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Exploring the Acceptance of Multiple Micronutrient Supplement (MMS) Among Pregnant Women: A Case Study in Kulon Progo District, Yogyakarta

Eksplorasi Penerimaan Multiple Micronutrient Supplement (MMS) pada Ibu Hamil: Studi Kasus di Kabupaten Kulon Progo, Yogyakarta

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ARTICLE INFO

Received: 24-09-2025

Accepted: 24-02-2026

Published online: 13-03-2026

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10.20473/amnt.v10i1.2026.96-105**Available online at:**<https://e-journal.unair.ac.id/AMNT>**Keywords:**

MMS, Anemia, Pregnancy, Multivitamin

ABSTRACT

Background: Based on the 2023 SKI report, the prevalence of anemia in pregnant women reached 27.7%, with a higher rate of 31.4% among women aged 25-35 years. Anemia in pregnancy is generally managed with Iron and Folic Acid (IFA) supplementation. Still, adherence to IFA consumption remains low due to side effects such as nausea and digestive disorders. As an alternative, the Multiple Micronutrient Supplement (MMS) was introduced, which can improve anemia in pregnant women and is 13% more effective than IFA in preventing Low Birth Weight.

Objectives: To explore the acceptance of MMS among pregnant women in Kulon Progo District.

Methods: Qualitative research with an exploratory case study design. Thirteen informants were selected through purposive sampling, including eight pregnant women as main informants and five supporting informants: two midwives, two pharmacists from Community Health Centers, and one representative from the District Health Office. The study was conducted at the Kulon Progo District Health Office and at the Wates and Samigaluh 2 Primary Health Centers. Data were collected through in-depth interviews and analyzed using Atlas.ti.

Results: Acceptance of MMS was influenced by knowledge of MMS, consumption experiences (taste, aroma, and side effects), and support from health workers. Some pregnant women stated that they got bored and did not continue consumption. However, consistent involvement of health workers improved acceptance.

Conclusions: Acceptance of MMS among pregnant women is influenced by perceptions, product characteristics, and health worker support. Midwives provide education and monitoring, while pharmacists manage MMS stock recording and reporting.

INTRODUCTION

Anemia is a nutritional problem worldwide, especially in developing countries such as Indonesia. Based on the results of the 2013 Basic Health Research (Riskesdas), the prevalence of anemia among pregnant women was 37.1%, and in 2018, it increased to 48.9%^{1,2}. The 2023 Indonesian Health Survey (SKI) reveals that the prevalence of anemia among pregnant women was 27.7%. However, the prevalence of anemia among pregnant women of productive age 25-34 years remained high at 31.4%³. Anemia indirectly increases the risk of death in pregnant women, especially severe bleeding in severe anemia due to insufficient iron reserves during pregnancy⁴. Additionally, severe anemia also increases the risk of infection during the postpartum period and hypertension during pregnancy. Factors that cause

anemia in pregnant women include iron deficiency due to inadequate dietary iron intake, acute bleeding, closely spaced pregnancies, age and level of education, and infectious diseases that impair iron absorption (worm infestation) or cause red blood cell hemolysis (malaria)^{4,5}.

In an effort to prevent and treat anemia in pregnant women, in 2024, the Ministry of Health introduced the Multiple Micronutrient Supplement (MMS), which the World Health Organization (WHO) has recommended since 2020 as a replacement for Iron Folic Acid (IFA) supplementation. The MMS formula is internationally recognized as the United Nations International Multiple Micronutrient Antenatal Preparation (UNIMMAP), which has been developed since 1999 through collaboration among the World Health Organization (WHO), the United Nations

University, and UNICEF. MMS contains 15 essential vitamins and minerals, consisting of vitamin A, vitamin D, vitamin E, vitamin B1, vitamin B2, vitamin B3, vitamin B6, vitamin B12, folic acid, vitamin C, zinc, iron, selenium, copper, and iodine⁶. A variety of studies related to MMS have been conducted in Indonesia. Research in Semarang showed that hemoglobin levels in the group given multi-micronutrient supplements increased by an average of 1.545 g/dL. The average hemoglobin level in pregnant women before receiving multi-micronutrient supplements was 9.71 g/dL, which is classified as moderate (<10 g/dL). After consuming multi-micronutrient supplements for 6 weeks, the mean hemoglobin level in pregnant women increased to 11.26 g/dL, which is classified as non-anemic⁷. Meanwhile, research by Hastuty *et al.* in 2021 at the Kampung Baru Community Health Center in Banggai Regency showed a significant relationship between MMS consumption and the anemia incidence (p-value < 0.05)⁸. In addition, a randomized, double-blind, community-based trial was conducted in Probolinggo Regency to compare the Multiple Micronutrient Supplement (MMN) group with the placebo iron-folic acid supplement (IFAS) group. It showed that miscarriages or premature births were more common in the placebo-IFAS group than in the MMN group. The percentage of non-viable fetuses was higher in the placebo-IFAS group at 18.2% compared to the MMN group at 1.8%. Only one case of miscarriage was found in the MMN group. At the same time, there were four cases of miscarriage and four cases of early prematurity (birth at 28-35 weeks of gestation) in the placebo-IFAS group (7.4%). Overall, miscarriage or fetal loss and preterm birth occurred more frequently in the placebo-IFAS group than in the MMN group. These differences suggest that MMN supplementation may potentially protect against miscarriage and preterm birth, thereby supporting pregnancy continuation to term⁹.

The Ministry of Health has implemented the MMS program as a transition period from IFA, with priority given to provinces with high rates of Low Birth Weight (LBW), pregnant women with Chronic Energy Deficiency (CED), high stunting, and large populations of pregnant women¹⁰. One of the regions in the Special Region of Yogyakarta (DIY) that has implemented the MMS program is the Kulon Progo District. The Kulon Progo District Health Office stated that it was appointed as a pilot project for the MMS program. The selection of Kulon Progo District as the research location was based on considerations of the regional characteristics. According to 2023 data from the Kulon Progo Regency Health Office, the Kulon Progo District covers 586.82 km². Geographically, the Kulon Progo District covers lowlands and hills. This will affect access to health services, the affordability of education, and assistance for pregnant women. In 2023, there were 308 cases of low birth weight (LBW <2500 grams) in Kulon Progo Regency. This number is still higher than that of Yogyakarta City, which recorded 194 babies. The high rate of LBW is related to the condition of pregnant women who experience Chronic Energy Deficiency (CED), anemia, and hypertension during pregnancy. Moreover, the number of infant and toddler deaths in Kulon Progo Regency reached 43 deaths. This number is also higher than that of

Yogyakarta City, which recorded 29 deaths. The causes of the elevated number of infant and child deaths in Kulon Progo Regency are LBW and prematurity, asphyxia, infection, congenital disorders, and heart disease^{11,12}.

The success of the MMS program is not only determined by the availability of supplements, but also by pregnant women's acceptance and the role of health workers. Acceptance is an important factor that influences compliance with supplement consumption in pregnant women and can be interpreted as an individual's capacity to adhere to the prescribed therapy¹³. A study by Abidah and Sumarmi in 2022 examined the acceptability of supplement characteristics, including color, shape, aroma, packaging appearance, and overall acceptability. The results of this study indicated a significant difference in color characteristics. Pregnant women in the IFA group reported that the color of IFA was more attractive than the pale color of MMS, which was considered unattractive and resembled medicine. However, the shape of MMS capsules was more accepted, with an average of 4.3. The MMS bottle packaging was preferred over the IFA blister packs because it was considered safer and more hygienic¹³. Furthermore, a 2024 study by Ulyas *et al.* found that 26 respondents with high acceptability reported no drowsiness side effects when consuming MMS¹⁴. In addition to acceptability, the role of health workers in providing support, education, and guidance is very important in increasing pregnant women's compliance with MMS supplementation. Education and support from health workers play an important role in increasing pregnant women's compliance with MMS use, and supporting optimal maternal and fetal health¹⁵.

The Multiple Micronutrient Supplement (MMS) program was first implemented in Kulon Progo District in 2025. The distribution of MMS was carried out by the Ministry of Health to the Kulon Progo District Health Office, amounting to 3,120 bottles. It was distributed to all Community Health Centers in the Kulon Progo District in January 2025. Therefore, this study aims to explore the MMS program in more depth, such as understanding and perceptions of the pregnant woman regarding the benefits and side effects of MMS, the obstacles and barriers faced by pregnant women in accessing and consuming MMS, the factors that influence pregnant women's acceptance of MMS consumption, and the experiences of pregnant women in participating in the MMS program, as well as the role of health workers, especially midwives and pharmacists at Community Health Center in supporting the MMS program, the MMS administration mechanism, MMS monitoring, recording and reporting of MMS.

METHODS

This research is a qualitative study with an exploratory case study approach. This approach was chosen to explore pregnant women's acceptance of the MMS program currently being implemented in the Kulon Progo District. Through this approach, the study aims to gain an initial understanding of the MMS program, identify factors influencing acceptance, and examine the role of health workers in supporting its implementation at the Community Health Center.

The selection of research subjects used purposive sampling techniques, divided into two informants, namely primary informants and supporting informants. The total number of informants was 13 people. The key informants were pregnant women, with at least 3 from each Community Health Center. Information gathering on MMS acceptance among pregnant women was conducted using interview guidelines that included knowledge about the benefits of MMS, initial perceptions of MMS side effects, initial concerns about MMS, barriers to accessing MMS, barriers to consuming MMS, and pregnant women's opinions on capsule characteristics such as color, taste, shape, size, and aroma. The inclusion criteria for key informants included pregnant women who received MMS in the working area of the Kulon Progo District Health Center, and the exclusion criteria included pregnant women with communication disorders (hearing/speech disorders) and cognitive disorders, as well as mental disorders that affected their ability to provide answers. Supporting informants consisted of one person in charge of MMS at the Kulon Progo District Health Office, one midwife from each Community Health Center, and one person in charge of pharmacy and drugs at each Community Health Center. The inclusion criteria for supporting informants were the Health Office and midwives who were aware of the MMS administration program, as well as those in charge of pharmacy and drugs, who knew the number of MMS dispensed and received. Information was gathered from health workers at the Community Health Center and the Health Office using interview guidelines. Questions for midwives included the implementation of the MMS administration program training, how to introduce MMS to pregnant women, the mechanism for administering MMS at the Community Health Center, and how midwives monitor MMS for pregnant women. Questions for those responsible for pharmacy and medicines at the Community Health Center included the time of receiving MMS, the number of MMS received by the Community Health Center, and the procedure for recording MMS stock. Meanwhile, questions for the Kulon Progo District

Health Office included the number of MMS received by the Health Office, the time of receipt, and the mechanism for recording and reporting MMS from the Community Health Center to the Kulon Progo District Health Office.

The research locations were the Kulon Progo District Health Office, the Wates Community Health Center, and the Samigaluh 2 Community Health Center. The selection of these community health centers was based on geographic considerations that reflect the region's diversity. The Wates Community Health Center represents an urban area, while the Samigaluh 2 Community Health Center is located in a relatively remote, hilly area (rural). These differences in geographical characteristics are expected to provide an overview of MMS implementation across areas with diverse access and challenges. Data collection was conducted through in-depth interviews and analyzed using the Atlas.ti application. This research was conducted on June 21-30, 2025, after obtaining ethics committee approval clearance issued by the Medical and Health Research Ethics Committee of the FK-KMK Gadjah Mada University with number KE/FK/0822/EC/2025 on May 23, 2025, and obtained a permit from the Kulon Progo District Health Office with number: 000.9.2/1479 on June 13, 2025, as well as obtaining permission from the Community Health Center.

RESULTS AND DISCUSSIONS

The research results are divided into two parts, namely the characteristics of the informants and the four main themes of analysis. The characteristics of the informants include the key informants being pregnant women at the Wates and Samigaluh 2 Community Health Centers, and the supporting informants being the Health Office, midwives, and pharmacists at the Community Health Centers. The main themes include pregnant women's understanding and perceptions of MMS, obstacles and barriers in accessing and consuming MMS, factors that can influence pregnant women's acceptance of MMS, and the role of health workers in supporting the MMS program.

Table 1. Frequency distribution of characteristics of primary informant participants

No.	Informant Code	Age (Years)	Highest Level of Education	Gestational Age	Hemoglobin Level (g/dL)	Child Number
1.	Informant 01	29	Bachelor's degree	33 weeks 5 days	12.4	2
2.	Informant 02	29	Vocational High School	12 weeks	11.8	2
3.	Informant 03	28	High school	20 weeks	13	1
4.	Informant 04	29	Master's degree	15 weeks	11.7	2
5.	Informant 05	42	Junior high school	26 weeks	10.9	5
6.	Informant 06	32	High school	31 weeks	11.2	2
7.	Informant 07	30	Bachelor's degree	35 weeks	11	3
8.	Informant 08	25	High School	38 weeks	13.9	1

Hb = Hemoglobin

Table 2. Frequency distribution of characteristics of participant informants

No	Informant Code	Age (Years)	Highest Level of Education	Position
1.	NJ	52	Dietitian	Junior Nutritionist
2.	SE	53	Midwife Profession	Midwife Coordinator

No	Informant Code	Age (Years)	Highest Level of Education	Position
3.	EFW	50	D3 Pharmacy	Pharmacy Practitioner
4.	LN	37	D4 Midwifery	Midwife Coordinator
5.	CAP	34	Bachelor of Pharmacy	Pharmacist

Pregnant Women's Understanding and Perception of Multiple Micronutrient Supplement (MMS)

Pregnant women's understanding is related to their prior knowledge of MMS. Pregnant women are unfamiliar with the term MMS and still equate it with Iron Folic Acid (IFA) that they took during their previous pregnancies. Mothers' prior knowledge about the benefits of MMS generally stems from the belief that MMS contains more complete ingredients than IFA and supports the health of both mother and fetus. Even though they have been educated, not all information can be fully absorbed by pregnant women. Most pregnant women do not yet understand the specific benefits of MMS in supporting fetal growth and preventing pregnancy complications such as anemia, prematurity, and the risk of low birth weight. Most often, pregnant women understand the benefits of MMS as a nutritional requirement¹⁶. This prior knowledge may reflect pregnant women's awareness of the importance of MMS capsules in supporting health during pregnancy and ensuring a smooth delivery¹⁷. This prior knowledge stimulates or encourages healthy behavior¹⁸.

"What I know is, after reading about it... ya, there are supplements to increase blood, there is B12... it seems that the contents are complete, right?" (Informant 01).

"There are iron supplements and folic acid... that also increase appetite" (Informant 03).

"...As far as I know, all MMS covers everything important for a healthy pregnancy" (Informant 07)

In addition, as MMS is considered a new supplement for most pregnant women, it naturally raises various perceptions, especially regarding its potential side effects. These perceptions about side effects can influence mothers' attitudes towards accepting MMS, particularly during their initial visits to health facilities. Some mothers expressed concerns that MMS could cause adverse reactions, such as allergies, based on their personal history with certain medications. Others feel uncomfortable and associate MMS consumption with sleep disturbances. As a relatively new supplement, MMS also raises initial perceptions of concern about side effects among some pregnant women. These perceptions include perceived severity, which is the fear of discomfort from side effects when taking MMS. Negative perceptions and a lack of understanding among mothers can influence the acceptance of MMS¹⁹. In addition to negative perceptions of side effects, there is concern about MMS. This concern arises due to negative information about MMS. Google, Instagram, and Facebook are the most commonly used media for searching for information. News and health issues that are hotly debated are often accessed by various user

types. The spread of false news will create a negative public opinion, so that MMS, which should be beneficial to the health of mothers and babies, becomes useless²⁰.

"At first, I wasn't sure, because I don't like taking medicine and I'm allergic to it... at first, yes (I was worried), because the viral rumors said that it was just a government program with no benefits at all. That's how it was at the beginning" (Informant 07).

"...Yesterday I was also worried that it would make me unable to sleep or something, but it turned out that it didn't... "Of course, at the beginning, I was worried about the effects on the fetus. I mean, the effects on its health, you know, and also on my health. Yesterday I also thought about whether it would make me unable to sleep or something, but it turned out not to be the case" (Informant 08).

Despite the widespread negative news, pregnant women still accept MMS because they have confidence after receiving information from healthcare workers, especially doctors and midwives. Pregnant women who receive information from healthcare workers can feel confident that it will be considered when accepting MMS²¹.

Challenges and Barriers in Accessing and Consuming Multiple Micronutrient Supplements (MMS)

Barriers to accessing MMS are one aspect that needs to be considered. In this study, no barriers to MMS access were found among pregnant women. Interviews at two Community Health Centers revealed that all pregnant women received MMS during their first visit (K1). The MMS delivery system has been directly integrated with antenatal care (ANC) services at the Community Health Center. During their first visit to the Community Health Center, pregnant women undergo a pregnancy check-up, receive education from a midwife, and obtain their MMS. However, some pregnant women first learned about MMS from their Ob-Gyn, who then referred them to the Community Health Center to obtain it. There were no obstacles to pregnant women accessing MMS, as all pregnant women receive it at the Community Health Center.

"... Yes... At first, I went to the doctor, but then I had to go to the Community Health Center too. Then at the Community Health Center, they asked me to get checked, the lab tests, and at the Community Health Center, they gave me the MMS, then I went back to the doctor, 'Did you get the MMS yesterday?'" (Informant 01).

"It's given at the Community Health Center"
(Informant 02).

This distribution mechanism is highly efficient, with health workers, particularly midwives, playing a strategic role as liaisons between the national program and the program targets. Providing MMS in ANC services also strengthens pregnant women's trust in health workers, thereby accelerating the acceptance of supplements. The distribution of MMS is conducted in the same way as in Sidoarjo District, where the District Health Office distribute it to pregnant women during ANC services. Health workers actively introduce MMS into the process, which, in turn, builds positive perceptions and increases pregnant women's acceptance of this program²². Pregnant women's access to ANC services needs to be considered. If access and supply of supplements are inadequate, it will hinder pregnant women from receiving MMS. Conversely, if pregnant women have adequate access to health facilities for ANC, they will receive MMS. The flexibility of ANC services is an important strength that can help increase MMS acceptance²³.

Although access to MMS is relatively easy because it is integrated with ANC services, continued acceptance of these supplements is not only determined by access, but also by barriers to MMS consumption among pregnant women. The obligation to consume 180 MMS capsules during pregnancy, which means one capsule every day, poses a challenge for some pregnant women. One informant said that even though it is known that the supplement is beneficial, boredom set in over time. The routine of taking MMS once a day sometimes causes boredom for pregnant women, which can reduce motivation and make supplement consumption a compulsory action. This compulsion can even affect the comfort of swallowing¹⁴. In addition, daily busyness and other activities are also reasons pregnant women forget to consume MMS, so they do not consume MMS regularly as recommended²⁴.

"Well, lately it hasn't been very routine hehe. Before, it was routine during the second trimester... But now yaa... sometimes I forget, sometimes that's it, you know" (Informant 01).

"Over time, maybe because I got tired of drinking it every day, it tasted bitter and was hard to swallow... It felt like I was forced to drink it, and then I was advised to drink it after breakfast, but then it would get stuck in my throat because I was already tired of it" (Informant 07).

Another obstacle is the difficulty in opening the bottle. When pregnant women first received MMS, they complained about the difficulty in opening the bottle. The unfamiliar, relatively new method of opening the bottle, which required pressing and then twisting, required pregnant women to exert more strength. When they were weak and unable to open the bottle, pregnant women asked their families for help. However, some informants initially had difficulty opening the bottle but eventually became proficient after understanding the technique and being taught by a midwife at the

Community Health Center. The bottle cap that is opened by pressing and then twisting is called child-resistant packaging. This packaging is designed to prevent children from taking supplements, but it is quite easy for adults²⁵. Child-resistant packaging makes bottle caps safer and more hygienic, preventing contamination and child access. However, it is necessary to reconsider the comfort of the main users, who are pregnant women²⁶.

"It was really difficult (to open the bottle), I even asked my husband to help me open it because it was so hard, especially at that time when I was in my first trimester and felt really weak, I felt like I was about to lose my temper, it was really difficult.... Oh, that was when I was really weak. It was so hard, so hard heeh... I pressed, twisted, but it was still hard" (Informant 04).

"At first, I couldn't open it, but here (at the community health center) they taught me" (Informant 08).

Factors That Can Influence Pregnant Women's Acceptance of Multiple Micronutrient Supplements (MMS)

Pregnant women's acceptance of MMS consumption can be seen from its color, taste, shape, size, aroma, and side effects. Regarding color, most pregnant women interviewed said the brown color of the MMS capsules made them feel strange. Some also said that it was unattractive, pale, unlike the color of medicines/supplements, which are generally white or yellow, and that there were spots on the capsules. The brown color of the capsules often causes negative perceptions because it differs from the colors of supplements generally consumed by pregnant women, such as white or yellow, so the brown color of MMS is considered unattractive and more like medicine. The unattractive color of MMS is perceived as deviating and may affect quality analysis¹³. The preferred color order for supplements, from most to least preferred, is maroon, grayish yellow, and brown²⁷.

"In my opinion, the color is a bit unappealing, sis hehe, it's brown" (Informant 03)

"It's like... it's like moldy, hehe... Other capsules are sometimes white, like paracetamol, which is white and yellow, but it's like spots, like mold hehe" (Informant 02).

"I've never seen brown medicine before... usually it's white" (Informant 05).

In terms of taste, based on interviews with pregnant women, they answered that MMS tastes normal, some initially tasted sweet but gradually became bitter, and some tasted fishy. Daily consumption of supplements can cause pregnant women to experience boredom and a change in their taste perception of MMS from sweet to bitter, especially when they are not feeling well. This result is reinforced by a study conducted at the Dulupi Community Health Center in Boalemo Regency with 22 respondents, which showed that respondents

disliked MMS capsules due to their bitter taste, which made them difficult to swallow. The body of a pregnant woman adapts to nutritional needs by responding to changes in taste. The bitter taste of MMS can trigger or worsen nausea, so pregnant women tend not to take the capsules regularly¹⁴.

"Hmm, it tastes fishy for me personally"
(Informant 04)

"At first, it tasted kind of sweet, but after a while, maybe because I got tired of drinking it every day, it became a bit bitter" (Informant 07).

Regarding the shape and size of MMS, interviews with pregnant women indicate they prefer the capsules' shape and size. All pregnant informants said the capsules were not too large and made MMS easier to swallow. The capsules' relatively small size made them easier for some pregnant women to swallow. The shape, diameter, and surface area of the supplement will affect the rate of absorption and ease of swallowing. Previous studies have emphasized that the acceptance rate of capsule-shaped MMS is higher because the capsule shell can reduce the unpleasant taste that may arise when the supplement is swallowed¹³.

"In my opinion, the size is just right, not too small and not too big, because if it's too big, it's sometimes difficult to swallow. This one is just right" (Informant 08).

Regarding the aroma of MMS, all pregnant women reported disliking it. The aroma produced by MMS capsules is very strong when the bottle is opened. One pregnant woman said that she did not like the aroma and felt more nauseous when smelling the capsules.

"I don't really like the smell, ya miss hehe. Especially now... now I can still tolerate it, but when I feel really nauseous, it makes me feel even more nauseous" (Informant 01).

"The smell ya, miss, hehe... the smell is quite strong, hehe... every time I open the bottle, that smell hits me right away" (Informant 03).

"...It's just the smell... because it's really eeee some vitamins and some like folic acid are mixed, so it smells a bit unpleasant, a bit mixed up" (Informant 06).

The unpleasant smell of MMS often causes nausea before the capsules are consumed. It can be concluded that the strong smell of MMS is one of the factors that can reduce pregnant women's acceptance of MMS consumption. Previous research conducted in Surabaya showed that pregnant women in the MMS acceptance group also complained of a strong smell that could cause dizziness and nausea after consumption. This finding is because pregnant women are receiving MMS for the first time, which can cause hypersensitivity, and the body is not yet accustomed to the smell of MMS¹³.

Another study conducted in Sidoarjo, where MMS is named LADUNI, stated the same thing, that pregnant women complained about the unpleasant smell and that it could cause nausea²².

Factors that can affect acceptance can also be seen from the side effects experienced by pregnant women after consuming MMS. Side effects are an important consideration in assessing the acceptance of MMS by pregnant women. Pregnant women who consume it regularly can improve their physical condition, such as improving their health and helping to reduce nausea, which strengthens the positive acceptance of MMS. Based on interviews with pregnant women who have consumed MMS, the majority reported no side effects such as nausea or vomiting after taking it. Pregnant women who usually experience morning sickness, feel weak, and experience nausea reported feeling less weak and experiencing reduced nausea. In addition, pregnant women did not feel tired and felt comfortable after taking MMS. This result is similar to previous studies in which the majority of respondents did not experience side effects or only experienced mild complaints that did not affect their acceptance of MMS. The timing of consumption also has affects outcomes: consuming MMS at night before bed is considered to help optimize nutrient absorption and minimize discomfort¹⁷. However, there was one pregnant woman who still felt nauseous, and if the capsule got stuck in her throat, she would vomit after consuming the capsule. This condition is likely because the pregnant woman already felt nauseous before consuming MMS, which exacerbated her nausea. Initial physiological conditions can exacerbate side effects. Conversely, if there are no initial physiological conditions, there will be no side effects after consuming MMS. Side effects occur because the body is still adjusting to the new supplement. The body's adaptation to new supplements also influences the reactions felt¹³.

"Yes. Especially during pregnancy, during the first trimester, the second trimester is when morning sickness really starts to kick in, the nausea and fatigue, but after taking it, it gets a bit better" (Informant 01).

"Usually there is nausea ya, miss... After consuming it, there's usually a little nausea, and sometimes it can lead to vomiting hehe" (Informant 03).

The Role of Health Workers in Supporting the Multiple Micronutrient Supplement (MMS) Program

Health workers have a role in supporting the successful implementation of MMS. To support the smooth running of the MMS program, socialization is needed so that all parties are aware of it, especially health workers at the Community Health Center. In addition to socialization, Interpersonal Communication training must also be carried out. This Interpersonal communication training is necessary for health workers, especially midwives. Interpersonal Communication is expected to change people's behavior. Health workers need to master interpersonal communication to make the MMS program more effective. This training is conducted to improve workers' capacity to communicate

about MMS at their respective Community Health Centers²⁸. The Kulon Progo District Health Office organized the Interpersonal Communication training in collaboration with the Ministry of Health. Based on interviews with midwives at the community health center, the training was provided in February 2025.

"Heeh, yesterday we were trained by the Ministry of Health for 2 days ya... Wait a minute, miss, hehe, what was it... February or something... Basically, we got it first, then the training later, so yeah, we already got the doping... I had the training in February, miss, that's right" (SE).

The mechanism for administering MMS to pregnant women is implemented when the mother makes her first pregnancy visit (K1) at the Community Health Center. It is during this visit that the midwife introduces MMS. The role of the midwife in providing support, education, and guidance from health workers is very important in increasing MMS consumption among pregnant women. Midwives play an important role in providing education and support to pregnant women to ensure the health of the mother and fetus¹⁵. Based on interviews with midwives at two community health centers, MMS administration is carried out the supplements are available from the Health Office and have been distributed to the Pharmacy Department. Then, pregnant women who make their first visit (K1) and have undergone laboratory tests are provided with information and education on how to take MMS, its composition, and how to open the bottle. After the midwife provided education to the pregnant woman, the midwife prescribed MMS to be picked up at the Pharmacy Department.

"As for the mechanism, obviously, the first drop-off is from the district health office, dropping from the district health office ya, then it is given to the community health center through the pharmacy. From the pharmacy, we coordinate with between the pharmacy, the district health office, and the midwives at the maternal and child health clinic (KIA), including the midwives from the health sector who also convey this to us. So, there is a distribution of MMS. There is always coordination between the health and family welfare department, the pharmacy, the midwives, and the pharmacy department in the district health office. Then, from there, every pregnant woman who comes for a check-up is given MMS" (LN).

The implementation of the MMS program at the Community Health Center involves the Pharmacy unit in logistics management and supplement distribution. The District Health Office began distributing MMS to the Community Health Center in January, amounting to 3,120 bottles. The distribution of MMS was adjusted to the number of pregnant women in the Community Health Center area. The Wates Community Health Center received 400 bottles of MMS, and the Samigaluh 2 Community Health Center received 110 bottles. This mechanism aligns with research conducted in Sidoarjo District, where the procurement and distribution process

also involve the District Health Office and Community Health Centers as field implementers. However, there are differences in terms of partnership. In Sidoarjo, the MMS procurement process involved Civil Society Organizations (CSOs) and used imported MMS products, thus requiring additional licensing from the Ministry of Health. In addition, the Sidoarjo District Health Office collaborated with universities to provide technical support to the Community Health Center in implementing the MMS program. The timing of implementation can explain differences in the partnership pattern. Sidoarjo District was one of the earliest areas to implement the MMS program, thus forming a more complex cooperation model. However, the nutritional content of the MMS used in both districts still refers to the national standards set by the Ministry of Health²².

"In terms of procurement, because this is still a pilot project, we first received a letter from the Ministry of Health asking us to submit a proposal. Then we submitted the proposal and it was approved, so we immediately distributed it to the community health centers, so we at the health office had no stock at all... It started in January... early January" (NJ).

"The first delivery was around the beginning of the year...Actually, there was a stock from January to July...The first delivery was 400 bottles" (EFW).

"Received the MMS in January... There was a total of 110 bottles" (CAP).

In addition, monitoring is needed to understand pregnant women's experiences with MMS. Midwives from two community health centers stated that MMS'S monitoring is conducted by directly asking pregnant women about their MMS consumption and by reviewing the control card in the KIA (Maternal and Child Health) book during pregnancy checkups at the community health center. This monitoring is similar to that conducted in Sidoarjo District, namely through the KIA book. However, in Sidoarjo, midwives collaborate with health cadres to conduct home visits to monitor MMS consumption. This monitoring mechanism has not been established at the national level, so each midwife assesses MMS acceptance. Monitoring of the MMS program is carried out in the same way as the existing mechanism, namely the IFA program²².

"As for monitoring... so far, monitoring has only been done this way, when we meet and ask about it. But even though that's the case, the monitoring hasn't been very thorough... It's been very visible, actually. Maybe, eh, we always remind them, 'After you drink it, checklist in your KIA book, okay?, like that... Besides what we asked during the interview, we also looked at the KIA book, and maybe also the lab results... The lab results, for example, from the evaluation of the lab results, ehh, how was the anemia yesterday, was the medication taken correctly or not, was it taken regularly or not, like that" (LN).

MMS recording and reporting are conducted online by the Community Health Center and the District

Health Office regularly. MMS stock recording is carried out by the Pharmacy Department using stock cards available at the Community Health Center. Then, reports are submitted through the Ministry of Health's Drug Management System (SIMO) application. In addition to the SIMO application, reporting is also carried out through the Sigizi Terpadu and Kesga DIY applications owned by the Health Office of the Special Region of Yogyakarta, with reports submitted monthly. Recording and reporting are limited to MMS stock and the number of pregnant women who receive it. This reporting and recording remain the same as in the previous maternal health program, namely the IFA program²⁹. Additionally, MMS reporting is conducted through an application developed by the province. Similarly, in Sidoarjo District, an online application is used to monitor maternal and child health services. However, this application was developed by the Community Health Center and not at the provincial or district/city level. Recording and reporting serve a commitment to the implementation of the MMS program²².

"There is a stock card for daily expenses, so for example, if today we spend 5, it will be used up by patients if we don't match it with the warehouse, see how many patients are in the KIA... 4 like that. We just need to coordinate more for usage, and every month we report the expenditures through SIMO, reporting to the health office, how much was spent, how much was spent" (EFW).

"Yes, it's through Sigizi Kesga... There's also the Kesga website, I forgot, the Kesga website... the Kesga website and Sigizi... The Kesga website is a provincial application, while Sigizi Kesga is a Ministry of Health application, so there are two... one national server and one provincial server. So, we no longer use other reporting websites" (NJ).

The strength of this study lies in its use of qualitative methods and an exploratory approach, which allow the author to examine pregnant women's experiences with MMS through in-depth interviews. In addition, the involvement of health workers as supporting informants can provide a clearer overview of the MMS program's implementation mechanisms at the Community Health Center. The results of this study can contribute to the development of educational and support strategies for pregnant women and serve as input for policy-making to improve the implementation of the MMS program.

The limitations of this study are that the author did not explore in depth the role of the family in influencing the acceptance of MMS by pregnant women, did not explore in depth the experiences of pregnant women who had consumed multivitamins from commercial products, and did not study the direct impact of MMS consumption on the physical condition of pregnant women, such as an increase in hemoglobin levels.

CONCLUSIONS

This study shows that pregnant women still perceive MMS as TTD. Understanding of the benefits of

MMS remains general, though some know that its composition is more complete than TTD. Pregnant women also have concerns about side effects. Factors that influence the acceptance of MMS include difficulty opening the bottle, a strong odor, and unattractive brown color. Health workers play a role in education, distribution, monitoring of acceptance, recording and reporting MMS. Community health centers need to provide education on the benefits, differences between MMS and TTD, and how to consume MMS during ANC and pregnant women's classes, as well as monitor changes in capsule color. The Kulon Progo District Health office is expected to conduct routine routine monitoring and evaluation of MMS distribution and availability, provide attractive education media, and ensure that health that health workers receive ongoing training. Further research is recommended using a quantitative approach to measure MMS consumption compliance and compare MMS acceptance with TTD.

ACKNOWLEDGEMENT

The authors would like to thank the Kulon Progo District Health Office, Wates Community Health Center, and Samigaluh 2 Community Health Center for granting permission to conduct this research, as well as the pregnant women who participated in this study. The author would also like to thank the supervising lecturer for their guidance and input during this research.

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors have no conflicts of interest in this research. All costs related to the research were sourced by the Ministry of Health's Educational Assistance Program with number HK.02.03/F/2322/2023.

AUTHOR CONTRIBUTIONS

KP: conceptualization, writing, editing, investigation, methodology, formal analysis; BIJK: supervision, review, conceptualization; PDR: supervision, review, conceptualization, methodology.

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