well-intentioned, they can limit access to essential nutrients, potentially affecting maternal and fetal health.

Lastly, resistance to change in health practices was also highlighted as a barrier to the uptake of the supplements. Participants noted that transitioning to new health interventions, such as moving from IFA to multiple micronutrient supplements (MMS), often encounters resistance due to familiarity with existing options and skepticism toward new medications.

Supplement costs.

Respondents said that many women could not afford supplements, when they asked to purchase them independently (apart from the free ones from public facilities). Participants noted that the cost of essential supplements, such as iron and folic acid, is a challenge not only for individuals but also for the government and communities.

Demand-side Factors of Supplement Adherence

Many of the factors associated with supplement adherence, both facilitator and barriers, are identical to supplement uptake. Please refer to the proceeding section on Demand-side Factors of Supplement Uptake for these.

Facilitators

Additional facilitators of supplement adherence included positive past-experiences, counseling for managing side effects and remembering to take, and support from community and household members.

Positive past-experiences taking IFA.

When describing what motivated or supported supplement adherence, pregnant women discussed feeling positive changes in their bodies. These included feeling strong after taking supplements and increased appetite.

> Yes, I have [seen women taking or discussing supplements in my community] . A lot of women from the community take these supplements, even my wife does. For us to have seven children who are healthy and strong, she used to take these supplements.
>
> Community leader, Northern Province, rural facility catchment area

Counseling.

Supplements are given to women alongside counseling. This counseling generally describes the purpose of the supplements—red (iron) pills are for boosting blood and yellow (folic acid pills) strengthen the fetus's bones. Together these supplements give women the strength they need for pregnancy, delivery, and the postpartum period. Other messages specific to adherence include taking supplements with food and water to reduce side effects; designating a specific time of day to take the supplements; and designating a specific place to store supplements that is consistently visible.

> **So these tablets that we are given are for us to have enough blood and so that the baby can grow well in the womb**, this is what they tell us when they give them to us.
>
> Pregnant Woman, Southern Province, rural facility

> Like today…we have been taught about folic acid, that **we are supposed to take it to make the bones of the baby strong**. So we are supposed to be taking them, we shouldn't be throwing them away when they give us. That's why if we are not taking them the bones of the child will not be strong, no wonder you will find that some children will take long to start walking up to two years, reason being the mother was not taking folic acid.
>
> Pregnant Woman, Lusaka Province, urban facility

Community-level support.

Informal support networks, such as neighbors and local leaders, reinforce health education and supplement-adherence within their respective communities. While these community networks can be sources of both support and misinformation, they can play a key role in normalizing and encouraging positive health behaviors, including supplement adherence, at the household level.

> Even in the community, by surprise someone might just ask you if at all you have taken the drugs or if you have continued taking the drugs. So, if you had forgotten you are reminded to go and take the drugs. But my family supports [me] a lot in taking these drugs.
>
> Pregnant Woman, Northern Province, urban facility

Household-level support.

Family members, especially husbands and mothers/mothers-in-law, are mentioned as influential figures who might encourage or discourage supplement adherence based on their own beliefs or past experiences. Health education that involves all family members, including extended family, has been successful in reducing these beliefs and encouraging recommended health behaviors, like supplement adherence, within the household.

> The advice I used to give my wife is, when taking ferrous and folic acid she usually feels nausea… others will say it makes them feel weak… so **I advised her take the medicine when going to bed, the best time is to take them when going to bed**, so that she avoids feeling all those things.
>
> Husband/partner, Lusaka Province, urban facility

> When we visit our client who is the pregnant women, the husband who is the head of that household is also present and we educate them together. **This is because sometimes the pregnant woman might forget to take the supplements and the husband may help her remember on the time she was told to take the supplements.** We also educate them together because there are certain topics that requires a partner to be around as the education is being given for example teaching them that a pregnant woman needs enough time to rest, she doesn't need to over work. So during that time the husband should help with the chores and also remind her to attend antenatal as to take the supplements hence, the partner needs to be around so that this education is given to the both of them.
>
> Community-based volunteer (SMAG), Northern Province, urban facility

At least one mother/mother-in-law described discouraging supplement adherence and promoting traditional or religious beliefs; however, overwhelmingly, most mothers/mothers-in-law described supporting their daughters and daughters-in-law to take supplements as prescribed.

For me I have a daughter and an in-law, the advice I give them is that they shouldn't be deceived or lied by their friends to take any traditional roots, someone can take those quite alright, but you will suffer, according to how we were being taught while we were still producing children was that, once you take those medicine, they will cause a lot of pain because it's like by doing so you could have just provoked the situation. **I teach my children so that they understand that labor is a natural process designed by God and we should allow the normal process to slowly prevail until the right time. I once found my daughters with medicine but I discouraged to take them.** It's like her friends advised her to take since she had some challenges with her first pregnancy.

Mother/Mother-in-law, Lusaka Province, rural facility catchment area

The other thing is that when a child informs me that they are pregnant, I advise them to not to take any medicine without prescription. Because sometimes our daughters don't know anything, even when they feel headache, they will quietly go and buy painkillers like diclofenac. **So, I encourage them to go to the clinic whenever they are not feeling alright or they ask their spouses to escort them. I even tell them not to listen to unverified information from their friends, because sometimes they are told to use traditional roots or medicines which I believe are not good for them.** So I discourage them not to take such advice, because they end up being misled. I advise them to go to the facility because that's where they can get the necessary help.

Mother/Mother-in-law, Lusaka Province, rural facility catchment area

Barriers

Like facilitators, many barriers to supplement adherence parallel barriers to uptake. Please refer to the proceeding section on Demand-side Factors of Supplement Uptake for these.

After stockouts, which limit access to supplements, the most salient barriers to adherence were forgetting to take supplements, negative past-experiences taking IFA, and insufficient counseling.

Negative past-experiences taking IFA.

Negative experiences taking IFA in the past were a commonly cited barrier to adherence. These may be experienced by pregnant women themselves or of family members and friends, and include associating supplements with nausea and vomiting, bad smell of supplements, bad taste of supplements, hard and dark stools (side effect of iron supplementation), and discomfort or difficulty swallowing supplements.

Suggestions for managing side effects and difficulty swallowing are core subjects of adherence counseling at facility-, community-, and household-level. Family members are key supporting actors for reinforcing counseling messages and reminding women to take supplements daily.

Us as husbands we encourage them in case they are having nausea and vomiting we tell them to put the supplements in the middle of the food so that it will be easier for them to swallow not only that but me as the husband to get involved and help her keep the supplements so that I will be able to remind her to take every day without fail.

Husband/partner, Northern Province, rural facility catchment area

Insufficient counseling.

Some women do not understand the role of supplements in improving their health and that of their fetus. While these data cannot conclusively associate this lack of understanding with insufficient counseling, delayed ANC attendance is a known challenge in Zambia. Delayed attendance reduced the number of contacts with counselors and health messages. Repeated exposure to counseling messages and support from trusted messengers and individual influencers, such as SMAGs and members of their communities (e.g., friends, elders) and households, are likely to improve message recall and efficacy overtime.

Additionally, husbands described mood swings during pregnancy and not knowing their husband's duties as barriers to supporting their wives with supplement adherence. These challenges may be useful for contextualizing household-level counseling and other SBC content.

Recommendations

Supporting ANC Attendance

Opportunities to build on the positive perceptions of ANC and its benefits for the pregnant woman and unborn baby may increase ANC attendance and widen the base of women reached by MMS. Participants proposed training CHVs in basic health education and supplement administration specifically. Comments from community members about negative interactions with providers suggest that facility-based providers and CBVs may benefit from strengthening interpersonal communication (IPC) skills.

For additional recommendations see "social and behavior change communication" under Supporting MMS Rollout

Supplement Uptake

To increase supplements uptake, participants proposed maximizing the existing community and facility mechanisms, including facility and community education to enhance acceptance and increase uptake of IFA and building on relationships between facilities and communities. Key recommendations included family engagement in client counseling, IEC materials and training for providers, and IEC materials for clients.

For additional recommendations, including those specific to MMS, see subsection on Supporting MMS Rollout.

Supplement Adherence

To promote supplement adherence, participants similarly proposed maximizing existing mechanisms to facilitate social support within households and between partners (e.g., husband-wife), reach and monitor distant or otherwise hard-to-reach communities, and provide counseling. Counseling on how to manage potential side-effects and strategies to remember to take supplements daily were described as key to adherence.

For additional recommendations, including those specific to MMS, see subsection on Supporting MMS Rollout.

Supporting MMS Rollout

Social and behavior change communication.

Participants were unanimously in favor of MMS, particularly because of the reduced pill burden and understood benefit of supplementation.

The information that we need, is to **tell pregnant women about this supplement that has been introduced for pregnant women and it has all the nutrients that are needed in one tablet.** It helps in blood boosting, maybe you do not eat and only rely on eating clay soil every day. Now that this supplement has come they should accept it. It will not destroy their body that is what we can educate pregnant women

Community-based volunteer, Northern Province, rural facility catchment area

The women would welcome it with two hands, more especially for those who are ill-health and every other pregnant woman in general. It's not a lot of people who like taking medications **so just a tablet containing all that would really do especially for those also fail due to nausea this one is easier to take because it's just a tablet.**

Mother/,mother-in-law, Northern Province, urban facility catchment area

Sensitization or social and behavior change communication (SBCC)—at individual- and community-levels—was the most commonly provided recommendation to support uptake of MMS. Family inclusion in counseling delivered through ANC services (e.g., by health facility-based providers and CBVs) and within the household (e.g., CBV counseling delivered in households) is important to continue. Participants suggested sensitization should include explanations of side effects, strategies for side effect management, and clarification on how MMS is better than IFA as key messages.

I think the best strategy [to promote MMS acceptance] is maybe even to consider public places, public gatherings places like churches, you sensitize them then the usual way we do it doing under-five then also during ANC booking, even the OPD. Though at the OPD, we tend not to overload people with information because people there are sick, they need help so the information maybe just be disturbing to them so the under-five as well as ANC booking then uh... also to run adverts, on the radio, television on the importance and about the same MMS.

Facility-based staff, Northern Province, rural facility

At the community-level, participants suggested sensitization should occur before national roll out of MMS, that it could be co-facilitated by community leaders and facility-based providers, and that it would be supported by SMAGs.

Yes, I wanted to talk about these same MMS, when the village headman gives an announcement for the people to gather, sometimes even the doctor come and we work as a team, because the village headman only explains to the people about the drug that has been changed, hence with the help from the doctor can helps us to explain about the drug not only leaving it to the SMAGs, they will start asking that were has is this come from because the doctors are not mentioning about it.

Community-based volunteer (SMAG), Northern Province, rural facility catchment area

I believe that the SMAG will also be instrumental to go round the community and at ANC clinic to sensitize about mms, I strongly believe they Will manage because they are very effective in terms of communication here at the clinic we do have a duty rota, so every member of SMAG knows about their respective responsibilities we promise you that we shall do our level best when the time comes. We have seen this drug so thing will be okay as people get information about it.

Community-based volunteer (SMAG), Lusaka Province, rural facility catchment area

Participants recommended developing counseling and/or job aids to facilitate the transition.

Supplement packaging.

When discussing MMS packaging, participants suggested using a larger font and adding a picture of a pregnant woman to the bottle to support acceptance. Very few participants said MMS would be acceptable as it is currently packaged, particularly because the bottles resemble that of ARVs and may lead to stigmatization by community members.

You have to put more effort in explaining to them because a person who hasn't read the wordings [illiterate] on the bottle will say that it's ARVs. … You have to put a much bigger font than this, and also a picture of a person who will be taking these drugs, like that photo which is on a bottle of glycerine but it should show that this woman is pregnant. Because once they see this they will say, yes this is the one.

Community leader, Southern Province, rural facility catchment area

That bottle, my elderly man, to tell you the truth many women will not accept to carry it, they will say you are carrying PREP when they see how this bottle is. So these women will be happy to see a picture of a pregnant woman on there and that will show people that the content of that bottle is truly for pregnant women. It will be better to have it changed or maybe you bring one with 4 corners and green in color, that will help.

Community-based volunteer (SMAG) Southern Province, rural facility catchment area

Some participants recommended paper packaging or breaking up the bottles into smaller counts to encourage repeated ANC attendance (which is currently done for IFA) and reduce perceived pill burden. Bottle breaking is not feasible due to donor and safe storage requirements of MMS. Alternative suggestions for incentivizing repeated ANC attendance and reducing perceived pill burden of the 180 count bottles should be generated as part of the human-centered design process.

So yeah, so sometimes you have a discrepancy. You have the high attendance, the supplement is low. So at that particular time, you know that, okay. we had more women coming, less getting this. So this is a problem, because we need to have same figures. You have 20 women coming for antenatal attendance, either initial or revisit, you expect 20 women to be supplemented. If you have 20 coming, 15, that is an issue. So we, of course, we try to source for It helps us to plan in terms of the supplements that we order and also, of course, we need to rationalize, **[ration] in terms of the supplements so that if possible we give 20 tablets so that others also can benefit. So basically it helps us to monitor our stock, of course.**

Health facility-based staff, Lusaka Province, urban facility

Capacity strengthening.

Participants recommended training facility- and community-based providers as well as community leaders on essential information for the MMS rollout. In addition to this, discussion of existing capacity to collect and use data for decision making suggests that capacity strengthening efforts in these areas are necessary, and should be strengthened. Pharmaciststoo would benefit from training and mentoring on how to use stock control cards and the ELMIS.

Strengthened and sustainable supply chain.

Consistent availability of MMS was described by all participants as essential. Participants stressed that an irregular supply would lead to distrust among clients and disrupt the continuity of care.

While there are many challenges for the current supplement supply chain, participants suggested incorporating MMS directly into the healthcare system's existing kits rather than handling it separately. They noted that this approach would ensure access and availability of MMS alongside other commodities given to pregnant women during ANC (e.g., '*chitenge'*, baby clothes, etc.). Incorporation into the existing supply chain would also allow MMS implementation to benefit from recent supply chain improvements, such as the ELMIS, and to generate additional insights for supply chain strengthening.

As part of this strengthening, participants recommended expanding storage space for supplements, especially in MCH departments, improving transportation access, and increasing the availability of fuel.

Other.

Due to the common nature of IFA stockouts, participants raised concerns that pregnant women would not be able to afford MMS, if they are asked to purchase them from private pharmacies. Because of the described benefits of MMS over IFA, MMS was perceived to be more expensive than IFA supplements. While this concern is not likely to be an issue during the implementation period for Phase II, it may be useful to consider developing messages to pre-emptively allay concerns for the post-intervention period.

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Annex 1: Supplementary Tables of Sample Characteristics

Table 4: Stakeholders by Gender

Stakeholder Type	Male	Female	Null	TOTAL
Health Facility-based Staff	8	20	-	**28**
Community-based Volunteers	14	33	0	**47**
Community Leaders	25	5	1	**31**
Husbands and Partners	15	-	-	**15**
Mothers and Mothers-in-law	-	18	-	**18**
Pregnant Women	-	66	-	**66**
Postpartum Women	-	14	-	**14**
TOTAL	**62** (28%)	**156** (71%)	**1** (<1%)	

Table 5: Stakeholders by Marital Status

Stakeholder Type	Single	Married	Divorced	Widowed	Null	TOTAL
Health Facility-based Staff	6	9	-	-	13	**28**
Community-based Volunteers	-	16	-	-	31	**47**
Community Leaders	1	20	-	1	9	**31**
Husbands and Partners	-	15	-	-	-	**15**
Mothers and Mothers-in-law	1	5	1	2	9	**18**
Pregnant Women	7	58	1	-	-	**66**
Postpartum Women	1	13	-	-	-	**14**
TOTAL	**16** (7%)	**136** (62%)	**2** (1%)	**3** (1%)	**62** (28%)	

*Tertiary includes college- and university-delivered education.

Table 6: Stakeholder by Education Level

Stakeholder Type	None	Primary	Secondary	Tertiary*	Null	TOTAL
Health Facility-based Staff	-	-	-	28	-	**28**
Community-based Volunteers	1	16	17	1	12	**47**
Community Leaders	1	5	17	-	8	**31**
Husbands and Partners	-	-	8	7	-	**15**
Mothers and Mothers-in-law	1	13	4	-	-	**18**
Pregnant Women	1	31	28	4	2	**66**
Postpartum Women	1	5	8	-	-	**14**
TOTAL	**16** (7%)	**136** (62%)	**2** (1%)	**3** (1%)	**62** (28%)	

Table 7: Characterization of Stakeholder Age

Stakeholder Type	Lowest	Highest	Mean±SD	Median	Mode	Total (n)
Health Facility-based Staff	25	58	40±11.4	35.5	28	28
Community-based Volunteers	25	80	47±11.0	47	42	47
Community Leaders	24	71	51±11.5	51.5	52	30
Husbands and Partners	29	57	39±7.3	38	42	15
Mothers and Mothers-in-law	40	64	52±8.2	53	60	18
Pregnant Women	17	45	28±7.0	28	30	66
Postpartum Women	16	35	24±5.6	23.5	24	14

Annex 2: Quantitative Survey Results

Executive Summary

The Zambia Multiple Micronutrient Supplementation (MMS) Project conducted surveys to assess demographics, knowledge, behaviors, and attitudes about supplements for healthy pregnancies. The surveys involved three key groups in the antenatal care (ANC) system: health workers, health facilities, and pregnant or postpartum women.

Health Facilities

Health facilities (N=5) in Zambia's Northern Province were represented primarily by pharmacists, most of whom have been in their roles for over a year. All facilities offer free supplements, typically iron or folic acid, to pregnant women, though some also provide IFA. Supplements are distributed in small bottles, but facilities have faced significant shortages of iron and folic acid, lasting nearly six months. These shortages were caused by delays, inadequate supply, and expired products. Most facilities order IFA in monthly sachets of 30 tablets.

Health facilities are generally familiar with multiple micronutrient supplements (MMS) and recognize their benefits, including improved nutrient support and health outcomes. However, they also note potential side effects. While they anticipate a positive response to the switch from IFA to MMS, they express concerns about maintaining a consistent supply. Strengthening supply chain management is seen as a solution to these challenges.

Health Workers

Health workers (N=46) report frequent interactions with pregnant and postpartum women, seeing at least one patient per week. They emphasize that key components of ANC include physical exams, health education, and testing, often delivered through group or one-on-one sessions. Challenges in accessing ANC, such as distance to health facilities, were identified, with community outreach and collaboration with local volunteers and leaders suggested as potential solutions.

All health workers recommended nutritional supplements, particularly folic acid or iron, and recognized the benefits of iron-folic acid (IFA) in preventing neural tube defects. They provided counseling on IFA use, addressing barriers like gastrointestinal discomfort and forgetfulness. For patients experiencing side effects, alternative formulas or dosage adjustments were offered. While most health workers were unfamiliar with MMS, many believed it offered comprehensive nutritional support, with general optimism about the transition from IFA to MMS, although supply consistency and supply chain management remained concerns.

Women

Women (N=125) in the study were mainly from Zambia's Northern Province, with a third from Lusaka and Southern Provinces. On average, they were 25.6 years old, mostly married, and half had a secondary education. Most were unemployed and had multiple pregnancies. ANC typically began at 13 weeks, and nearly two-thirds faced transportation challenges, traveling more than 45 minutes to access care. Half had 3-4 ANC visits, with most not missing any appointments.

Women valued ANC for monitoring prenatal health, providing pregnancy education, and managing complications. They trusted healthcare providers for information, which was mainly about pregnancy and childbirth. All women received nutritional supplements, mostly iron or folic acid, with about a third experiencing side effects, mainly nausea. Almost all were advised to take IFA and took it daily, with most being very familiar with IFA and receiving counseling from healthcare providers.

Nearly all women expressed willingness to take multiple micronutrient supplements (MMS) instead of IFA, especially if benefits for the mother and child were clear. Most felt there was nothing that would discourage them from switching to MMS.

Conclusions

The Zambia MMS Project highlights a strong acceptance of MMS among health workers and women, with significant potential for improving maternal and child health outcomes. However, challenges with supplement availability and transportation remain. Addressing supply chain issues and strengthening community outreach could support the successful transition from IFA to MMS, benefiting both maternal and child health across Zambia.

Results

Health Facilities

Demographics

The demographic characteristics of health facilities (N=5) participating in the ZMMS Project Survey are described in **Table 8**. Most of the participating health facilities were in the Northern Province (60.00%). Most respondents participating on behalf of health facilities indicated that their role is pharmacist (60.00%). 40% of participants indicated that they have been working in maternal and child health services for 1-2 years or 3-5 years. The health facilities typically see 65.5±44.40SD women per month.

Table 8: Demographics: Health Facility (N=5)

Characteristic	n (%) or Mean±SD
Province	
Lusaka Province	1 (20.00%)
Northern Province	3 (60.00%)
Southern Province	1 (20.00%)
District	
Kasama District	1 (20.00%)
Lusaka District	1 (20.00%)
Luwingu District	1 (20.00%)
Mazabuka District	1 (20.00%)
Mbala District	1 (20.00%)
Health Facility	
Chisanga Urban Health Centre	1 (20.00%)
George Urban Health Centre	1 (20.00%)
Kakungu Health Post	1 (20.00%)
Mbayamusuma Health Facility	1 (20.00%)
Shimumbi Rural Health Centre	1 (20.00%)
What is your role/job title at the health facility?	
Pharmacist	3 (60.00%)
Medicine Stock Manager	2 (40.00%)
How many years of experience do you have working in maternal and child health services?	
Less than 1 year	1 (20.00%)
1-2 years	2 (40.00%)
3-5 years	2 (40.00%)
Average number of pregnant women seen per month in this health facility	**65.5±44.40SD**
Don't know	1 (20.00%)

Supplements provided in ANC services

Table 9 describes practices around supplements provided in ANC services at the health facilities.

All health facilities indicated that they provide either iron or folic acid to their pregnant patients; some health facilities (40.00%) indicated that they provide IFA. All health facilities indicated that supplements, including IFA, are provided free to pregnant women.

Most health facilities indicated that iron and folic acid are distributed in little bottles (60.00%); mixed responses were seen for IFA, with some indicating big bulks and others indicating little bottles.

All health facilities indicated that there was a shortage of iron over the last year, with the shortage lasting 5.60±4.51SD months. Most health facilities indicated a folic acid shortage (60.00%), with the shortage lasting 8.33±3.51SD months. Of the responding health

facilities, both indicated a shortage in IFA supply over the last year, with the shortage lasting 18.5±24.75SD months. Most health facilities indicated that the primary reason for IFA shortages were due to delays (80.00%); some (20.00%) indicated that the requested amount was inadequate or that the supply expired.

All responding health facilities indicated that they request IFA once a month. Most health facilities indicated that they request the IFA to be provided as a sachet of 30 tablets (40.00%).

Table 9: Supplements provided in ANC Services (N=5)

Characteristic	n (%) or Mean±SD
What kind of micronutrient supplements does your health facility provide to pregnant women?	
Iron	5 (100.00%)
Folic acid (Vitamin B9)	5 (100.00%)
Calcium	0 (0.00%)
Vitamin B12	0 (0.00%)
Iron and folic acid (together in 1 tablet)	2 (40.00%)
Other	0 (0.00%)
None	0 (0.00%)
Are these supplements provided for free to pregnant women?	
Yes	5 (100.00%)
No	0 (0.00%)
Is iron folic acid (IFA) provided for free to pregnant women?	
Yes	5 (100.00%)
No	0 (0.00%)
In the last year, in what format does the health facility receive iron tablets?	
Big bulks	2 (40.00%)
Little bottles	3 (60.00%)
Blister packs	0 (0.00%)
How many tablets come in that packaging?	**511.5±488.5**
In the last year, in what format does the health facility receive folic acid?	
Big bulks	2 (40.00%)
Little bottles	3 (60.00%)
Blister packs	0 (0.00%)
How many tablets come in that packaging?	**512.5±487.5**
In the last year, in what format does the health facility receive iron and folic acid (together in 1 tablet) tablets?[1]	
Big bulks	1 (50.00%)
Little bottles	1 (50.00%)
Blister packs	0 (0.00%)
How many tablets come in that packaging? [1]	**512.5±487.5**
In the last year, has your facility encountered any shortage of iron supply?	
Yes	5 (100.00%)
No	0 (0.00%)

Characteristic	n (%) or Mean±SD
In the last year, how many months had your facility had a shortage of iron supplements?	**5.60±4.51**
In the last year, has your facility encountered any shortage of folic acid supply?	
Yes	3 (60.00%)
No	2 (40.00%)
In the last year, how many months had your facility had a shortage of folic acid supplements?[2]	**8.33±3.51**
In the last year, has your facility encountered any shortage of iron and folic acid (together in 1 tablet) supply?[3]	
Yes	2 (100.00%)
No	0 (0.00%)
In the last year, how many months had your facility had a shortage of iron and folic acid supplements?[3]	**18.5±24.75**
What was the reason for the shortage of iron and folic acid supplements?	
Amount requested was inadequate	1 (20.00%)
Amount received was less than requested	0 (0.00%)
Distribution to facility was delayed	4 (80.00%)
Supply was expired	1 (20.00%)
Supply was damaged	0 (0.00%)
Other	2 (40.00%)
How often do you request or order IFA?[4]	
More often than once a month	0 (0.00%)
Once a month	2 (100.00%)
Once in 3 months	0 (0.00%)
Once in 6 months	0 (0.00%)
Irregularly	0 (0.00%)
In what format is IFA provided to pregnant women?	
Sachet of 30 tablets	2 (40.00%)
Sachet of 90 tablets	1 (20.00%)
Bottles of 30 tablets	1 (20.00%)
Bottles of 90 tablets	0 (0.00%)
Other[5]	1 (20.00%)

[1]Missing data, n=2.; [2]Missing data, n=3.; [3]Missing data, n=2.; [4]Missing data, n=2.; [5]Other responses included: 30 tablets are given if 1 per day is prescribed and 90 tablets are given if 3 tablets per day are prescribed.

Perceptions and acceptability of MMS

Table 10 describes the perceptions and acceptability of MMS by the health facilities.

Most health facilities indicated that they were very familiar with MMS for pregnant and postpartum women (60.00%). Health facilities indicated the main advantages of MMS include comprehensive nutrient support and improved health outcomes (80.00% and 60.00%, respectively). When asked about the main disadvantages, some health facilities

indicated potential for adverse effects (40.00%). Overall, health facilities perceive that women will respond positively to the switch from IFA to MMS (60.00%).

When asked about potential challenges of introducing MMS, all health facilities indicated concern over ensuring there is a consistent supply and availability of MMS; some indicated challenges around addressing concerns about potential side effects (40.00%). Health facilities indicated that strengthening supply chain management could help to address the challenges of introducing MMS.

Table 10: Perceptions and acceptability of MMS

Characteristic	n (%)
How familiar are you with multiple micronutrient supplementation (MMS) for pregnant and postpartum women?	
Very familiar	3 (60.00%)
Somewhat familiar	1 (20.00%)
Not familiar	1 (20.00%)
What do you see as the main advantages of implementing MMS among pregnant mothers in your community?	
Comprehensive nutrient support	4 (80.00%)
Potential cost savings	2 (40.00%)
Improved health outcomes	3 (60.00%)
Other[1]	3 (60.00%)
What do you see as the main disadvantages of implementing MMS among pregnant mothers in your community?	
Increased complexity of supplementation regimen	1 (20.00%)
Potential for adverse effects	2 (40.00%)
Logistical challenges	1 (20.00%)
Other[2]	3 (60.00%)
How do you anticipate pregnant women would respond to the switch from iron and folic acid supplementation to MMS compared?	
Positively	3 (60.00%)
Negatively	1 (20.00%)
Neutral	1 (20.00%)
Thinking about the challenges we spoke about for iron and folic acid; what challenges do you think we may have with introducing MMS?	
Ensuring consistent supply and availability of MMS	5 (100.00%)
Training staff on MMS administration and monitoring	1 (20.00%)
Addressing concerns about potential side effects or interactions	2 (40.00%)
No challenges	1 (20.00%)
Other[3]	1 (20.00%)
How can these challenges be addressed to ensure successful implementation of MMS?[4]	
Strengthening supply chain management	1 (100.00%)
Providing comprehensive training and support to health providers	0 (0.00%)

Conducting community education and engagement campaigns	0 (0.00%)
Other	0 (0.00%)

[1]Other responses included: convenience of 1 tablet per day; reduced cases of low birth weight; reduced fetal and maternal morbidity; prevention of anemia during pregnancy; healthy fetal development; reduction in number of tablets needed to be taken as MMS is a combined tablet.

[2]Other responses included: costly; potential drug interaction with anti-malarial drugs (e.g., fansindar is an anti folate metabolite and anti acids [i.e., magnesium triscilicate]); no disadvantages as it will enhance the health outcome of mother and baby.

[3]Other response included: Accessibility of the supplements by the pregnant women and the cost.

[4]Missing data, n=1.

Health Workers

Demographics

The demographic characteristics of health workers (N=46) participating in the ZMMS Project Survey are described in **Table 11**. Health workers were primarily from the Northern Province (41.30%); about a third of participants were from the Southern and Lusaka Provinces (30.43% and 28.26%, respectively).

The health workers were 31.76±8.15SD years. About a third of the health workers indicated that they were nurses (36.96%) and had 1-2 years of experience in maternal and child health (28.89%). All health workers indicated that they typically see at least 1 pregnant and postpartum woman within a week. About a third of health workers indicated that they see 11-20 (34.09%) or more than 30 (36.36%) pregnant women per week. About a third of health workers indicated that they see between 1-5 or 6-10 postpartum women weekly (28.57% and 33.33%, respectively).

Table 11: Demographics of Health Workers (N=46)

Characteristic	n (%) or Mean±SD
Provinces	
Lusaka Province	13 (28.26%)
Northern Province	19 (41.30%)
Southern Province	14 (30.43%)
District	
Chongwe	4 (8.70%)
Kasama	7 (15.22%)
Lusaka	9 (19.57%)
Luwingu	7 (15.22%)
Mazabuka	7 (15.22%)
Mbala	5 (10.87%)
Sinazongwe	7 (15.22%)
Health Facility	
Chisanga Urban Health Centre	7 (15.22%)

Characteristic	n (%) or Mean±SD
George Urban Health Centre	5 (10.87%)
Kabwata Urban Health Centre	4 (8.70%)
Kakungu Health Post	5 (10.87%)
Katoba Rural Health Centre	4 (8.70%)
Mbayamusuma Health Facility	7 (15.22%)
Shimumbi Rural Health Centre	7 (15.22%)
Siatwinda Rural Health Centre	7 (15.22%)
Age in years	**31.76±8.15SD**
What is your role/job title at the health facility?	
Nurse	17 (36.96%)
Midwife	5 (10.87%)
Doctor	1 (2.17%)
Community Health Worker	5 (10.87%)
Other[1]	18 (39.13%)
How many years of experience do you have working in maternal and child health services?[2]	
< 1 year	6 (13.33%)
1-2 years	13 (28.89%)
3-5 years	10 (22.22%)
6-10 years	10 (22.22%)
More than 10 years	6 (13.33%)
How many pregnant women do you typically interact with in a week?[3]	
0	0 (0.0%)
1-5	4 (9.09%)
6-10	4 (9.09%)
11-20	15 (34.09%)
21-30	5 (11.36%)
More than 30	16 (36.36%)
How many postpartum women do you typically interact with in a week?[4]	
0	0 (0.0%)
1-5	12 (28.57%)
6-10	14 (33.33%)
11-20	8 (19.05%)
21-30	2 (4.76%)
More than 30	4 (9.52%)
Don’t know	2 (4.76%)

[1]Other responses included: classified daily employee, clinical officer general (n=2), community health assistance, environmental health technician (n=7), medical laboratory technologist, nutritionist, psychosocial counselor, social worker. Of the other responses 5 were re-coded in analysis (1 as midwife, 4 as nurses).

[2]Missing data, n=45.; [3]Missing data, n=44; [4]Missing data, n=42

Knowledge and Practices Regarding ANC Services

Table 12 describes the knowledge and practices regarding ANC services of health worker participants.

Most health workers indicated that key components of ANC services provided at their facility included physical exams, health education and counseling, laboratory tests, and immunizations (95.56%, 93.48%, 91.30%, and 76.09%, respectively). About two thirds of health workers indicated that they recommend that pregnant women attend eight visits during their pregnancy (66.67%). Most health workers indicated that they provide information about ANC services via group education sessions, one-on-one counseling, or through educational materials (91.11%, 73.33%, and 62.22%, respectively).

When asked why women may not attend ANC care, many health workers indicated there are challenges related to distance to health facilities, cultural beliefs, and lack of awareness of the importance of ANC care (60.47%, 48.84%, and 39.53%, respectively). When asked how these challenges are addressed in their practice, most health workers indicated that they provide community outreach and education programs, collaborate with community-based volunteers, and collaborate with community leaders and traditional birth attendants (79.55%, 70.45%, 56.82%).

Table 12: Knowledge and practices regarding ANC services (N=46)

Characteristic	n (%)
What are the key components of ANC services provided at your health facility?	
Physical examinations (e.g., blood pressure, weight)	43 (95.56%)
Laboratory tests (e.g., blood tests, urine tests)	42 (91.30%)
Health education and counseling	43 (93.48%)
Immunizations	35 (76.09%)
Referrals for specialized care	25 (54.35%)
Other (please specify)[1]	6 (13.04%)
How many ANC visits do you recommend that pregnant women attend?[2]	
Minimum of 4 visits	5 (11.11%)
8 visits	30 (66.67%)
Other[3]	8 (17.78%)
Don't know	2 (4.44%)
How do you ensure pregnant women receive adequate information about ANC services during their visits?[4]	
Through one-on-one counseling session	33 (73.33%)
Using educational materials (e.g., brochures, posters)	28 (62.22%)
Group education sessions	41 (91.11%)
Other[5]	10 (22.22%)
Don't know	1 (2.22%)
Why don't women attend ANC?[5]	
Lack of awareness about the importance of ANC	17 (39.53%)
Distance to health facilities	26 (60.47%)
Cultural beliefs and practices	21 (48.84%)
Financial constraints	6 (13.95%)
Other[6]	19 (44.19%)
How do you address these challenges in your daily practice?[7]	
Providing community outreach and education programs	35 (79.55%)

Characteristic	n (%)
Offering transportation assistance	2 (4.55%)
Collaborating with community leaders and traditional birth attendants	25 (56.82%)
Collaborating with community-based volunteers	31 (70.45%)
Providing financial incentives or subsidies	3 (6.82%)
Other[8]	13 (29.55%)

[1]Other responses included: administer iron and folic acid supplements; incentives (e.g., mosquito nets) (n=2); provision of supplements, treatment and prevention)

[2]Missing data, n=45; [3]Other responses included: 5 to 6 visits; 6 to 7 visits (n=2); a minimum of 6 visits (n=2); 6 visits; every month once registered for ANC; [4]Missing data, n=45; [5]Other responses included: outreach programs (n=2); sending volunteers in the field and contacting via mobile; coming through their partners and include the CBV safe motherhood action SMAG; community sensitization in churches, markets and communities; probe their knowledge; indicate appointments in their ANC cards to remind them of next visit; call SMA group to teach them and other groups; get feedback through questions and answers; Neighborhood Health committee NHCs members and SMAG and CBVS are sent to conduct sensitization concerning early ANC; [5]Missing data, n=43; [6]Other responses included: Busy with work; male partner influence (n=2); late booking for ANC; fear of being referred to the hospital; laziness; farm workers (n=6); Myth that when pregnancy is still small no one should know (n=3); lack of male involvement or engagement (n=3); loss of employment; fear of HIV diagnosis and related stigmatization; pregnant teens trying to hide pregnancy from parents (n=2); conflicting family priorities (e.g., funerals); ignorance; transportation during rainy seasons; [7]Missing data, n=44; [8]Other responses included: encourage them to attend ANC visits; emphasize the importance of ANC care; SMAG (Safe motherhood Action Group); community education on safe child birth; The Red Cross and DHMT; talks in school health services; dream program; clergy involvement (n=2); request a letter from head letter to state that the partner is not available; staff contribute money for transport for those having challenges; involve partners; checkups done at home during outreach.

Knowledge and Practices Regarding IFA Supplementation

Table 14 describes the knowledge and practices regarding IFA supplementation of health worker participants.

All health workers indicated that they recommend their pregnant patients take nutritional supplements—the majority indicated that they specifically recommend folic acid or iron alone (97.83% and 94.48%, respectively) and a little more than a third recommend iron and folic acid (IFA) (39.13%). When asked to describe the benefits of IFA, all health workers indicated that it helps to prevent anemia and most indicated that it helps to prevent neural tube defects (95.56%). Most health workers indicate that when counseling women on IFA they speak to the benefits for fetal and maternal health, the risks of iron deficiency anemia and neural tube defects, and provide instructions on when and how to take IFA (95.65%, 86.96%, 73.91%).

Many health workers indicated that primary barriers to IFA uptake include nausea and gastrointestinal discomfort and forgetfulness (65.22% and 50.00%, respectively); about a third of health workers indicated that stock outs served as a barrier (30.43%). To support pregnant women to overcome these obstacles, more than half of health workers indicated that they provide counseling on managing side effects (65.22%) and about a third indicated that they offer reminder systems (36.96%).

More than half of health workers indicated that pregnant women have come to them with complaints of side effects from IFA or concerns about IFA (55.56%). When asked how they manage these concerns some health workers indicated that they manage these concerns by providing alternative formulations or adjusting the dosage or timing of supplements (20.45% and 20.45%, respectively).

Table 6. Knowledge and practices regarding IFA supplementation (N=46)

Characteristic	n (%) or Mean±SD
Do you recommend uptake of nutritional supplements to pregnant women?	
Yes	46 (100%)
If yes, please specify which supplements you recommend:	
Iron	43 (94.48%)
Folic Acid (Vitamin B9)	45 (97.83%)
Calcium	7 (15.22%)
Vitamin B12	6 (13.04%)
Other[1]	9 (19.57%)
Iron and folic acid	18 (39.13%)
No	0 (0%)
What are the benefits of iron and folic acid (IFA) supplementation for pregnant women?	
IFA supplementation helps prevent anemia	45 (100.00%)
IFA supplementation helps neural tube defects in pregnant women and their babies	43 (95.56%)
Other[2]	3 (6.67%)
What do you tell pregnant women about IFA supplementation?	
The benefits of IFA supplementation for maternal and fetal health	44 (95.65%)
Explaining the risks of iron deficiency anemia and neural tube defects	40 (86.96%)
Providing instructions on when and how to take IFA supplements	34 (73.91%)
Potential side effects	2 (4.44%)
Other[3]	2 (4.44%)
What obstacles do pregnant women face in adhering to IFA supplementation?	
Nausea and gastrointestinal discomfort	30 (65.22%)
Forgetting to take the supplements	23 (50.00%)
Financial constraints	5 (10.87%)
Cultural beliefs about medication	8 (17.39%)
Stock outs	14 (30.43%)
Other[4]	14 (30.43%)
No obstacles	2 (4.44%)
Don’t know	2 (4.35%)
How do you support pregnant women to overcome these obstacles?	
Providing counseling on managing side effects	30 (65.22%)
Offering reminder systems (e.g., text messages, pill organizers)	17 (36.96%)

Characteristic	n (%) or Mean±SD
Providing free or subsidized supplements	3 (6.52%)
Addressing cultural beliefs through education and engagement	10 (21.74%)
Purchase from private pharmacy	8 (17.39%)
Other[5]	18 (39.13%)
Don't know	2 (4.35%)
Prefer not to answer	1 (2.22%)
Have you encountered any side effects or concerns related to iron and folic acid supplementation among pregnant women?	
Yes	25 (55.56%)
No	20 (44.44%)
How do you manage these side effects or concerns in your practice?[6]	
Providing alternative formulations (e.g., slow-release tablets)	9 (20.45%)
Adjusting the dosage or timing of supplements	9 (20.45%)
Offering supportive care (e.g., anti-nausea medication)	7 (15.91%)
Other[6]	20 (45.45%)
Don't know	5 (11.36%)
Prefer not to answer	3 (6.82%)

[1]Other responses included: Magnesium (n=2); potassium; ferrous sulphate (n=4); Fansidar (n=4); vitamin A; Vitamin B6; multivitamins (n=5); mebendazole (n=2); [2]Other responses included: reduce low birth weight; prevent diseases in newborns and stillbirths; supplementation of vitamin B; [3]Other responses included: malaria infections; sanitation and water treatment; seek medical assistance if needed;[4]Other responses included: lack of knowledge on IFA; financial constraints if IFA is unavailable at the health facility (n=3); taste or smell of IFA (n=2); language barriers from the health workers to the pregnant women; burden of taking more than 1 tablet (n=3); lack of spousal knowledge/support; splitting tablets (n=2); attitude due to lack of knowledge; dark stool; vomiting; weakness; [5]Other responses included: advise to take at bedtime; pair pregnant women with a peer mother to support one another; coat the IFA with food to reduce nausea; encourage consumption of leafy vegetables (n=3); Safe Motherhood Action Group checks in on pregnant women; engagement of husbands/partners (n=4); advise to take all tablets and skip for 3 days; link to SMG; ask to buy supplements during stock out; set alarms/reminders; counsel on importance and side effects of skipping supplements (n=2); encourage to eat a balanced diet; access supplements from neighboring facilities; no obstacles observed; [6] Missing data, n=44; [7]Other responses included: encourage IFA to be taken after a meal; encourage IFA to be taken at bedtime; coat tablet with nshima for those with nausea and vomiting; not encountered (n=12); advise to take anti-nausea medication; remind them of the benefits; discuss the side effects of not taking; encourage a balanced diet.

Perceptions and acceptability of MMS

Table 15 describes the perceptions and acceptability of MMS of health worker participants.

Most health workers indicated that they were not familiar with MMS (71.74%), but about one in five indicated that they were somewhat familiar with MMS. When asked to speak to the advantages of MMS, most health workers indicated that it provides comprehensive nutrient support and improved health outcomes (95.65% and 76.09%, respectively); about a third indicated potential cost savings (36.96%). When asked to speak about the disadvantages of MMS, most health workers indicated no disadvantage (41.30%). Some

health workers indicated that the potential for adverse effects may be a potential disadvantage (26.09%).

Overall, health workers indicated that women likely would respond favorably to the switch from IFA to MMS (89.13%). Most health workers indicated that challenges with introducing MMS may include ensuring a consistent supply and availability of MMS (60.00%). A third of health workers indicated no anticipated challenges with the transition from IFA to MMS.

When asked about the challenges of integrating MMS into ANC services, a majority of health workers indicated concerns around strengthening the supply chain (55.56%). About a quarter of health workers indicated perceived challenges around conducting community education and engagement campaigns (24.44%) or that there were no perceived challenges (22.22%). When asked how these challenges can be addressed, about a third of health workers indicated the importance of strengthening supply chain management (27.27%); however, about half of health workers indicated no anticipated challenges (45.45%).

Table 7. Perceptions and acceptability of MMS (N=46)

Characteristic	n (%) or Mean±SD
How familiar are you with multiple micronutrient supplementation (MMS) for pregnant and postpartum women?	
Very familiar	4 (8.70%)
Somewhat familiar	9 (19.57%)
Not familiar	33 (71.74%)
What do you see as the main advantages of implementing MMS among pregnant mothers in your community?	
Comprehensive nutrient support	44 (95.65%)
Potential cost saving	17 (36.96%)
Improved health outcomes	35 (76.09%)
Other	16 (34.78%)
No advantage	1 (2.17%)
What do you see as the main disadvantages of implementing MMS among pregnant mothers in your community?	
Increased complexity of supplementation regimen	4 (8.70%)
Potential for adverse effects	12 (26.09%)
Logistical challenges	4 (8.70%)
Other[1]	15 (32.61%)
No disadvantage	19 (41.30%)
Don’t know	1 (2.17%)
How do you anticipate pregnant women would respond to the switch from iron and folic acid supplementation to MMS compared?	
Positively	41 (89.13%)
Neutral	5 (10.87%)
Negatively	0 (0.00%)

Characteristic	n (%) or Mean±SD
Thinking about the challenge we spoke about for iron and folic acid, what challenges do you think we may have with introducing MMS?	
Ensuring consistent supply and availability of MMS	27 (60.00%)
Training staff on MMS administration and monitoring	5 (11.11%)
Addressing concerns about potential side effects or interactions	11 (24.44%)
No challenges	13 (28.89%)
Other[2]	5 (11.11%)
What challenges do you foresee in integrating MMS into existing ANC services?	
Strengthening supply chain management	25 (55.56%)
Providing comprehensive training and support to health providers	8 (17.78%)
Conducting community education and engagement campaigns	11 (24.44%)
Other[3]	9 (20.00%)
No challenges	10 (22.22%)
How can these challenges be addressed to ensure successful implementation of MMS?	
Strengthening supply chain management	3 (27.27%)
Providing comprehensive training and support to health providers	2 (18.18%)
Conducting community education and engagement campaigns	2 (18.18%)
Other[3]	6 (54.55%)
Prefer not to answer	1 (9.09%)

[1]Other responses included: easy access; no challenges of taste/smell; no complaints of side effects; 1 tablet (n=6); convenience; immune system benefits; easy to take; appearance is good; protects baby from deformities; easy to take.

[2]Other responses included: cost (n=3); adherence is still a concern; resistance to change (n=2); need to involve community and church leaders; myth that supplements may cause miscarriages.

[3]Other responses included: no anticipated challenges (n=5); continuous engagement through the health promotion team.

Women

Demographics

The demographic characteristics of women (N=125) participating in the ZMMS Project Survey are described in **Table 16**. Most women were from the Northern Province of Zambia (42.40%), with about a third being from the Lusaka and Southern Provinces (28.80% and 28.80%, respectively).

Women were 25.63±6.41SD years. Most women indicated that they were currently pregnant (73.50%). Most women indicated that they were currently married (86.55%). More than a third of women indicated they had a primary education (39.50%) and about half indicated that they had a secondary education (47.06%). Most women indicated that

they currently are unemployed (63.03%), but about a third indicated that they had informal employment (31.93%).

Table 16: Demographic Characteristics of Women (N=125)

Characteristic	n (%) or Mean±SD		
Province	Total (N=125)	Pregnant (N=86)	Postpartum (N=31)
Lusaka Province	36 (28.80%)	25 (29.07%)	5 (16.15%)
Northern Province	52 (42.40%)	37 (43.02%)	16 (51.61%)
Southern Province	36 (28.80%)	24 (27.91%)	10 (32.36%)
District			
Chongwe	18 (14.40%)	12 (13.95%)	0 (0.00%)
Kasama	17 (13.60%)	11 (12.79%)	6 (19.35%)
Lusaka	18 (14.40%)	13 (15.12%)	5 (16.13%)
Luwingu	19 (15.20%)	14 (16.28%)	5 (16.13%)
Mazabuka	17 (13.60%)	12 (13.95%)	5 (16.13%)
Mbala	17 (13.60%)	12 (13.95%)	5 (16 .13%)
Sinazongwe	19 (15.20%)	12 (13.95%)	5 (16.13%)
Health Facility[1]			
Chisanga Urban Health Centre	17 (14.17%)	11 (12.79%)	6 (19.35%)
George Urban Health Centre	9 (7.50%)	6 (6.98%)	3 (9.68%)
Kabwata Urban Health Centre	9 (7.50%)	7 (8.14%)	2 (6.45%)
Kakungu Health Post	17 (14.17%)	12 (13.95%)	5 (16.13%)
Katoba Rural Health Centre	13 (10.83%)	12 (13.95%)	0 (0.00%)
Mbayamusuma Health Facility	17 (14.17%)	12 (13.95%)	5 (16.13%)
Shimumbi Rural Health Centre	19 (15.83%)	14 (16.28%)	5 (16.13%)
Siatwinda Rural Health Centre	19 (15.83%)	12 (13.95%)	5 (16.13%)
Respondent group[2]			
Pregnant	86 (73.50%)	86 (100.00%)	
Postpartum	31 (26.50%)		31 (100.00%)
Age in years	25.63±6.41SD	25.55±6.06SD	25.97±1.36SD
Marital status[3]			
Married	103 (86.55%)	75 (87.21%)	26 (83.87%)
Single	15 (12.61%)	10 (11.63%)	5 (16.13%)
Divorced	1 (0.84%)	1 (1.16%)	0 (0.00%)
Widowed	0 (0.00%)	0 (0.00%)	0 (0.00%)
Education level[3]			
No formal education	8 (6.72%)	4 (4.65%)	3 (9.68%)
Primary education	47 (39.50%)	32 (37.21%)	14 (45.16%)
Secondary education	56 (47.06%)	44 (51.16%)	12 (38.71%)
Tertiary education	8 (6.72%)	6 (6.98%)	2 (6.24%)
Occupation[3]			
Employed full-time	1 (0.84%)	0 (0.00%)	0 (0.00%)
Employed part-time	1 (0.84%)	0 (0.00%)	0 (0.00%)
Formal	4 (3.36%)	3 (3.49%)	1 (3.23%)
Informal	38 (31.93%)	28 (32.56%)	10 (32.26%)

Characteristic	n (%) or Mean±SD		
Unemployed	75 (63.03%)	55 (62.95%)	20 (64.52%)
Student	0 (0.00%)	0 (0.00%)	0 (0.00%)

[1]Missing data, n=120; [2]Missing data, n=117; [3]Missing data, n=119.

Maternal characteristics

The maternal characteristics of women (N=125) participating in the ZMMS Project Survey are described in **Table 17**. About a third of women indicated that they had either one, or three or more previous pregnancies (27.73% and 27.73%, respectively). Women who were currently pregnant indicated that they currently were 27.85±7.97SD weeks in gestational age. Women who were currently postpartum indicated that it had been 4.10±2.16SD weeks since they delivered their babies.

Table 17: Maternal characteristics (N=125)

Characteristic	n (%) or Mean±SD		
	Total (N=125)	Pregnant (N=86)	Postpartum (N=31)
Number of previous pregnancies[1]			
0	23 (19.33%)	19 (22.09%)	3 (9.68%)
1	33 (27.73%)	25 (29.07%)	7 (22.58%)
2	29 (24.37%)	18 (20.93%)	11 (35.48%)
3 or more	33 (27.73%)	23 (26.74%)	10 (32.26%)
Prefer not to answer	1 (0.84%)	1 (1.16%)	0 (0.00%)
If *pregnant*, what is your gestational age?[2]	27.85±7.97SD	28.15±7.58SD	
If *postpartum*, weeks since delivery:[3]	4.10±2.16SD		4.04±2.15SD

[1]Missing data, n=119; [2]Missing data, n=66; [3]Missing data, n=32.

Antenatal clinic attendance during pregnancy

Table 18 describes antenatal clinic attendance during pregnancy.

More than a third of women indicated that it takes them more than 60 minutes to get to the health facility where they are receiving ANC (39.50%); about a quarter indicated that it takes them 46-60 minutes or less than 30 minutes to obtain ANC (23.53% and 21.01%, respectively).

About half of women who were currently pregnant indicated that they had 3-4 ANC visits during their pregnancy (51.14%). Most pregnant women indicated that they had not missed any ANC appointments (82.35%).

Women indicated that they were about 13.23±6.66SD weeks pregnant when they attended their first ANC appointment. When asked about factors that influenced their attendance to ANC care, about half of women indicated the availability of skilled healthcare providers (49.58%).

All women indicated that ANC care during pregnancy is very important. Most women indicated that ANC is beneficial as it monitors the health of the mother and baby, provides education about pregnancy and childbirth, and supports early detection and management of complications (96.64%, 78.99% and 74.79% respectively). About half of women indicated that ANC is beneficial as it provides necessary vaccinations to the mother (52.94%).

Most women indicated that they have obtained pregnancy-related information from healthcare providers (95.80%). About half of women indicated that they obtained pregnancy related information from family members and friends, and community health care volunteers (55.46% and 47.90%, respectively). Most women indicated the most trusted source of pregnancy-related information comes from healthcare providers (89.92%).

Table 18: ANC attendance during pregnancy (N=125)

Characteristic	n (%) or Mean±SD		
	Total (N=125)	Pregnant (N=86)	Postpartum (N=31)
Time taken to get to the facility[1]			
Less than 30 minutes	25 (21.01%)	21 (24.42%)	3 (9.68%)
31-45 minutes	19 (15.97%)	11 (12.79%)	8 (25.81%)
46-60 minutes	28 (23.53%)	15 (17.44%)	12 (38.71%)
More than 60 minutes	47 (39.50%)	39 (45.35%)	8 (25.81%)
If pregnant, how many antenatal care (ANC) visits have you attended during your current pregnancy period?[2]			
1-2 visits	20 (22.73%)	18 (20.93%)	
3-4 visits	45 (51.14%)	45 (52.33%)	
5 or more visits	23 (26.14%)	23 (26.74%)	
Have you or did you miss any ANC appointments?[1]			
Yes	21 (17.65%)	14 (16.28%)	6 (19.35%)
No	98 (82.35%)	72 (83.72%)	25 (80.65%)
How many weeks pregnant were you at your first ANC visit during pregnancy?[2]	13.23±6.66SD	13.15±6.54SD	
What factors influence or influenced your decision to attend ANC appointments?[1]			
Availability of transportation	5 (4.20%)	3 (3.49%)	0 (0.00%)
Distance to the health facility	6 (5.04%)	4 (4.65%)	2 (6.45%)
Availability of skilled healthcare providers	59 (49.58%)	45 (52.33%)	14 (45.16%)

Characteristic	n (%) or Mean±SD		
Family support	12 (10.08%)	10 (11.63%)	2 (6.45%)
Other[3]	36 (30.25%)	23 (26.74%)	13 (41.94%)
Don't know	1 (0.84%)	1 (1.16%)	0 (0.00%)
How important do you think it is to attend ANC visits during pregnancy?[1]			
Very important	119 (100.00%)	86 (100.00%)	31 (100.00%)
Somewhat important	0 (0.00%)	0 (0.00%)	0 (0.00%)
Somewhat unimportant	0 (0.00%)	0 (0.00%)	0 (0.00%)
Very unimportant	0 (0.00%)	0 (0.00%)	0 (0.00%)
What do you consider as the benefits of attending ANC visits?[1]			
Monitoring the health of the mother and baby	115 (96.64%)	83 (96.51%)	31 (100.00%)
Receiving necessary vaccinations	63 (52.94%)	48 (55.81%)	14 (45.16%)
Education about pregnancy and childbirth	94 (78.99%)	68 (79.07%)	25 (80.65%)
Early detection and management of complications	89 (74.79%)	70 (81.40%)	18 (58.06%)
Other[4]	4 (3.36%)	4 (4.65%)	0 (0.00%)
Where have you obtained pregnancy-related information?[1]			
Healthcare providers	114 (95.80%)	84 (97.67%)	30 (96.77%)
Community health care volunteers	57 (47.90%)	39 (45.35%)	17 (54.84%)
Family members/friends	66 (55.46%)	45 (52.33%)	19 (61.29%)
Internet/online resources	12 (10.08%)	10 (11.63%)	1 (3.23%)
Printed materials (e.g., brochures, posters)	10 (8.40%)	6 (6.98%)	4 (12.90%)
Don't know	1 (0.84%)	0 (0.00%)	0 (0.00%)
What is your most trusted source of pregnancy-related information?[1]			
Healthcare providers	107 (89.92%)	79 (91.86%)	27 (87.10%)
Community health care volunteers	6 (5.04%)	4 (4.65%)	1 (3.23%)
Family members/friends	4 (3.36%)	1 (1.16%)	3 (9.68%)
Internet/online resources	2 (1.68%)	2 (2.33%)	0 (0.00%)
Printed materials (e.g., brochures, posters)	0 (0.00%)	0 (0.00%)	0 (0.00%)

[1]Missing data, n=119; [2]Missing data, n=88; [3]Other response included: learned about early booking; learned about the importance of antenatal care; to check health of unborn baby (n=16); to check the health of the mother (n=6); to obtain Fansidar; fear of being arrested (n=2); to learn how to take care of self during pregnancy (n=2); because I'm pregnant; to monitor the health of the mother and unborn baby (e.g., check blood pressure, monitor health) (n=2); to receive health education and counseling; due to advise from a clinic; to receive nutritional supplements to prevent anemia; due to symptoms of pregnancy (e.g., nausea, dizziness); to check the growth of the baby (n=3); to confirm pregnancy; to prepare for delivery; encouraged by spouse; to deliver at the health facility; free ANC services; complications during pregnancy.
[4]Other response included: deliver preparation; to receive Fansidar; to check positioning of baby in the womb; to know HIV status; to receive supplements; to obtain treatment when unwell.

Nutritional supplements during pregnancy

Table 19 describes the experiences of the women with nutritional supplements during pregnancy.

All women indicated that they received nutritional supplements during their pregnancy. Nearly all women indicated that they received either folic acid or iron (97.48% and 93.28%, respectively).

About 1/3 of women indicated that they experienced side effects from taking supplements. The most common side effect indicated was nausea (44.1%); about a third of respondents indicated exhaustion as a side effect (30.23%); about a quarter indicated vomiting or dizziness (25.58% and 23.26%, respectively).

Nearly all women were advised by a health provider to take IFA during their pregnancy (98.21%). Similarly, nearly all women received IFA supplements from a health care provider during their pregnancy (97.32%). Of those currently and recently pregnant, most indicated that they take their IFA daily (88.10% and 84.82%, respectively). Of those responding (n=20), women were mixed in their rationale for not taking their IFA supplements daily.

When asked about their familiarity with IFA, most women indicated that they were very familiar, and a quarter indicated they were somewhat familiar (74.11% and 22.32%, respectively). Nearly all women indicated that they had received IFA counseling during pregnancy (96.43%). Nearly all women indicated that they received information on IFA from healthcare providers (95.54%). Similarly, most women indicated that healthcare providers are the most trusted source of information on IFA (94.64%).

Table 19: Nutritional supplements during pregnancy (N=125)

Characteristic	n (%)		
	Total (N=125)	Pregnant (N=86)	Postpartum (N=31)
Have you or did you receive any nutritional supplements during your current or most recent pregnancy?[1]			
Yes	119 (100.0%)	86 (100.00%)	31 (100.00%)
If yes, please specify which supplements you have received or been prescribed by the healthcare provider:			
Iron (red)	111 (93.28%)	80 (93.02%)	29 (93.55%)
Folic acid (yellow)	116 (97.48%)	85 (98.84%)	29 (93.55%)
Calcium (white)	4 (3.36%)	4 (4.65%)	0 (0.00%)
Vitamin B12 (white)	1 (0.84%)	1 (1.16%)	0 (0.00%)
Iron folic acid (red)	6 (5.04%)	3 (3.49%)	1 (3.23%)
Other[2]	32 (26.89%)	23 (26.74%)	9 (29.03%)
Don’t know	1 (0.84)	1 (3.23%)	0 (0.00%)
No	0 (0.00%)	0 (0.00%)	0 (0.00%)
Have you or did you experience any side effects from taking these supplements?			
Yes	43 (38.05%)	35 (42.17%)	6 (21.43%)
No	69 (61.06%)	47 (56.63%)	22 (78.57%)
Prefer not to answer	1 (0.88%)	1 (1.20%)	0 (0.00%)
What side effects did you experience?[1]			

Characteristic	n (%)		
Nausea	19 (44.19%)	16 (45.71%)	2 (33.33%)
Vomiting	11 (25.58%)	8 (22.86%)	2 (33.33%)
Dizziness	10 (23.26%)	8 (22.86%)	2 (33.33%)
Exhaustion/tired	13 (30.23%)	10 (28.57%)	2 (33.33%)
Diarrhea	1 (2.33%)	0 (0.00%)	0 (0.00%)
Constipation	0 (0.00%)	0 (0.00%)	0 (0.00%)
Black stool	0 (0.00%)	0 (0.00%)	0 (0.00%)
Headache	4 (9.30%)	4 (11.43%)	0 (0.00%)
Other[3]	12 (27.91%)	8 (22.86%)	4 (66.67%)
Were you advised by your health provider to take iron folic acid during your current or most recent pregnancy?[4]			
Yes	110 (98.21%)	80 (97.56%)	28 (100.00%)
No	1 (0.89%)	0 (0.00%)	0 (0.00%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	0 (0.00%)
Have you or were you given iron folic acid supplements by the health provider during your current or most recent pregnancy?[4]			
Yes	109 (97.32%)	79 (96.34%)	28 (100.00%)
No	1 (0.89%)	0 (0.00%)	0 (0.00%)
Not applicable	1 (0.89%)	1 (1.22%)	0 (0.00%)
Don't know	1 (0.89%)	1 (1.22%)	0 (0.00%)
***If currently pregnant*, How often did you take your iron folic acid supplements in the past month?[5]**			
Daily	74 (88.10%)	74 (90.24%)	
Often (4-6 times/week)	5 (5.95%)	5 (6.10%)	
Sometimes (2-3 times/week)	2 (2.38%)	1 (1.22%)	
Rarely (once a week)	1 (1.19%)	0 (0.00%)	
Never	0 (0.00%)	0 (0.00%)	
Prefer not to answer	1 (1.19%)	1 (1.22%)	
Other[6]	1 (1.19%)	1 (1.22%)	
***In your recent pregnancy*, How often did you take your iron folic acid supplements in a month?[4]**			
Daily	95 (84.82%)	70 (85.37%)	25 (89.29%)
Often (4-6 times/week)	7 (6.25%)	4 (4.88%)	2 (7.14%)
Sometimes (2-3 times/week)	1 (0.89%)	0 (0.00%)	1 (3.57%)
Rarely (once a week)	1 (0.89%)	(0.00%)	0 (0.00%)
Never	0 (0.00%)	0 (0.00%	(0.00%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	(0.00%)
Other[7]	7 (6.25%)	7 (8.54%)	(0.00%)
What are or were the main reasons for not taking iron folic acid supplements daily as advised?[8]			
Forgetfulness	3 (15.00%)	2 (13.33%)	1 (33.33%)
Side effects	3 (15.00%)	2 (13.33%)	0 (0.0%)
I don't like IFA	1 (5.00%)	0 (0.00%)	0 (0.00%)
I don't think IFA is necessary	2 (10.00%)	0 (0.00%)	0 (0.00%)
I have another supplement I take[9]	0 (0.00%)	0 (0.00%)	0 (0.00%)
Difficulty in obtaining supplements	0 (0.00%)	0 (0.00%)	0 (0.00%)

Characteristic	n (%)		
Other[10]	12 (60.00%)	10 (66.67%)	2 (66.67%)
Don't know	0 (0.00%)	0 (0.00%)	0 (0.00%)
Prefer not to answer	1 (5.00%)	1 (6.67%)	0 (0.00%)
How familiar are you with the benefits of taking iron folic acid supplements during pregnancy?[4]			
Very familiar	83 (74.11%)	58 (70.73%)	23 (82.14%)
Somewhat familiar	25 (22.32%)	21 (25.61%)	4 (14.29%)
Not familiar	3 (2.68%)	2 (2.44%)	1 (3.57%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	0 (0.00%)
Have you received any education or counseling about the importance of iron folic acid supplementation during pregnancy?[4]			
Yes	108 (96.43%)	78 (95.12%)	28 (100.00%)
No	3 (2.68%)	3 (3.66%)	0 (0.00%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	0 (0.00%)
What sources of information have you used to learn about iron folic acid supplementation?[4]			
Healthcare providers	107 (95.54%)	78 (95.12%)	28 (100.00%)
Community health care volunteers	46 (41.07%)	32 (39.02%)	13 (46.43%)
Family members/friends	19 (16.96%)	12 (14.63%)	7 (25.00%)
Internet/online resources	7 (6.25%)	5 (6.10%)	1 (3.57%)
Printed materials (e.g., brochures, posters)	3 (2.68%)	1 (1.22%)	2 (7.14%)
Don't know	1 (0.89%)	1 (1.22%)	0 (0.00%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	0 (0.00%)
What source of information do you trust most for information about iron folic acid supplementation?[4]			
Healthcare providers	106 (94.64%)	79 (96.34%)	27 (96.43%)
Community health care volunteers	18 (16.07%)	12 (14.63%)	4 (14.29%)
Family members/friends	3 (2.68%)	2 (2.44%)	0 (0.00%)
Internet/online resources	3 (2.68%)	2 (2.44%)	0 (0.00%)
Printed materials (e.g., brochures, posters)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Don't know	0 (0.00%)	0 (0.00%	0 (0.00%)
Prefer not to answer	1 (0.89%)	1 (1.22%)	0 (0.00%)

[1]Missing data, n=119; [2]Other response included: take prenatal vitamins; antimalarial medication; unsure of what was given; medication for appetite (n=2); Fansidar (n=26); deworming medication (n=7); multivitamins (n=7); [3]Other responses included: appetite; increased heart rate; increased appetite (n=8); itchiness; side effects only felt when taken during the day and not when taken at bedtime; [4]Missing data, n=112; [5]Missing data, n=84; [6]Other response included:1 tablet for iron and a quarter tablet of folic acid daily; [7]Other responses included: takes daily but forgot to take it once; first pregnancy (n=3); [8]Missing data, n=20; [9]Other responses included: none (n=3); appetite medicine; current 1st pregnancy (n=6); takes daily; the smell of iron; [10]Other responses included: took as prescribed (n=4); folic acid is being taken for the first pregnancy; first pregnancy (n=3).

Willingness to accept MMS

Table 20 describes the women's willingness to accept MMS.

When asked about their willingness to take MMS in place of IFA, nearly all women indicated willingness to take MMS (99.16%). Most women indicated that they would accept MMS if there were perceived health benefits to the mother and the child (86.44% and 83.90%, respectively). Of those responding (n=3), most women indicated that they would not take MMS if there was no information on the new product or a low perception of efficacy (66.67% and 66.67%, respectively). When asked what would discourage women from taking MMS, most indicated that there was nothing to discourage them (68.91%).

Table 20: Willingness to accept MMS (N=125)

Characteristic	n (%)		
	Total (N=125)	Pregnant (N=86)	Postpartum (N=31)
If MMS is introduced for use in pregnancy, would you be willing to accept to take this new product?[1]			
Yes	118 (99.16%)	86 (100.00%)	30 (96.77%)
No	1 (0.84%)	0 (0.00%)	1 (3.23%)
What would make you accept to take MMS?[2]			
Perceived health benefits to mother	102 (86.44%)	75 (87.21%)	25 (83.33%)
Perceived health benefits to the child	99 (83.90%)	73 (84.88%)	24 (80.00%)
Good experience with iron folic acid	39 (33.05%)	32 (37.21%)	7 (23.33%)
Other[3]	20 (16.95%)	14 (16.28%)	6 (20.00%)
Don't know	0 (0.00%)	0 (0.00%)	0 (0.00%)
Prefer not to answer	0 (0.00%)	0 (0.00%)	0 (0.00%)
What would make you not accept MMS?[4]			
No information on the new product	2 (66.67%)	0 (0.00%)	1 (100.00%)
Low perception of efficacy	2 (66.67%)	0 (0.00%)	0 (0.00%)
Able to afford balanced meals	0 (0.00%)	0 (0.00%)	0 (0.00%)
It is for the vulnerable/ low class	1 (33.33%)	0 (0.00%)	0 (0.00%)
Low personal risk to malnutrition	0 (0.00%)	0 (0.00%)	0 (0.00%)
Perception and experience with iron folic acid	0 (0.00%)	0 (0.00%)	0 (0.00%)
Perceived high opportunity cost	0 (0.00%)	0 (0.00%)	0 (0.00%)
Negative influence, husband/family	0 (0.00%)	0 (0.00%)	0 (0.00%)
Other	0 (0.00%)	0 (0.00%)	0 (0.00%)
What would discourage you to take MMS?[1]			
High frequency of going for ANC	3 (2.52%)	2 (2.33%)	0 (0.00%)
Long distances to ANC	5 (4.20%)	4 (4.65%)	0 (0.00%)
High cost of transport to ANC	2 (1.68%)	1 (1.16%)	0 (0.00%)
Poor health provider attitude	1 (0.84%)	0 (0.00%)	0 (0.00%)
Bad experience with iron folic acid	1(0.84%)	1 (1.16%)	0 (0.00%)
Other[5]	109 (91.60%)	77 (89.53%)	31 (100.00%)
Don't know	1 (0.84%)	1 (1.16%)	0 (0.00%)

[1]Missing data, n=119; [2]Missing data, n=118; [3]Other responses included: nutrients in MMS (n=7); easy to take (n=2); 1 tablet (n=4); smell is neutral (n=2); for blood boosting; low availability and/or high cost of nutrients in food (n=2); importance of following ANC instruction; benefits to mother and baby (n=2); protects the body from disease; a lot of benefits; [4]Missing data, n=3; [5]Other responses included: the smell (n=3); nothing (n=82); side effects (n=7); high cost of MMS (n=3); unfamiliar with MMS (n=2); misperceptions about MMS; nausea; incompatible with other medications; reactions; intolerance; fear of new product ("maybe trying it on you") (n=2); vomiting (n=2); unpleasant color ("It is not a good color for medicines. The color should be bright"); if health worker indicates it is not good (n=2).