Gizi Indon 2024, 47(1):21-34
GIZI INDONESIA
Journal of The Indonesian Nutrition Association
p-ISSN: 0436-0265 e-ISSN: 2528-5874

EXPLORING MANAGEMENT ASPECTS OF MULTIPLE MICRONUTRIENT SUPPLEMENTATION PROGRAM FOR PREGNANT WOMEN IN SIDOARJO DISTRICT, EAST JAVA

Eksplorasi Aspek Manajemen Program Suplementasi Multi Mikronutrien bagi Ibu Hamil di Kabupaten Sidoarjo, Jawa Timur

Evi Nurhidayati[1,2], Luh Ade Ari Wiradnyani[1,2], and Muchtaruddin Mansyur[2,3]

[1]Department of Nutrition, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
[2]Southeast Asian Ministers of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON), Jakarta, Indonesia
[3]Department of Community Medicine, Faculty of Medicine, Universitas Indonesia – Dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia
Email: awiradnyani@seameo-recfon.org

Diterima: 10-01-2023 Direvisi: 23-02-2024 Disetujui terbit: 31-03-2024

ABSTRACT

The most recent guidelines on antenatal care (ANC) issued by the World Health Organization in 2020 emphasize multi-micronutrient supplementation (MMS) to enhance maternal, infant, and child health. However, research exploring management aspects of MMS program implementation is still limited, particularly in Indonesia. This study aims to examine the management of the MMS program among pregnant women in Sidoarjo District. This qualitative research used a phenomenological approach conducted in Sidoarjo District involving 51 informants (stakeholders and beneficiaries) from April to May 2022. MMS tablets (Laduni) were distributed during ANC for free through an existing platform which is similar to the iron tablets distribution. Due to limited supply, the coverage of MMS tablets did not cover all pregnant women in Sidoarjo District. Therefore, they need to purchase the commercial MMS tablets by themselves. Management of the MMS program necessitated collaboration among various stakeholders, including civil society organizations for product supply, universities for quality control, and district health office and public health center for distribution. Monitoring and evaluation of the MMS program were integrated into an existing platform of the iron-folic acid program. Nevertheless, it should be strengthened by a coverage survey, as well as recording and reporting during the ANC.

Keywords: management, multiple micronutrient supplementation, pregnant women

ABSTRAK

Pedoman terbaru tentang perawatan antenatal (ANC) yang dikeluarkan oleh Organisasi Kesehatan Dunia (WHO) pada tahun 2020 menekankan suplementasi multi-mikronutrien (MMS) untuk meningkatkan kesehatan ibu, bayi, dan anak. Namun, penelitian yang mengeksplorasi aspek manajemen dari implementasi program MMS masih terbatas, khususnya di Indonesia. Penelitian ini bertujuan untuk melihat manajemen program MMS pada ibu hamil di Kabupaten Sidoarjo. Penelitian kualitatif ini menggunakan pendekatan fenomenologi yang dilakukan di Kabupaten Sidoarjo dengan melibatkan 51 informan pada bulan April hingga Mei 2022. Tablet MMS (Laduni) didistribusikan pada saat ANC secara gratis melalui platform yang sama dengan distribusi tablet tambah darah (TTD). Karena keterbatasan pasokan, cakupan tablet MMS tidak mencakup semua ibu hamil di Kabupaten Sidoarjo. Oleh karena itu, mereka harus membeli tablet MMS komersial secara mandiri. Pengelolaan program MMS melibatkan berbagai pemangku kepentingan seperti organisasi masyarakat sipil untuk penyediaan produk, perguruan tinggi untuk pengawasan kualitas produk, dinas kesehatan kabupaten dan puskesmas untuk pendistribusian produk. Pemantauan dan evaluasi program MMS diintegrasikan ke dalam platform program TTD yang sudah ada. Namun demikian, hal ini perlu diperkuat dengan survei cakupan, serta pencatatan dan pelaporan selama ANC.

Kata kunci: ibu hamil, manajemen, suplementasi multi mikronutrien

Doi: 10.36457/gizindo.v47i1.826
www.persagi.org/ejournal/index.php/Gizi_Indon

INTRODUCTION

Maternal and child undernutrition has emerged as a global concern due to its potential to yield both short-term and long-term consequences on various facets of human life across the life cycle. Concurrently, the nutritional status of mothers can significantly influence birth outcomes and contribute to early-life malnutrition, primarily stemming from chronic energy and micronutrient deficiencies in the mother.[1]

Referring to the Global Nutrition Report (GNR) 2020, it was reported that 613.2 million women of reproductive age experienced anaemia, with 35.3 million of them being pregnant women (data from 2016).[2] Furthermore, the global data on child undernutrition in 2020 indicated that 20.5 million newborns (14.6%) had low birth weight, 45.5 million children (6.7%) were wasted, and 149.2 million children (22.0%) were stunted.[3,4]

In Indonesia, maternal and child undernutrition has garnered national attention, with the prevalence of anaemia in pregnant women reaching 48.9 percent in 2018.[5] Furthermore, as of 2021, the prevalence of stunting, wasting, and underweight among children under five years was reported at 24.4 percent, 7.1 percent, and 17.0 percent, respectively.[6]

To address maternal, infant, and child health, the World Health Organization (WHO) has launched their updated recommendations on antenatal care (ANC) services with a special focus on multiple micronutrient supplements during pregnancy. These supplements, comprising 13 or 15 micronutrients, align with the UNIMMAP (United Nations International Multiple Micronutrient Antenatal Preparation) formulation, which encompasses 15 micronutrients.[7] The significance of multiple micronutrient supplementation (MMS) during pregnancy is underscored by its association with a reduction in maternal anemia, preterm birth, small for gestational age (SGA), and low birth weight (LBW).[7] Consequently, the maternal and infant outcomes, particularly in cases of preterm birth, SGA, and LBW, pose a heightened risk for infants to experience wasting, stunting, and underweight during subsequent stages of life.[8]

In low and middle-income countries, micronutrient deficiencies are prevalent, particularly among pregnant women who have increased energy and nutrient requirement, impacting their functioning, growth, and development.[9] Consequently, the adoption of MMS program during pregnancy has been proposed as a cost-effective strategy to yield multiple benefits.[9] A hypothetical replacement of iron-folic acid supplementation (IFAS) with MMS for pregnant women in studies conducted in Bangladesh and Burkina Faso demonstrated the effective prevention of mortality and preterm birth.[10] Similarly, in Vietnam, a study investigating the effectiveness of MMS during pregnancy revealed that regular MMS intake could enhance birthweight and height at 2 years of age compared to IFAS.[11]

In Indonesia, the implementation of MMS program has been initiated in a pilot phase limited to specific districts, while IFAS program remains a national program. The potential transition from IFAS to MMS arises from concerns about the low effectiveness of the IFAS program, including issue on monitoring and evaluation mechanisms to ensure delivery and consumption of IFAS tablet.[12] Similar challenge have been observed in countries like Nicaragua, Nepal, and Vietnam, where IFAS serves as a national program. These concerns include a lack of comprehensive data regarding the coverage and adherence to IFAS among pregnant women.[13]

Some pilot studies on MMS has been initiated in several districts in Indonesia, including Lombok Island[14], Probolinggo District[15], and Banggai District[16]. The outcomes of the MMS pilot study indicate its potential in reducing fetal loss, neonatal mortality, the risk of low birth weight, and Malondialdehyde levels.[14,16]

Despite the implementation of MMS program in several districts in Indonesia, including Sidoarjo District where the MMS program is integrated into the pre-marriage services *(Layanan Terpadu Pranikah*/Laduni) program, research on the management aspects of the program remains limited. Sidoarjo District has introduced the Laduni program as part of the MMS program initiative to accelerate nutrition improvement. According to the maternal and child nutrition profile in Sidoarjo District, the prevalence of stunting, wasting, and underweight among children under five years

was 14.8 percent, 5.4 percent, and 7.2 percent, respectively, in 2021.[6] Additionally, 12.2 percent of pregnant women of reproductive age in the district suffer from chronic energy deficiency.[5] Given the national priority on accelerating stunting reduction, Sidoarjo District has been designated as a priority location since 2020.[17] Therefore, it is imperative to conduct research on the management of MMS for pregnant women in Sidoarjo District, East Java, to prevent early-life malnutrition.

METHODS

This study was a qualitative study using a phenomenological approach. The research focused on investigating the perceptions, experiences, and expectations of relevant stakeholders regarding the management of MMS program for pregnant womento prevent early-life malnutrition in Sidoarjo District, East Java.

The data collection for this study took place from April to May 2022 and involved in-depth interviews conducted through both online and face-to-face methods with a total of 23 informants. These informants represented government and non-government institutions at various levels, including national, provincial (East Java Province), district (Sidoarjo District), selected sub-districts (Jabon - rural, and Buduran - urban), and selected villages (Siwalan Panji and Dukuh Sari Village). The informants were selected based on their position in their respective institution relevant to MMS program. Data collection was done through face-to-face interviews with strict health protocols, except interviews with national and provincial governments, university, civil society organization (CSO), and industry, through online platforms using the Zoom Meeting application.

Additionally, the study included focus group discussions (FGD) with 28 informants from the beneficiary groups, comprising 14 pregnant women and 14 mothers of children under 5 years. All FGD sessions with the beneficiaries were conducted face-to-face with strict health protocols. The selection of informants was guided by maximum variation purposive and snowball sampling methods based on data saturation. The variations include type of residence, type of MMS product consumed during pregnancy, compliance towards the MMS consumption where ≥180 tablets during pregnancy is good and <180 tablets during pregnancy is poor for mother under 5 five years old children. For pregnant women, the compliance referred to their current consumption in which everyday consumption is categorize as good compliance and not regular consumption is poor compliance.

Inclusion of different types of informants in this study is part of triangulation process to obtain insight from various perspective.

The data analysis for this study followed an iterative process which involves several cycle of refinement from transcription, coding, categorization, and theme determination. Content analysis was employed through hierarchical coding. Three pre-determined themes, adapted from the WHO logic model for micronutrients in public health (2016)[18] and Berti et al (2018)[13], were resources, management, and communities. However this paper will focus on management theme. Furthermore, within the management theme, the study used 5 pre-determined sub-themes namely (1) delivery mechanism, (2) accessibility, (3) coverage, (4) quality control, and (5) monitoring and evaluation.

This study received ethical approval from the Health Research Ethics Committee, Faculty of Medicine, Universitas Indonesia, granted on March 14th, 2022, with the approval number KET-250/UN2.F1/ETIK/PPM.00.02/2022.

RESULTS

Characteristic of The Informants

Majority of the stakeholders participated in this study were female (n = 18), within the age range of 46 to 55 years (n = 12). Eleven informants held a master's degree. While majority of the beneficiaries were aged between 26 to 32 years, had graduated from senior high school, were not employed, resided in rural areas, and demonstrated good adherence to MMS consumption. The total number of informants in this study was 51, as listed in Table 1 and Table 2.

Sub-theme 1: Delivery Mechanism MMS Program

The delivery mechanism of the MMS program consisted of procurement and

distribution processes. These processes engaged District Health Office (DHO), university, Civil Society Organization (CSO), Public Health Center (PHC), and Ministry of Health (MoH).

MMS tablets in Sidoarjo District are supplied by the CSO with the name of the product called "Laduni" since it has been integrated into the district program "Laduni/*Layanan Terpadu Pranikah*" (Integrated Pre-marriage Services). Since the Laduni is imported product, there were some permit arrangements that should be completed. In this process, the DHO sent a request letter to the MoH to obtain a Special Access Scheme (SAS) number (*No. Ijin Kemenkes RI*). The SAS number (*No. Ijin Kemenkes RI*) must featured on the label or packaging of the Laduni product.

.

Table 1

Characteristics of the Stakeholders

Informants	Number (n = 23)
Characteristics	
Gender	
Female	18
Male	5
Age	
26-35	4
36-45	5
46-55	12
Above 55	2
Education Level	
Senior High School	5
Diploma Degree	3
Bachelor Degree	2
Master Degree	11
Doctoral Degree	2
Institution	
National Level	
Ministry of Health (MoH)	3
Ministry of National Development Planning (Bappenas)	2
Provincial Level	
Provincial Health Office (PHO)	1
Province Development Planning Agency (Bappeda)	2
District Level	
District Health Office (DHO)	1
District Development Planning Agency (Bappekab)	1
Sub-district Level	
Public Health Center (PHC/Puskesmas)	2
Village Level	
Midwife	2
Cadre	5
Government Partners	
Academia/University	2
Civil Society Organization (CSO)	1
Business Sector/Industry	1

Table 2

Characteristics of the Beneficiaries

Characteristics	Mother of CU 5 (n = 14)	Pregnant Women (n = 14)
Age		
19-25	4	4
26-32	6	9
33-40	4	1
Education Level		
Elementary and Junior High School	2	1
Senior High School	10	8
Diploma and Bachelor Degree	2	5
Occupation		
Working	5	2
Not Working	9	12
Residential Area		
Urban	5	5
Rural	9	9
Child Age		
0-11 months	9	N/A
12-23 months	3	N/A
24-59 months	2	N/A
Number of Child		
1	5	N/A
2	3	N/A
>2	6	N/A
Gestational Age		
1st trimester	N/A	5
2nd trimester	N/A	3
3rd trimester	N/A	6
Anemia Status		
Anemic	2	-
Non-Anemic	12	14
MMS Consumption		
Laduni	7	12
Commercial product	7	2
Adherence of MMS Consumption		
Poor	3	3
Good	11	11

"Given its non-commercial product and its intended use for a specific program, we were required to obtain a permit from the Ministry of Health through the Directorate General of Pharmaceuticals and Medical Tools to get the Special Access Scheme (SAS) number. To obtain the SAS number, a request letter from the district government was required." (Academia/University, IDI#13)

After getting approval of the SAS permit from the MoH, the DHO initiated a collaboration with a university which in-charged to provide technical assistance to public health center (PHC) in implementing MMS program in Sidoarjo District. The collaboration was formalized in form of Memorandum of Understanding (MoU) between two parties. This collaborative agreement aimed to facilitate the distribution of the Laduni from CSO to DHO, enhancing packaging, and incorporating the necessary labeling for the Laduni product.

Additionally, the university has signed a MoU with the CSO as an integral component of the grants associated with the MMS program in Sidoarjo District. The university referred to the existing MoU with the DHO as the basis to propose grant to the CSO.

"In response to a request from the DHO (to support MMS program in Sidoarjo District), the university submitted a formal request to XXX (the CSO)."(Academia/University, IDI#13)

The CSO distributed the Laduni product to the university, to be further distributed to the DHO pharmacy warehouse. The Public Health Center (PHC) then obtained the Laduni product based on their estimated number of pregnant women in its PHC. Following this, nutritionists from the PHC distributed Laduni product to the beneficiaries during Antenatal Care (ANC) sessions, as part of the district government program.

"It's important to note that the distribution of the Laduni to the PHC, was managed independently by the PHC. The distribution process initiated from the district pharmacy warehouse, where the university distributed the Laduni product to DHO. Subsequently, DHO stored it in the district pharmacy warehouse, and allocations were made for each PHC based on the number of beneficiaries." (District level, DHO, IDI#4)

"We receive the Laduni supply from DHO. (the number of Laduni is) based on our reports on estimaed number of pregnant and pre-marriage women for the present year. The data are compiled by DHO, and subsequently, Laduni is distributed to us (PHC)." "Regarding the coverage of MMS, we distribute the Laduni to pregnant women who attend pregnancy check at PHC, Posyandu, and village midwives." (Sub-district level, PHC, Rural, IDI#2)

Stakeholders from the District Development Planning Agency (Bappekab) were not engaged in the procurement and distribution processes of the MMS/Laduni Program in Sidoarjo District, as their mandate primarily focuses on budgeting. Similarly, stakeholders from the Provincial Development Planning Agency (Bappeda), Provincial Health Office (PHO), and Ministry of National Development Planning (Bappenas) were not involved in these processes. This is attributed to the program being a district initiative, and the DHO holds the mandate for its implementation. Additionally, industry solely contribute to the production of premix as an ingredient for commercial MMS products.

Sub-theme 2: Accessibility of MMS Product

The accessibility of the MMS product in Sidoarjo District is facilitated through two channels: firstly, as a component of the district government program (Laduni product) provided by the DHO, and secondly, as a commercial product available for purchase in the marketplace. The Laduni product, integrated into the district program, is distributed to PHCs, which subsequently distribute it to beneficiaries through the ANC program. The Laduni product, being a part of the district program, is offered at no cost to beneficiaries in both rural and urban sub-districts. Therefore, pregnant women can receive Laduni product from the PHC.

"We receive an adequate supply of MMS from DHO, and as a result, we do not need to purchase it. Pregnant women who visit our facility will be provided with MMS." (Sub-district level, PHC, Urban, IDI#3)

"I received Laduni from the PHC." (Mother of CU5, Rural, Laduni, Poor, FGD1#4)

"I received Laduni during the early stages of pregnancy, around 2 or 3 months, and obtained it from the PHC." (Pregnant Woman, Urban, Laduni, Good, FGD3#1)

On the other hand, MMS from commercial sources are purchased by pregnant women in both rural and urban sub-districts based on prescriptions provided by obstetricians and gynecologists,

"I did not receive Laduni product. I only received a prescription from the doctor. Yes, that is the product (commercial product)." (Mother of CU5, Rural, Commercial product, Good, FGD1#2)

The PHC staff shared her interesting insight about practice of pregnant women towards MMS if they have to purchase the tablet themselves based on the prescription from the private midwife or obgyn. They more convinced the benefits of the commercial product since it was more expensive rather than Laduni product as describe in the following quotation.

"If mothers receive additional prescriptions, such as other vitamins from the midwife or obstetrician, they tend to have more trust in those supplements." (Sub-district level, PHC, Rural, IDI#2)

Sub-theme 3: Coverage of MMS Program

The MMS program in Sidoarjo District is designed to benefit both pregnant and pre-marriage women through the Laduni program. However, this present study focused on pregnant women.

In Sidoarjo District, the Laduni was distributed to pregnant women in all sub-districts. Nevertheless, due to limited quantities the DHO set criteria to prioritize pregnant women who get the Laduni.

"Yes, the MMS coverage has been extended to all sub-districts. However, it has not allocated to all pregnant women in Sidoarjo." (Academia/University, IDI#13)

"The target is 100 percent for pregnant women and pre-marriage women. In 2021, MMS covered only 71.43 percent of pregnant women. Then, the priority target for MMS is pregnant women who suffer from anemia or chronic energy deficiency, as MMS cannot cover all pregnant women." (District level, DHO, IDI#4)

Sub-theme 4: Quality Control of MMS Product

The quality control of Laduni product assessed in this study include formulation, packaging and labeling, as well as taste and aroma. The university acted as the primary responsibility for the quality control process.

"Quality control of the product was the responsibility of the university as they were also involved in the labeling process. The university collaborated with the Food and Drugs Agency (BPOM). We were not involved. We received the (Laduni) product and checked the expiration date." (District level, DHO, IDI#4)

The formulation of the Laduni product in Sidoarjo District adheres to the UNIMMAP (United Nations International Multiple Micronutrient Antenatal Preparation) formulation recommended by UNICEF and WHO since 1999. It is important to note that the commercial MMS product does not refer to the UNIMMAP formulation.

"All MMS that we used to support the government since the 90s are based on the UNIMMAP formula. We do not have another formula. We follow the standard from WHO until now. Currently, the supply is from abroad, and there is no local production in Indonesia. There are many MMS products in Indonesia, but the formula is not the UNIMMAP formula. Therefore, we cannot buy from Indonesia." (CSO, IDI#14)

"There was no (commercial MMS) product with the UNIMMAP formula available in the marketplace." (Academia/University, IDI#13)

A comparison between the UNIMMAP formulation, Laduni product, commercial product, and the Recommended Dietary Intake (RDI) of pregnant women in Indonesia is presented in Table 3. According to the table, Laduni product have less amount of calcium, vitamin K, biotin, DHA, and AHA compare with the commercial product. Conversely, the commercial product does not contain vitamin E, vitamin C, zinc, selenium, and iodine.

Regarding the packaging and labeling aspects, the DHO requested the university to create attractive packaging and labeling for the Laduni product. The orginal label was in English considering Laduni is an imported product. Given the Laduni is made for two different target groups, the university developed two distinct sets of packaging and labeling, each for pregnant women and pre-marriage women.

Table 3

Formulation of UNIMMAP Standard, Laduni Product, and Commercial Product

Micro Nutrient	UNIMMAP Formula(19)	Laduni Product	Commercial Product	RDI (AKG 2019)(20)		
				T1	T2	T3
Vitamin A	800 µg	800 RE	10,000 IU	900 RE	900 RE	900 RE
Vitamin D	200 IU	200 IU	400 IU	15 µg = 600 IU	15 µg = 600 IU	15 µg = 600 IU
Vitamin E	10 mg	10 mg	-	15 µg	15 µg	15 µg
Vitamin C	70 mg	70 mg	-	85 mg	85 mg	85 mg
Vitamin B1	14 mg	1.4 mg	3 mg	1.4 mg	1.4 mg	1.4 mg
Vitamin B2	1.4 mg	1.4 mg	3.4 mg	1.4 mg	1.4 mg	1.4 mg
Niacin	18 mg	18 mg	20 mg	18 mg	18 mg	18 mg
Vitamin B6	1.9 mg	1.9 mg	2 mg	1.9 mg	1.9 mg	1.9 mg
Vitamin B12	2.6 µg	2.6 µg	4 µg	4.5 µg	4.5 µg	4.5 µg
Folic Acid	400 µg	400 µg	1 mg	600 µg	600 µg	600 µg
Iron	30 mg	30 mg	30 mg	18-27 mg	18-27 mg	18-27 mg
Zinc	15 mg	15 mg	-	10-12 mg	10-12 mg	10-12
Copper	2 mg	2 mg	0,1 mg	1000 µg	1000 µg	1000 µg
Selenium	65 µg	65 µg	-	29-30 µg	29-30 µg	29-30 µg
Iodine	150 µg	150 µg	-	220 µg	220 µg	220 µg
Calcium:	-	-	-	1200 mg	1200 mg	1200 mg
Calcium D-pantothenate	-	-	7.5 mg	-	-	-
Calcium carbonate	-	-	100 mg	-	-	-
Vitamin K1	-	-	50 µg	55 µg	55 µg	55 µg
Biotin	-	-	30 µg	30 µg	30 µg	30 µg
DHA	-	-	40 mg	-	-	-
AHA	-	-	8 mg	-	-	-

*Notes:
- RDI calculation based on the range RDI of two reproductive age group, 19-29 years and 30-49 years
- T = Trimester

"The DHO requested to have more attractive packaging. We discussed and reached an agreement to create attractive packaging. For pre-marriage women, we chose a tosca color with images of brides and grooms. For pregnant women, we opted for a purple color with an image of a pregnant woman. Each photo on the packaging must include the SAS permit number." (Academia/University, IDI#13)

The packaging and labeling of the MMS/Laduni product consisted of various elements, such as targeted beneficiaries, quantity of capsules, micro-nutrient content, producer/manufacturer, SAS number, expiration date, benefits of the product, consumption and storage guidelines, as well as partnership logos representing the CSO, university, and the Government of Sidoarjo District.

Meanwhile, the packaging and labeling of the commercial product differed from the Laduni product, especially on halal logo, additional ingredients (butylated hydroxyanisole, methyl paraben, edicol black PN, powder FD&C Red No.40, iron oxide red, titanium dioxide, gelatin (bovine), glycerin), and retail price. There were no SAS number and information about the benefits of MMS consumption on labeling of the commercial product.

Majority of beneficiaries, both urban and rural sub-districts, reported feeling better and have no complaints after consuming both Laduni and commercial products.

"When I consume Laduni, I am feeling good. I don't have any complaints or issues at all." (Pregnant woman, Urban, Laduni, Good, FGD3#2)

"I didn't have any issues or complaints during the Laduni consumption." (Mother of CU5, Rural, Laduni, Good, FGD1#7)

Nevertheless, some pregnant women have different perspectives about the taste, aroma, and shape of the Laduni and commercial products. Both Laduni and IFAS products are in tablet form, while MMS from commercial products is in capsule form. The nutritionists from PHC have reported that during pregnancy check in ANC, several beneficiaries raised their concerns about the taste and aroma of the

Laduni product, as it has been associated with inducing nausea.

"Some mothers shared their experience on Laduni consumption, such as nausea." (Sub-district level, PHC, Rural, IDI#2)

"A pregnant woman mentioned about the smell of Laduni. She told me that it has unpleasant aroma." (Village level, Cadre, IDI#11)

Some beneficiaries also complained about the size of Laduni, which was too large for their preference. Additionally, they reported that the taste and aroma of the commercial product were preferable compared to Laduni that has fishy aroma.

"I received so many large-sized pills. I could not consume it if the pills had big size. Consequently, I had to grind the pills, but the taste was bitter." (Mother of CU5, Urban, Laduni, Poor, FGD4#4)

"The taste (of the commercial product) is slightly sweet, whereas Laduni, despite its small size, it has unpleasant aroma, like fish or iron. Consequently, Laduni induces nausea for me." …. "The size of XXX (commercial product) is not an issue as the tablet is sleek and easily consumable. XXX (commercial product) has a pleasant aroma. However, Laduni has a fishy smell, which is quite strong. Therefore, pregnant women with a history of nausea may find it more challenging." …. "The smell of Laduni is very strong, unlike IFAS, which only has a strong iron scent." (Mother of CU5, Urban, Commercial product, Good, FGD4#2)

On the other hand, the nausea and vomiting experienced when consuming Laduni product during pregnancy may be associated with physiological changes inherent to the pregnancy itself.

"In the early trimester, I experienced difficulties in consuming Laduni due to nausea and vomiting, mainly because of its unpleasant smell. However, in the second trimester, I was able to consume it as the nausea had subsided." (Pregnant woman, Rural, Laduni, Good, FGD2#9).

Sub-theme 5: Monitoring and Evaluation of MMS Program

The monitoring of the MMS/Laduni program in Sidoarjo was integrated into an existing platform or reporting system, that aligned with the IFAS program. This includes written reports from PHC through the Maternal and Child Health (KIA) Book and online application "*Si Cantik*"(*Sidoarjo Cegah Angka Kematian Ibu dan Anak*/Sidoarjo Prevents Maternal and Child Mortality). Additionally, midwives and community health workers (cadres) conducted home visits to monitor the consumption of MMS.

This mechanism aligned with the statement from the national government, acknowledging that monitoring and evaluation for the MMS program has not been established at the national level, as MMS was introduced as an innovative program by district governments. Nevertheless, the monitoring and evaluation of the MMS program can follow an existing mechanism which is similar with the IFAS program.

"Yes, there was no monitoring and evaluation mechanism established for the MMS program yet." (National level, MoH, IDI#21)

"Perhaps, the evaluation mechanism will be similar to IFAS." (National level, Bappenas, IDI#18)

Nutritionists at PHC inputted the MMS consumption of the beneficiaries in the written report through KIA book and regular report of PHC when the beneficiaries come to PHC for pregnancy check-up.

"We record data of MMS consumption (of the pregnant women). Whatever we provide to the pregnant women, including MMS, is documented in the KIA book. In addition to the KIA book, we also maintain our own notes." (Sub-district level, PHC, Urban, IDI#3)

Subsequently, the PHC submitted the report, detailing the conditions in each village, to the DHO. The DHO then conducts an analysis of this report which must be presented/submitted to the Bappekab. The analysis consisted of the results of monitoring and evaluation, and its recommendations.These recommendations serve as considerations for

the budget allocation of the Laduni program in the subsequent period, overseen by Bappekab.

"We solicit feedback from PHC as part of reporting process. The feedback reports from PHC described the conditions in each village. Subsequently, we analyzed these reports The results of the analysis were usually requested by Bappekab. Based on these results and recommendations, it serves as consideration when proposing the budget for the MMS program." (District level, DHO, IDI#4)

The PHC has developed an online application called "*Si Cantik*," which stands for "*Sidoarjo Cegah Angka Kematian Ibu dan Anak*" (Sidoarjo Prevents Maternal and Child Mortality). This application is designed to monitor maternal and child health services, include the Laduni program. However, the current status indicates that the transition from written reports to online reporting is still in progress.

"There are also reports through the 'Si Cantik' application, which includes data on pregnant women receiving Laduni. The application reports the number of pregnant women consuming Laduni. These data are available in the 'Si Cantik' application. However, not all data have been fully inputted. The system is currently in a transition process from semi-manual reporting to online reporting." (District level, DHO, IDI#4)

At the village level, midwives and community health workers (cadres) actively participate in conducting home visits as part of the monitoring process for beneficiaries. Their role includes reminding beneficiaries to regularly consume Laduni. Subsequently, the midwives and cadres report the results of these home visits to the PHC.

"In each citizen association (RW), we have cadres who assist pregnant women in each area. So, even if they cannot come to the PHC, we can reach out to the pregnant women. Each cadre is assigned to one RW. Then, the reports from the cadres are summarized at the village level and submitted to the PHC." (Village level, Midwife, Urban, IDI#9)

Despite the establishment of the Laduni program in Sidoarjo District since 2017, a coverage survey is scheduled to be conducted in 2022. This survey is considered a component of the joint monitoring and evaluation efforts involving the DHO, university, and CSO.

"A survey is scheduled for this year (2022). XXX (a civil society organization) has requested us to conduct the survey to monitor adherence to MMS consumption." (Academia/University, IDI#13)

"We will also support a coverage survey in Sidoarjo."(CSO, IDI#14)

DISCUSSION

The delivery mechanism of the MMS program in Sidoarjo District adopted the existing mechanism of the IFAS program through ANC services. An evidence-based study on MMS emphasizes the critical role of the delivery mechanism through the existing health system in effectively reaching pregnant women as beneficiaries of the MMS program.[13]

The procurement process for the Laduni product adhered to the official procedures from the MoH. This initiated with the official permit letter through the DHO to the Directorate General of Pharmaceuticals and Medical Tools of MoH, to obtain a Special Access Scheme (SAS) number for the Laduni product, as an import product. This procedure aligns with Minister of Health Regulation Number 51 of 2014 about the Importation of Medical Equipment through the Special Access Scheme.[21] The SAS is an official permit issued by the Government of Indonesia for essential products for the community through a special mechanism.[21] Products proposed to obtain SAS number should meet several requirements, including (1) providing optimal benefits for the community: (2) considering national needs and stocks; (3) meeting the standard on safety, benefit, and quality; (4) supporting government health policies; (5) originating from official sources; (6) having limited availability; (7) there is no similar product; (8) being incidental and not for regular purposes; and (9) not for commercial purposes.[21] Subsequently, the DHO proceeded to establish a MoU with the university. This MoU served as the basic agreement to implement the Laduni program in Sidoarjo District, complemented by an official

permit letter from the MoH. This was followed by a subsequent MoU between the university and the CSO.

Following the procurement process, the distribution of the Laduni product commenced with the CSO distributing the product to the university. Subsequently, the university distributed of the Laduni product to the DHO, and from the DHO to the PHC. At the community level, it became the responsibility of the nutritionists from the PHC to distribute the MMS product to the pregnant women during ANC sessions, in collaboration with the midwives. Existing delivery system for the IFAS program is already in place and can be potentially utilized for the distribution of MMS to the beneficiaries.[22] Leveraging the established delivery system for IFAS can reduce the distribution costs. Furthermore, high coverage of MMS program will be achieved if the delivery mechanism at the community level is put in place and the supply of MMS product is secured.[22]

In addition to the Laduni product provided for free by the district government, pregnant women also have access to commercial products available in the marketplace. The Laduni program in Sidoarjo District, as a district government initiative, is specifically targeted for pregnant women and pre-marriage women to prevent micronutrient deficiencies and mitigate their impact on pregnancy outcomes.

The coverage of the Laduni program in Sidoarjo District has gradually expanded from two sub-districts to all sub-districts. However, due to the limited quantity of the Laduni product, it has not yet reached all the targeted beneficiaries. Consequently, the DHO distributes the Laduni product selectively to a prioritized number of beneficiaries, based on proposed data from PHC. Pregnant women and pre-marriage women who are not covered by the district distribution can still access MMS by purchasing commercial products available in the marketplace.

Ensuring the quality of the MMS product is crucial, with particular focus on formulation, packaging, and labeling aspects. The formulation of Laduni product aligns with the UNIMMAP formula. In contrast, the formulation of the commercial product differs from the UNIMMAP formula, in terms of vitamin E, vitamin C, zinc, selenium, iodine, calcium, vitamin K, biotin, DHA, and AHA. This finding is similar with a situational analysis conducted in 12 lower and upper middle-income countries, including Brazil, Colombia, Guatemala, Mexico, Peru, Bangladesh, India, Vietnam, Ghana, Kenya, Nigeria, and South Africa, where the formulation of MMS product did not match with the UNIMMAP formulation.[23]

The packaging of the Laduni product becomes an attractive feature and its labeling functions as an informational source for the beneficiaries, while also as part of product regulatory.[23] Laduni product has packaging with two different colors for two different target beneficiaries, and its labeling consists of information on the number of capsules, micro-nutrient content, producer/manufacturer, SAS number, expiry date, benefits of the product, consumption and storage guidelines, and partnership logos. In contrast, the commercial product has a single color and features different components on its labeling, such as a halal logo, additional ingredients, and retail price. A situational analysis conducted in 12 countries across Asia, Africa, and Latin America found that MMS product labeling, at a minimum, includes a list of ingredients, expiry date, and manufacturer information.[23]

The beneficiaries expressed varied perspectives on the MMS products they consumed during pregnancy. Majority of the beneficiaries had no complaints about Laduni product. While some beneficiaries complained about the size and aroma of Laduni product which was too big and a bit fishy that can lead to nausea. In contrast, a few beneficiaries who consumed the commercial product found that the commercial product was slightly sweet and sleek which was easier to swallow and did not induce nausea. These different perspectives on Laduni and commercial products were influenced by the form of the product. Laduni product is a tablet which potentially difficult to swallow and leading to nausea, even though tablets have a longer shelf life than capsules.[24] A study in Mexico similarly identified that some beneficiaries found it challenging to swallow and detected a smell from the micronutrient tablet.[25] Conversely, the commercial product is a capsule coated with an outer shell that is more tasteless and easier to swallow.[24] However, capsules are more expensive than tablets, and

the outer shell contains gelatin, requiring assurance of halal certification.[24]

Laduni program in Sidoarjo District, as an innovative program by the DHO, has an existing monitoring platforms similar to the IFAS program. These platforms include written reports from PHC or KIA book, online application "*Si Cantik*" from PHC, and home visits conducted by midwives and cadres. However, a comprehensive coverage survey has not been conducted yet by the DHO, university, or CSO. The initiation of the coverage survey in 2022 indicates that the monitoring and evaluation of the Laduni program in Sidoarjo District is still unestablished. In the development of the monitoring and evaluation system for MMS, it is crucial to formulate a set of indicators consist of the program's cycle, covering inputs, activities, outputs, and outcomes.[26] These indicators can be adapted from existing IFAS program indicators, supplemented with specific indicators relevant to MMS.[26] At least, these indicators should consist of policy and supply availability, coverage, as well as adherence of the MMS consumption.[26]

CONCLUSION AND RECOMMENDATION

Conclusion

The MMS/Laduni product, implemented as part of the DHO program, was distributed to pregnant women through the existing delivery mechanism of IFAS program during ANC services. Despite being distributed in all sub-districts, the distribution of Laduni product has not reached all pregnant women in Sidoarjo District due to the limited quantity of Laduni product. Consequently, some pregnant women purchased MMS product from the commercial market.

The quality control of the Laduni product, based on the UNIMMAP formula, is overseen by the university and supervised by the DHO, particularly on product packaging and labeling. However, the quality of the MMS product should be improved, as some beneficiaries expressed their concerns about its taste and aroma, describing it as somewhat fishy. Additionally, feedback indicated that the hardness of the tablet posed challenges for swallowing compared to the commercial product.

Monitoring of the Laduni program involved manual reporting, and there is an ongoing transition towards implementing an online reporting system through a mobile application. However, the monitoring and evaluation systems have not been fully established, as the coverage and compliance survey has not been conducted yet. Consequently, the current data about the adherence of the Laduni consumption is unavailable.

Recommendation

The quality of the Laduni product should be improved based on the concerns raised by several beneficiaries about the taste, aroma, and size of the Laduni product compared to the commercial product. Additionally, there is a need to improve the monitoring and evaluation systems by formulating comprehensive coverage and compliance surveys, as well as strengthening the recording and reporting during ANC. This approach ensures the MMS program effectively targets and reaches its beneficiaries.

ACKNOWLEDGEMENT

The authors are appreciative of the contributions from Sidayu Ariteja (Directorate of Public Health and Nutrition, Ministry of National Development Planning Republic of Indonesia), Judhiastuty Februhartanty (Department of Nutrition Science Faculty of Medicine, Universitas Indonesia and SEAMEO RECFON), and Dian Kusumadewi (Department of Community Medicine, Faculty of Medicine, Universitas Indonesia), as well as all of related stakeholders from national, provincial, district, sub-district, village level, and all of beneficiaries for their participation in the study.

REFERENCES

1. Black R, Allen L, Bhutta Z, Caulfield L, de Onis M, Ezzati M et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet Ser Matern Child Undernutrition 1. 2008;371(9608):243–60. doi: 10.1016/S0140-6736(07)61690-0
2. Development Initiatives. Global Nutrition Report: Action on equity to end malnutrition. Bristol: Development Initiatives; 2020.
3. UNICEF, WHO, World Bank. Levels and trends in child malnutrition: key findings of the 2021 edition of the joint child malnutrition estimates. New York: United Nations Children's Fund;

2021.
4. Development Initiatives. Global Nutrition Report: The state of global nutrition. Bristol: Development Initiatives; 2021.
5. Ministry of Health Republic of Indonesia. National Report Basic Health Research 2018. Jakarta: National Institute of Health Research and Development Republic of Indonesia; 2018.
6. Ministry of Health Republic of Indonesia. Launching The Result of Indonesia's Nutritional Status Study 2021 [Internet]. 2021 [cited 2021 Dec 27].
7. World Health Organization (WHO). WHO antenatal care recommendations for a positive pregnancy experience. Nutritional interventions update: Multiple micronutrient supplements during pregnancy. Geneva: World Health Organization; 2020.
8. Christian P, Lee S, Donahue Angel M, Adair L, Arifeen S, Ashorn P et al. Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low- and middle-income countries. Int J Epidemiol. 2013;42(5):1340–55. doi: 10.1093/ije/dyt109
9. Keats EC, Haider BA, Tam E and BZ. Multiple-micronutrient supplementation for women during pregnancy. Cochrane Database Syst Rev. 2019;(3). doi: 10.1002/14651858.CD004905.pub6
10. Engle-Stone R, Kumordzie S, Meinzen-Dick L and VS. Replacing iron-folic acid with multiple micronutrient supplements among pregnant women in Bangladesh and Burkina Faso: costs, impacts, and cost-effectiveness. Ann N Y Acad Sci. 2019;1444(1):35–51. doi: 10.1111/nyas.14132
11. Huy N, Hop L, Shrimpton R and HC. An Effectiveness Trial of Multiple Micronutrient Supplementation during Pregnancy in Vietnam: Impact on Birthweight and on Stunting in Children at around 2 Years of Age. Food Nutr Bull. 2009;30(4):506–16.doi: 10.1177/15648265090304S405
12. Dipo DP. Policy on Maternal Micronutrient Supplementation: The Current and Future Development [Internet]. Indonesian Institute of Nutrition. Proceeding Researchers and Experts Discussion on Multiple Micronutrient Supplementations (MMS) for Pregnant Women as a Measure for Stunting Prevention. 2020 [cited 2021 Aug 28]. p. 10.
13. Berti C, Gaffey M, Bhutta Z and CI. Multiple-micronutrient supplementation: Evidence from large-scale prenatal programmes on coverage, compliance and impact. Matern Child Nutr. 2018;14(S5):e12531. doi: 10.1111/mcn.12531
14. SUMMIT Study Group. Effect of maternal multiple micronutrient supplementation on fetal loss and infant death in Indonesia: a double-blind cluster-randomized trial. Lancet. 2008;371(9608):215–27. doi: 10.1016/S0140-6736(08)60133-6
15. Sumarmi S, Wirjatmadi B, Kuntoro, Gumilar E, Adriani M and RE. Micronutrients Supplementation during Preconception Period Improves Fetal Survival and Cord Blood Insulin-Like Growth Factor 1. Asian J Clin Nutr. 2015;7(2):33–4. doi: 10.3923/ajcn.2015.33.44
16. Monoarfa Y, Gumilar E, Widasari L, Yekti R, Otoluwa A and TA. The effect of selenium and multiple micronutrient administration during periconception period on the level of malondialdehyde. Enfermería Clínica. 2020;30:114–8. doi: 10.1016/j.enfcli.2019.10.053
17. Minister of National Development Planning Official Letter Number B.240/M.PPN/D.5/PP.01.01/04/2019 about Expansion of Focus Location of Integrated Intervention for Stunting Reduction in 2020 [Internet]. [cited 2021 Nov 6]. Available from: https://cegahstunting.id/intervensi/intervensi-terintegrasi/lokasi-fokus-intervensi-penurunan-stunting/
18. World Health Organization (WHO). Logic model for micronutrient interventions in public health: Vitamin and Mineral Nutrition Information System [Internet]. 2016 [cited 2021 Sep 28]. Available from: https://apps.who.int/iris/bitstream/handle/10665/250746/WHO-NMH-NHD-EPG-16.1-colour-eng.pdf?sequence=3&isAllowed=y
19. World Health Organization, United Nations University, and United Nations Children's Fund. Composition of a multi-micronutrient supplement to be used in pilot programmes among pregnant women in developing countries: report of a United Nations Children's Fund (UNICEF), World Health Organization (WHO) and United Nations University workshop [Internet]. 1999 [cited 2021 Sep 28]. Available from: http://apps.who.int/iris/handle/10665/75358
20. Minister of Health Decree Number 28/2019 about Recommended Dietary Intake for Indonesian [Internet]. 2019 [cited 2021 Sep 16]. Available from: http://hukor.kemkes.go.id/uploads/produk_hukum/PMK_No__28_Th_2019_ttg_Angka_Kecukupan_Gizi_Yang_Dianjurkan_Untuk_Masyarakat_Indonesia.pdf
21. Minister of Health Regulation Number 51 of 2014 about Importation of Medical Equipment through Special Access Scheme [Internet]. 2014 [cited 2022 Oct 9]. Available from: https://peraturan.bpk.go.id/Home/Details/143148/permenkes-no-51-tahun-2014

22. Shrimpton R and Schultink W. Can supplements help meet the micronutrient needs of the developing world? In: Proceedings of the Nutrition Society. 2002. p. 223–9.
23. Monterrosa EC, Beesabathuni K, van Zutphen KG, et al. Situation analysis of procurement and production of multiple micronutrient supplements in 12 lower and upper middleincome countries. Matern Child Nutr. 2018;14(S5):e12. doi: 10.1111/mcn.12500
24. Bhamra H. Capsule vs Tablets: What's the Difference Between Capsules and Tablets? [Internet]. 2021 [cited 2022 Oct 15]. Available from: https://www.expresspharmacy.co.uk/blog/posts/capsule-vs-tablets-what-s-the-difference-between-capsules-and-tablets
25. Young SL, Blanco I, Hernandez-Cordero S, et al. Organoleptic Properties, Ease of Use, and Perceived Health Effects Are Determinants of Acceptability of Micronutrient Supplements among Poor Mexican Women. J Nutr. 2010;140(3):605–11. doi: 10.3945/jn.109.113498
26. Mei Z, Jefferds ME, Namaste S, Suchdev PS and F-AR. Monitoring and surveillance for multiple micronutrient supplements in pregnancy. Matern Child Nutr. 2018;14(S5)(e12501). doi: 10.1111/mcn.12501