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Facilitating Factors of Mothers' Good Adherence to Four National Nutrition Programs in Indonesia

Faktor yang Memfasilitasi Ibu dengan Kepatuhan yang Baik dalam Melaksanakan Empat Program Gizi Nasional di Indonesia

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ARTICLE INFO

Received: 28-03-2024

Accepted: 11-02-2025

Published online: 14-03-2025

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DOI:

10.20473/amnt.v9i1.2025.87-100

Available online at:<https://e-journal.unair.ac.id/AMNT>**Keywords:**

Information exposure, Family support, Mother's compliance, the First 1000 days of life

ABSTRACT

Background: Mothers' compliance with national nutrition programs during the first 1000 days of life is crucial to optimal child growth and development. However, national surveys have revealed low levels of compliance, suggesting challenges faced by mothers. Thus, understanding the facilitating factors of mother's consistent good compliance is important.

Objectives: To explore the facilitating factors of mothers' good compliance with four national nutrition programs during the first 1000 days of life.

Methods: Of the 48 mothers of 6-23-month-old children interviewed in this study, 10 demonstrated consistent compliance with the recommended maternal iron and folic acid (IFA) supplementation, breastfeeding, complementary feeding, and vitamin A capsule (VAC) supplementation programs. In-depth exploration and analysis were carried out on the 10 mothers, focusing on the roles of health staff, information exposure, knowledge, and family support.

Results: All mothers had a strong initiative to seek information from various sources, including healthcare staff, the mother and child health book, and Internet (among urban mothers), irrespective of their socio-demographic backgrounds. Frequent information exposure resulted in good knowledge, except on VAC supplementation. Healthcare staff, particularly midwives, played significant roles in mothers' compliance to IFA supplementation and breastfeeding, but much less for complementary feeding practices. The role of *Posyandu* cadres was limited to the dissemination of VAC supplementation schedules. Support from family members were observed in all programs, mainly in providing information and maintaining motivation.

Conclusions: Information exposure and family support were key to mothers' good compliance. The roles of healthcare staff, particularly in providing complementary feeding information, should be strengthened.

INTRODUCTION

The importance of good nutrition in the first 1000 days of life (FDL) for the prevention of stunting has been well acknowledged¹. To support good nutrition practices during that period, governments in many countries have launched nutrition programs, such as iron and folic acid (IFA) supplementation during pregnancy², encouraging exclusive breastfeeding (EBF) until the child reaches the age of six months, and continued breastfeeding until the child reaches the age of two years, providing a diverse

range of complementary foods in adequate quantities^{3,4}, and vitamin A capsule (VAC) supplementation⁵. This series of nutrition caring is expected to ensure adequate energy and nutrient intake from the womb to the age of 24 months, supporting the rapid growth and development that occurs during this period and laying a foundation for the child's future.

The Lancet published a comprehensive review in 2013 on the impact of nutrition interventions in reducing stunting in young children. The study mentioned that iron

tablet supplementation during pregnancy, promotion of breastfeeding and complementary feeding (IYCF), and VAC supplementation for children are among the 10 specific nutrition interventions proven to be effective in reducing stunting prevalence by up to 20%, provided that the programs reach at least 90% of the target population⁶. The impact of the programs largely depends on the level of compliance of pregnant women, mothers of young children, or other caregivers in implementing them⁷.

Four nutrition programs have been implemented nationally in Indonesia. Three of these four programs are reaffirmed in Presidential Regulation Number 71 of 2021 as part of the indicators for the availability of specific intervention services included in the National Strategy for the Acceleration of Stunting Reduction⁸. Meanwhile, the remaining program, VAC supplementation, is still implemented nationally as an effort to prevent vitamin A deficiency, which can increase the risk of blindness, morbidity, and mortality in children under five years of age⁹.

IFA tablet supplementation for all pregnant women, which is given at one tablet daily throughout pregnancy, is integrated into antenatal care (ANC) visits. Pregnant women who receive ANC at government-owned healthcare facilities (such as *Posyandu*, *Puskesmas*, or hospitals) receive iron tablets free of charge during pregnancy¹⁰. Infant and Young Child Feeding (IYCF), which includes breastfeeding and complementary feeding, is also promoted as part of growth monitoring at *Posyandu* for children under five every month, especially at the fourth station, using the Maternal and Child Health (MCH) Book as a reference. Counseling is provided by health workers and *Posyandu* cadres, either independently or accompanied by health personnel¹¹. Finally, VACs for infants and young children (6–59 months) are provided simultaneously in February and August at *Posyandu* and other healthcare facilities. If the target children do not visit the health facilities, a sweeping effort is conducted through home visits⁹.

We had the opportunity to analyze data from the 2010 National Health Survey (Riskesdas)¹² regarding maternal compliance with the four nutrition programs in a composite manner. We figured out that out of 3,668 mothers of children aged 6–23 months whose data were analyzed, only 2.7% consistently implemented all the recommended four nutrition programs (unpublished). The compliance rates for each program were as follows: 70.2% for vitamin A capsule supplementation for children, 68.4% for continued breastfeeding, 27.7% for iron tablet supplementation during pregnancy, and 11.6% for complementary feeding that met the Minimum Acceptable Diet (MAD) indicator. According to more recent data, the prevalence of mothers with high compliance with each of these programs is still far from the target.

The proportions of pregnant women who consumed ≥ 90 iron tablets during pregnancy were 33.3% in 2013¹³, 38.1% in 2018¹⁴, and 44.2% in 2023¹⁵. In terms of breastfeeding, 30.3% of children were exclusively breastfed in the past 24 hours in 2013¹³, and 78.8% of children aged 0–23 months were still being breastfed at the time of data collection. In addition, 53.5% of children under five received VACs in the past year in 2014¹⁴.

Regarding complementary feeding, only 46.6% of children received diversified foods in 2018¹⁴, and only 39.7% of children received complementary foods that met the Minimum Acceptable Diet (MAD) criteria in 2023¹⁵. Although there is no composite data available on maternal compliance with all the four programs from the most recent national survey, the low compliance rates for each individual program indicate a low composite compliance rate.

The low level of maternal compliance indicates that mothers face challenges in effectively implementing the recommended programs. An exploration should be carried out on mothers who could successfully carry out all the four nutrition programs as a learning opportunity, especially for program implementers, to improve maternal compliance and achieve the expected impact. Therefore, this study aimed to explore the factors that facilitate high maternal compliance with national nutrition program recommendations during the first 1000 days of life.

METHODS

Study Design

This study was conducted using a qualitative approach as part of a larger study titled "*A Continuum of Care Analysis on Adherence towards Maternal and Child Nutrition Programs and Its Association to Child Stunting in Indonesia*". The qualitative approach was applied to provide a deeper understanding of the results of quantitative analysis (unpublished), particularly regarding the roles of healthcare workers, information exposure and nutrition knowledge during pregnancy, child caregiving for children under two years of age, and family support. For example, it explored why mothers choose or do not choose healthcare workers as a source of nutrition information, or how family support is provided and why it influences maternal compliance.

Study Area and Respondents

The research was conducted at two *Posyandu* covering seven sub-hamlets/neighborhood units in one sub-district in Bogor City as an urban area, and at two *Posyandu* covering eight sub-hamlets in Bogor Regency as a rural area. The inclusion of both urban and rural areas aimed to provide a more comprehensive picture, with a consideration of the general differences in characteristics between urban and rural respondents. These differences include factors such as exposure to nutrition and health information and the education and employment status of the respondents.

Although it also included the families of children aged 6–23 months, *Posyandu* cadres, and midwives, this study focused on mothers of children aged 6–23 months who had consistently followed good nutrition practices during pregnancy and child caregiving. The good nutrition practices referred to in this study were compliance with four recommended nutrition programs: (1) IFA tablet supplementation during pregnancy, which involved consuming at least 90 tablets throughout pregnancy; (2) breastfeeding practices, which included exclusive breastfeeding for the first six months and continued breastfeeding until the time of the study; (3)

complementary feeding practices, where the child ate three times a day, with IYCF consisting of at least four out of seven food groups during the day prior to the interview; and (4) VAC supplementation, where the child received VAC supplementation in the last six months.

The data collection for this study was conducted in 2014. However, given that maternal compliance with consuming at least 90 IFA tablets during pregnancy, complementary feeding, and VAC supplementation did not significantly change based on the Riskesdas data from 2013 and 2018, as outlined in the background section of this article, the challenges faced by pregnant women and mothers of young children (*baduta*) in following the nutrition program recommendations during this period were also unlikely to have changed substantially. Therefore, the data from this study is still considered relevant to describe the current situation. Furthermore, although the prevalence of stunting in young children has shown a decline, it has yet to meet the target, and there remains a significant gap in prevalence between provinces. This is supported by the findings from the Indonesian Nutrition Status Survey (SSGI) in 2021¹⁶. The prevalence of stunting in children under five in Bogor City was 16.9%. Meanwhile, in Bogor Regency it was 28.6%, higher than the West Java Province and national rates (24.5% and 24.4%, respectively). Although the stunting prevalence in Bogor City remained below the provincial and national levels, the results from the SSGI 2022¹⁷ indicate an increase to 18.7%.

Sampling Procedures

The respondents of this study were selected purposively based on the following inclusion criteria: having a child aged 6–23 months, residing in the working area of the selected *Posyandu*, adhering to the four nutrition recommendations during pregnancy and child rearing as explained above, and willing to participate in the study. To obtain comprehensive information, the following characteristics were considered: (1) the respondent's education level, (2) the respondent's occupation, (3) the child's birth order, (4) the child's age, (5) the type of the family, and (6) the family's economic condition. Information on the family's economic condition was gathered qualitatively through interviews and observations during home visits, focusing on the condition of the house and the ownership of household assets, such as motorcycles, cars, laptops/computers, television units, and 12 kg LPG cylinders.

Mothers of children aged 6–23 months who visited the selected *Posyandu* on the day of growth monitoring were chosen as study respondents. The *Posyandu* schedule was obtained from the *Posyandu* supervisor. The mothers were given a brief explanation about the study. Mothers who were willing to participate in the study were asked more detailed questions regarding their adherence to the four recommended nutrition programs during pregnancy and child rearing as a form of screening to capture variations in the levels of compliance. The questions included those asking whether the mothers consumed at least 90 IFA tablets during pregnancy (yes/no), whether the mothers breastfed exclusively for the first six months (yes/no) and continued breastfeeding until the time of the interview (yes/no),

whether the children received three meals consisting of at least four out of seven food groups (i.e., carbohydrates, legumes, dairy and processed dairy products, animal protein such as red meat, poultry, fish, and offal, eggs, fruits and vegetables rich in vitamin A, and other fruits and vegetables) per day (yes/no), and whether the children received VAC supplementation in the last six months (yes/no)⁹. The interview schedule was established at the mothers' agreed-upon time. Sampling was also conducted using the snowball method to recruit respondents with specific characteristics¹⁸, such as working mothers who successfully breastfed their children exclusively and continued to breastfeed until the time of the interview and mothers who did not bring, or rarely brought, their children to *Posyandu* for growth monitoring. Snowball sampling was conducted by asking respondents, *Posyandu* cadres, or midwives. In addition to the variations in the implementation of the recommended nutrition programs during pregnancy and child rearing, the sampling was also carried out by considering the demographic characteristics of the respondents as described above.

Number of Respondents

Of the total 48 respondents (26 urban respondents and 22 rural respondents) who participated in the larger study, 10 respondents (seven urban respondents and three rural respondents) consistently followed the four recommended nutrition programs during pregnancy and child rearing. The exploratory results obtained from these 10 respondents are presented in this paper.

Data Collection Procedures

Data collection was carried out through in-depth interviews with respondents at their respective homes at the time that they had agreed upon. To ensure the completeness of information, some respondents were interviewed more than once. The interviews were conducted by the principal investigator using a pre-tested interview guide, which was based on the conceptual framework developed by Hector *et al.*¹⁹, considering several factors that influence breastfeeding practices, including individual factors (e.g., the respondent's knowledge and experience), group factors (e.g., the home environment and healthcare services), and social factors (e.g., societal norms on child rearing and pregnancy). Given that the recommendations for other nutrition practices share similar characteristics, such as the importance of maternal awareness and a supportive environment, with breastfeeding practices, this conceptual framework was selected as a reference for the design of the interview guide.

Data Analysis

Given that all respondents demonstrated good adherence to the four recommended nutrition programs, data analysis was conducted by identifying similarities and differences among the respondents through consistent comparison across four themes. These four themes were the roles of healthcare providers, exposure to information, knowledge, and the roles of the husband and other family members in relation to the four

programs (IFA supplementation during pregnancy, breastfeeding, supplementary feeding, and VAC supplementation). The similarities and differences between respondents were also analyzed, with a consideration of the variations in their characteristics. For example, for the family support theme, the analysis concentrated on the similarities and differences between respondents living in nuclear families versus extended families, those with their first child versus subsequent children, and those living in urban versus rural areas.

Data analysis was conducted both during the fieldwork (while data collection was still ongoing) and after the data collection was completed. During the fieldwork, data analysis was carried out by filling out a matrix containing the key points shared by the respondents, organized by theme. This matrix was filled out by the research assistants while the principal investigator was conducting the interviews. Each respondent's information was organized into a separate matrix. Further analysis was performed by closely examining the information obtained from the matrix, which involved reviewing the verbatim transcripts of the interviews. Relevant statements from the respondents were included as quotations to sharpen the analysis and provide additional context to their responses.

Ethical Clearance

This study received an ethical approval from the Ethics Committee of the Faculty of Medicine, Universitas Indonesia, on January 6, 2014 (Number 07/H2.F1/ETIK/2014). Permission to conduct the research was also obtained from the health offices of the regency and city. Participants provided written consent to participate, as demonstrated by a signed informed consent form.

RESULTS AND DISCUSSIONS

Of the total 48 respondents (26 urban respondents and 22 rural respondents) who were interviewed regarding maternal compliance with nutrition recommendations during the first 1000 days of life, 10 respondents (seven urban respondents and three rural respondents) consistently practiced the four nutrition recommendations that are the focus of this study. These ten respondents had varied socio-demographic characteristics (Table 1). Respondents in the city had higher education levels than those in the village, where both urban respondents and their husbands had completed high school education. Regarding family type, the husbands of three respondents in the village lived in the city and only returned to meet the said respondents and their children once every two weeks. Most of the children were 11 months old or older. The majority of the respondents were housewives.

Health Personnel and Community Health Worker Roles

All respondents in this study underwent ANC check-ups at *Posyandu* (integrated health posts) or visited private midwives, except for one respondent in the city who had ANC check-ups with an obstetrician. The respondents began receiving or purchasing IFA tablets as soon as they had their first ANC visit at 1 or 2 months of pregnancy. They continued to receive them in sufficient amounts until the ninth month of pregnancy. The study showed that adequate ANC visits (at least four times during pregnancy) were associated with a more than twofold increase in maternal adherence to consuming at least 90 IFA tablets during pregnancy (adjusted OR = 2.2; 95% CI 2.0, 2.4)²⁰.

According to the respondents, during the initial check-up, the midwife told them to take IFA tablets for the health of the baby and to ensure a smooth delivery (to have energy and avoid weakness). In the subsequent check-ups, some respondents were asked the question, "Has the previous supply run out?" to check their IFA tablet consumption. Some other respondents mentioned that they were rarely asked about their iron supplement consumption and were simply given another month's supply. None of the respondents ever received information about the potential side effects that may occur after taking IFA tablets or how to minimize them if there are any. This information is important to prevent any side effects of the IFA tablets from becoming a major problem²¹.

However, the respondents' strong trust in health personnel and their strong motivation for optimal health for both themselves and their babies led them to continue taking IFA tablets regularly despite facing challenges. These challenges included boredom, dislike of the taste/smell of the supplements, feeling nauseous after consuming them, and not receiving specific monitoring of IFA tablet consumption from health personnel. Additionally, the respondents reported feeling the benefits of consuming IFA tablets.

"The midwife said this is for increasing blood levels. Because my own are low, I need to take this (supplement) to avoid feeling weak, she said. As for side effects, she didn't tell me. She usually just gives it to me (without explaining the side effects). Since I know that what the doctor or midwife gives has a purpose, I just take it." (Respondent 1)

"The midwife told me to take it (the supplement) every day so that my blood levels increase. Besides, it's good for the baby. The midwife knows best. It feels good in my body. I used to have headaches, but after taking it, I have no more headaches." (Respondent 10)

Table 1. Socio-demographic characteristics of the respondents

No	Residence	Age (years)	Highest education, respondent/husband [^]	Respondent's occupation	Husband's occupation	Child's birth order	Child's sex	Child's age (months)	Socio-economic level	Type of family
1	Urban	23	SHS/D1	Housewife	Private employee (factory worker)	1	Female	12	Middle	Extended (lived with parents)
2	Urban	24	BD/BD	Housewife	Private employee (teacher)	1	Male	11	High	Extended (lived with parents)
3	Urban	34	D3/D3	Private employee	Entrepreneur	2	Male	9	Middle	Nuclear
4	Urban	30	BD/BD	Civil servant	Entrepreneur	2	Male	12	High	Nuclear
5	Urban	28	BD/SHS	Housewife	Entrepreneur	1	Male	11	High	Nuclear (sister lived nearby)
6	Urban	24	SHS/D3	Private employee	Private employee	1	Female	14	Middle	Nuclear (parents-in-law lived nearby)
7	Urban	25	SHS/SHS	Housewife	Private employee (furniture shop)	2	Female	20	Low	Nuclear
8	Rural	23	ES/ES	Housewife	Trader	1	Male	15	Low	Extended (lived with parents, husband came home once in two months)
9	Rural	26	ES/JHS	Housewife	Private employee (furniture shop)	2	Female	15	Low	Nuclear (parents lived nearby, husband came home once in two months)
10	Rural	22	JHS/ES	Housewife	Taxi driver	1	Female	16	Low	Extended (lived with parents, husband came home once in two months)

[^]SHS (Senior High School), BD (Bachelor's Degree), D3 (Diploma 3), ES (Elementary School), JHS (Junior High School)

The respondents' high trust in health workers, especially midwives, was also evident in breastfeeding practices. The respondents received fairly complete information about breastfeeding, including information about exclusive breastfeeding and the ideal breastfeeding period of up to two years, from the midwives. This high level of trust was even considerably useful in convincing respondents in the rural area, where the environment was less supportive of exclusive breastfeeding, as explained below.

"The midwife told me to give only breast milk until the age of six months. Other foods can be given afterward. 'Just ignore what people say in your village. Don't give bananas to the baby. No biscuits either. Just breast milk until six months.' The midwife said the baby's intestines aren't strong yet. I thought, 'Well, the midwife knows better. Let the neighbors talk, I don't listen to them.'" (Respondent 8)

This is in line with a previous study in Indonesia showing that mothers and their families highly trust the advice of midwives, which influences the mothers' decisions regarding breastfeeding practices²². This is a common occurrence, especially among mothers with lower levels of education²³. This is because health workers are considered to have better knowledge, skills, and experience related to maternal and child health than they do. Furthermore, given the more limited access to information, mothers with lower education levels will make use of the available information sources in their environment, including healthcare workers they meet during ANC visits and child health services such as immunizations. A study in Ghana found the opposite, where lower utilization of health services was found among mothers with lower education levels. This might be related to their lower health awareness compared to mothers with higher education levels²⁴.

In this study, there were three mothers living in the rural area with low education levels. These three mothers made maximum efforts for their children's health by utilizing the information sources they could access, namely the MCH book and health workers, which allowed them to have good knowledge about nutrition during pregnancy and child rearing. In this study, midwives also played an important role in helping respondents overcome early breastfeeding issues, such as nipple soreness and low breast milk production, which are often reasons for mothers to stop breastfeeding²². However, with adequate information and support, including from health workers, most mothers who faced these issues were able to continue breastfeeding optimally¹⁹ because support from health workers could build a foundation of awareness and self-confidence in mothers to continue breastfeeding²⁵.

"When it first started, the breast milk came out in small amounts, and my nipples got sore. It felt awkward to breastfeed. I immediately went to the midwife. It was really painful. The baby was also crying. The midwife gave me an ointment to apply on my nipples. Then she said, 'Just keep breastfeeding, and it will heal on its own.' And it did, it healed on its own." (Respondent 7)

Regarding complementary feeding, most respondents rarely asked or were rarely given information about it by doctors or midwives. This is different from two previous studies in Ethiopia^{26,27} and Indonesia²⁸. In those studies, good complementary feeding practices were observed in mothers who visited health facilities and received information from health workers. In this study, when taking their children to see a doctor, the focus of the discussion was on treating the children's illness. Respondents admitted that they rarely met with midwives after their children received complete immunizations. Additionally, they felt that they did not have the opportunity to ask questions when meeting with midwives or community health workers at *Posyandu* because the midwives often appeared rushed while the community health workers were usually focused on weighing activities.

"I never ask (the midwife). Because the midwife is often busy, sometimes there are a lot of people, so she's in a hurry. There's no time to chat. The community health worker is also the same. Her focus is on weighing." (Respondent 9)

Studies have shown that limited time for providing services and inadequate skills result in counseling or education not being carried out. Even when it is provided, the educational messages are often too general or only given to mothers with children facing nutritional issues²⁹. Improving access to information and services is one form of support that families need to receive⁸. This was the case with two respondents in this study. One respondent in the city was referred to a nutritionist at the community health center because her child's weight had not increased for three consecutive months. According to her, the advice was clear, actionable, and noticeable in its impact as her child's weight began to increase after she followed it. The mother, who had a 'fairly close relationship' with the private midwife, mentioned that she received information about complementary feeding for her child from the midwife.

"I asked the midwife, since I'm close to her. When my child was six months old, I asked what foods to give her. She told me to give xxx (a brand of instant baby porridge). At nine months, I gave homemade porridge. I used vegetables, carrots, spinach, whatever. Also chicken liver. The community health worker didn't say anything." (Respondent 5)

For VAC supplementation, respondents in both urban and rural areas received information about its distribution through announcements via loudspeakers at mosques/*mushalla* and from community health workers who went around in the morning on *Posyandu* days. Employed respondents knew that their children received VAC supplementation from caregivers who took the children to *Posyandu* or had their children receive the vitamin at home when community health workers conducted house-to-house sweeps. Respondents in the rural area also received information about the VAC

distribution schedule from community health workers. However, unlike in the urban area, the *Posyandu* schedule in the rural area was not fixed.

"The community health worker told me that there would be a Posyandu (event) the next day and that there would be vitamin capsules. In the past, the event was always held on the same date. But now, the midwife changes frequently. The current one didn't tell me the time. Suddenly, they'd say, 'Oh, the midwife is here.' It's sometimes like that." (Respondent 8)

Exposure to Information

In general, studies have found that mothers with higher levels of education have a stronger desire to seek the information they need³⁰. However, in this study, it was observed that respondents took the initiative to seek information themselves regardless of their family's educational and economic backgrounds because they felt the need to maintain their and their child's health. The MCH book became one of the sources of information for some respondents living in the urban area and the main source of information for respondents living in the rural area.

"I read everything in the MCH book. It's all there. It's dangerous if your feet swell during pregnancy. Bleeding is also dangerous. I read it because I really wanted to know. If you know, you can be more careful." (Respondent 9)

The ability to seek information was also considered important when respondents faced challenges, such as breastfeeding issues. This is in line with what mothers in urban and rural areas of Central Java experienced. They sought information to increase their breast milk production so that they could breastfeed exclusively²². In general, previous studies have shown that respondents who had higher education and good economic conditions and who lived in urban areas were more likely to choose breastmilk substitutes due to their perceived modernity and prestige³¹. However, in this study, mothers who had higher education and good economic conditions and who worked still practiced exclusive breastfeeding and continued breastfeeding after the exclusive breastfeeding period was over because they received adequate information exposure.

"I follow AIMI (the Indonesian Breastfeeding Mothers Association) on Facebook. They have all the information about breastfeeding. I also like to attend seminars, like the Seminar for Working Mothers on Breastfeeding Awareness. That's the most useful for me." (Respondent 6)

The many challenges in complementary feeding practices led the respondents in this study to seek information from various sources, especially to seek the information they specifically needed. For example, to avoid their child getting bored and to address feeding difficulties, they looked for information on menu variations for children, how to deal with picky eaters,

quick meal preparations, and more. They were able to apply the available relevant information to tackle the challenges that they were facing.

Urban respondents had more sources of information than rural respondents. They received information from people around them (e.g., mothers, mothers-in-law, siblings, friends, and neighbors), the MCH book, and mass media, such as television and the Internet. The ease of access, the availability of diverse information, and the appealing presentation of information are the reasons why these respondents chose the Internet as their source of information. Meanwhile, for respondents in the rural area, besides other mothers with toddlers, the MCH book was their main source of information.

"I want to know how to feed a child. Even though we give food three times a day, it doesn't necessarily mean that the nutrients are sufficient. I refer to the MCH book on it. I make porridge using spinach, for example." (Respondent 10)

According to WHO, good complementary feeding practices highly depend on the extent to which caregivers are exposed to information, in addition to family support and the existing health system³. A significant positive relationship between information exposure and mothers' knowledge about complementary feeding was found in a study conducted on mothers with children aged 6–8 months in Lombok³² and West Java²⁸. A study in Nepal also showed that mothers' participation in social activities in the community was positively related to their exposure to information on complementary feeding, which ultimately influenced the fulfillment of the dietary diversity recommendations for the child³³.

Different practices were reported by respondents regarding VAC supplementation. None of the respondents specifically sought information about this. They believed that vitamins are good for children and that vitamins are provided as part of a government program. Besides, vitamins are always given when the mother brings the child to *Posyandu* for routine weighing. This is in line with a study in Bangladesh³⁴ and Tanzania³⁵, which found that information about the schedule of VAC distribution plays an important role in the compliance of caregivers in bringing their toddlers to receive VAC.

"I only found out when I was already there (at Posyandu). I was told to get my child's mouth open. 'This is Vitamin A,' said the community health worker. They didn't explain what it was for. They just gave it, and I left right away." (Respondent 9)

Table 2 presents a summary of the information provided by the respondents based on the four themes that are the focus of this study. In general, the information provided was similar between respondents in urban and rural areas, so the data is not presented separately. Two differences between urban and rural areas were the exposure to information about breastfeeding and complementary feeding, which was much more diverse in the urban area than in the rural area, and the variable *posyandu* schedule in the rural

area, which affected the respondents' readiness to bring their children to receive VAC supplementation in February or August.

Knowledge on Nutrition and Health during Pregnancy and Child Caring

Studies have shown that a mother's knowledge is a stronger predictor than her level of education is in determining nutrition practices, including how she utilizes limited resources³⁰. The importance of respondents' knowledge was also evident in this study. Despite coming from diverse educational backgrounds and economic conditions, all respondents had good knowledge about the nutritional program recommendations. It is worth noting, however, that respondents' knowledge about VAC supplementation was not as strong as their knowledge about the other three programs.

Regarding IFA supplementation during pregnancy, most respondents felt that they might be at risk for anemia and that the tablets could reduce this risk. Some respondents mentioned that they or their friends who were also pregnant sometimes felt weak, dizzy, and lightheaded during pregnancy. The belief that the tablets are beneficial for pregnant women became stronger after they experienced the positive effects of taking them.

"...because I often felt dizzy. They say when you're pregnant, you're eating for two, so maybe I was not getting enough nutrients. When I was pregnant, I often felt lightheaded, so I just took the supplements." (Respondent 2)

"I had 'a lack of blood'. I was worried, afraid of giving birth. Because when you're anemic, you often feel weak. So I needed them (IFA tablets) to get my blood levels up. It really helped, I felt more energetic." (Respondent 10)

Good maternal knowledge about the risks during pregnancy is also associated with adherence to consuming IFA tablets, as shown in a study analyzing data from three rounds of the Indonesian Demographic and Health Survey (adjusted OR = 1.8; 95% CI 1.6, 2.0)²⁰. Good knowledge about the benefits of IFA tablets and the strong bond with the fetus they are carrying motivate pregnant women to make maximum efforts for a healthy pregnancy, including consuming the tablets regularly despite facing various challenge²¹. However, it should be noted that some respondents in this study were not aware of more detailed information about the IFA tablets, such as the proper way to take them, their potential side effects and how to minimize them, or the content of the tablets.

On the other hand, all respondents were able to correctly identify the benefits of breastfeeding. These

included boosting the immune system so that the child does not get sick easily, being hygienic, practical, and cost-effective, and helping the mother bond with the child. The respondents also knew about the benefits of colostrum, the duration of exclusive breastfeeding, and the proper duration for breastfeeding. This good knowledge contributed to the success of exclusive breastfeeding, even though the mothers faced challenges²².

Regarding complementary feeding, the respondents had good knowledge. They knew the recommended age for a child to start eating solid foods and the importance of offering a variety of foods to prevent the child from getting bored, ensure the child gets the necessary nutrients, and prevent the child from being picky with food. Some respondents also associated nutritious food with making the child smarter.

"The diet should be varied so that it contains all the necessary nutrients. Then, to check if the child has any allergies, I read that you should give a food for three days, and if nothing happens, it means he doesn't have an allergy. He should start learning to try different flavors, so later on, he won't be picky." (Respondent 3)

The importance of knowledge is also emphasized in studies on the practice of complementary feeding in Southeast Asia, where poor practices are associated with a lack of understanding among caregivers, especially mothers³⁶. Two studies in Indonesia have shown that maternal knowledge is significantly associated with the diversity of foods consumed by the children³⁰ and cooking methods²⁸. This diversification, based on good knowledge, becomes very important. However, time constraints due to household chores are one of the factors that hinder the practice of good complementary feeding by mothers³⁰.

The respondents' knowledge about VAC supplementation was still lacking. Most respondents were unaware of the specific months in which VAC supplements are distributed or could only mention one month. They also did not know the colors of the VACs or could only mention one color. Additionally, they did not know the age at which children should first receive VAC supplementation. However, all respondents believed that all vitamins are good for the child's health, including vitamin A. They also recognized that the VAC supplementation program is a government program and that it is mandatory as instructed by community health workers.

"Vitamin A is for the eyes, isn't it? I don't really know what else it's for. But the health worker said it's necessary, so I just obeyed. I was afraid something might happen to my child if he didn't get the capsules." (Respondent 7)

Table 2. Roles of health workers, exposure to information, health and nutrition knowledge, and support from family during pregnancy and child-caring

Themes	Recommended Nutrition Practices during Pregnancy and Child-Caring			
	IFA Tablet Consumption during Pregnancy	EBF and Continued Breastfeeding	Complementary Feeding Practices	VAC Supplementation
Roles of health workers and community health workers	<ul style="list-style-type: none"> ○ All informants received/purchased enough IFA tablets. ○ Health workers gave information about the benefits of IFA tablets, but not about their potential side effects and how to address them. ○ The consumption of IFA tablets was not specifically monitored by health workers. 	<ul style="list-style-type: none"> ○ The midwife was a source of information about EBF, colostrum, the benefits of breast milk, the duration of breastfeeding, and how to increase breast milk production. The midwife also helped address breastfeeding issues. ○ The doctor only advised mothers to continue breastfeeding. 	<ul style="list-style-type: none"> ○ Respondents generally did not ask for advice nor receive information about complementary feeding from health workers. ○ Respondents referred their children to a health worker, with whom they had a close relationship, when the children's weight did not increase. 	<ul style="list-style-type: none"> ○ The community health workers informed about the capsule distribution schedule and conducted sweeping. However, they did not provide information about the benefits of VAC supplementation. ○ Note: the <i>Posyandu</i> schedule in the rural area was not fixed.
Exposure to information	<ul style="list-style-type: none"> ○ The main sources of information were health workers during ANC visits (about general pregnancy health, not specifically about IFA tablets or anemia) and the MCH book (especially in the rural area). 	<ul style="list-style-type: none"> ○ Respondents sought and obtained information from various sources, such as midwives, family members (mother and mother-in-law), and the MCH book, mostly on their own initiative. ○ Urban respondents had more diverse sources of information, including the Internet, colleagues, and seminars (for working mothers). 	<ul style="list-style-type: none"> ○ Respondents asked their mother and mother-in-law and read the MCH book, mostly on their own initiative. ○ Urban respondents had more diverse sources of information, including colleagues, the Internet, and social media. 	There was no specific information. They only received information about the capsule distribution schedule from the community health worker.
Knowledge on nutrition during pregnancy and child-rearing	<ul style="list-style-type: none"> ○ Respondents felt that they were at risk of anemia and that IFA tablets could help, and they understood the benefits of the tablets. ○ Respondents followed the advice given by health workers because they believed that they knew what was best for the health of pregnant women. 	Respondents were aware of the benefits of breast milk, colostrum, exclusive breastfeeding, and the duration of breastfeeding.	<ul style="list-style-type: none"> ○ Respondents knew the age at which to start giving complementary foods, the child's needs for varied diets, and examples of foods. ○ Respondents felt that children should have a meal schedule. 	Respondents were aware of the general benefits of vitamin A, but they did not know in what month VAC were distributed, the color of the capsules, or the age at which the child should first receive them.

Support from husband and family	<ul style="list-style-type: none"> ○ The husband accompanied the wife during some ANC visits. He reminded her to take IFA tablets, prepared them, and provided drinking water. ○ The husband encouraged the mother to breastfeed, prepared the breast pump, and accompanied her in breastfeeding seminars. ○ The mother or mother-in-law helped the respondent when experiencing nipple soreness and provided advice on how to increase the breast milk production. 	<ul style="list-style-type: none"> ○ The husband fed the child and did household chores. ○ The mother or mother-in-law (extended family) helped prepare food for the child, provided information about the menu, and taught her how to cook. 	There was no specific support from the husband. A family member of a working mother brought the child to a VAC distribution site (<i>Posyandu</i>).
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IFA (Iron-Folic Acid), VAC (Vitamin A Capsule), ANC (Antenatal Care), MCH (Maternal and Child Health)

Support from the Husband and Other Family Members

All respondents in this study received support from their husbands and other family members, particularly their mothers, mothers-in-law, and older siblings. It is worth noting that no differences in the social norms regarding husband involvement in maternal health during pregnancy and child caregiving were found between urban and rural respondents. Both urban and rural respondents were accompanied by their husbands when undergoing ANC check-ups, although not every month, as sometimes the schedule for an ANC visit and the husband's work schedule overlapped.

"He (my husband) took me (to the health centre) when he had a day off from work of his own accord. He's always worried because I tended to feel dizzy. He also wanted to know about the baby's development and hear advice from the midwife. It made me feel motivated. Being pregnant, my mind tended to wander a lot, so having my husband with me made me feel more at ease." (Respondent 1)

This is in line with the results of several studies. Mothers in Indonesia who received full support from their husbands had nearly twice the compliance rate for consuming iron tablets of the rate of those who did not receive support from their husbands (aOR 1.9; 95% CI: 1.6, 2.3)²⁰. Another form of husband's involvement during pregnancy included reminding the wife to take the IFA tablets, drink milk, and eat nutritious food, as well as discussing with the wife about where to give birth.

"Don't forget to take the iron supplements," he always said that. He also reminded me to take the vitamins so the baby stayed healthy. I was scolded by my husband before as he kept track of the tablets. If he saw there's still a lot of tablets left, he knew I didn't take the tablets." (Respondent 10)

Support, such as reminders to take IFA tablets, is crucial because, as shown by previous studies, one of the main reasons for the low consumption of IFA tablets during pregnancy is mothers' forgetfulness³⁷. In addition, because the IFA tablets must be consumed daily over an extended period, mothers sometimes feel bored, as experienced by more than 50% of pregnant women in Surabaya²¹. The attention from family helps mothers maintain their motivation to take the tablets regularly, even when they feel bored.

Regarding child feeding, some respondents mentioned that their husbands left the decision about breastfeeding entirely to them. However, when they decided to exclusively breastfeed for the first six months and continue breastfeeding until two years, their husbands supported them. Respondents in the city mentioned that their husbands always supported them in breastfeeding, for example, by sharing information about foods that can increase milk production, encouraging them to breastfeed even when dealing with nipple soreness, and preparing a breast pump for working mothers.

"(My husband says,) 'You have to eat well, don't eat this or that.' When I have trouble pumping breast milk, he always helps. He's the one who prepares and sterilizes the breast pump and the bottles to store the expressed milk. He's been a great help." (Respondent 3)

The husband's role was also evident in the provision of complementary foods. For example, the husband would offer suggestions on nutritious foods for the child, provide easy-to-make food recipes, feed the child (especially in the urban area), and do other household chores. Support from member of the extended family (especially the mother or mother-in-law, as well as older siblings) was also mentioned by most respondents who lived with or near them.

"My mother-in-law often gives me advice on what to feed him (the child). She suggests this and that. Sometimes, she even cooks for him. It really helps me stay motivated to feed him and not give up, because it's really hard to get him to eat. Haha." (Respondent 6)

Support from the husband and other family members was also clearly evident in IYCF practices. For example, they helped maintain the mother's positive mindset and emotions toward breastfeeding, ensuring that she stayed motivated and confident in providing good IYCF for the child³⁸. This aligns with various studies that showed a positive relationship between family support and good breastfeeding practices³⁹, including for working mothers^{40,41}. However, support from the husband was not evident in VAC supplementation, as there was no specific communication between the mother and the husband regarding this. This was because the administration of VACs is part of the growth monitoring activities at *Posyandu*. Other family members played a role in bringing the child to *Posyandu* on distribution days, especially for respondents who were working.

Challenges and Key Factors

All respondents acknowledged that they faced challenges in implementing good nutrition practices during pregnancy and child caregiving. For example, they felt bored with taking iron tablets daily, disliked the taste or smell of the tablets, experienced nipple soreness or low breast milk production, especially at the beginning of breastfeeding, had to prepare expressed breast milk while at work, felt tired preparing meals due to household chores or work commitments, and sometimes faced a poor appetite in their children. Respondents identified several factors they considered key to overcoming these challenges and maintaining the recommended nutrition practices effectively. The two factors were family support (especially from the husband) and access to information.

"Access to information is much easier now. It's so simple to find information these days. In the past, to get a recipe, we had to buy a magazine. Now, we just open YouTube. There are recipes, instructions on how to make things, and sometimes even instructions on how to present them." (Respondent 4)

"My husband. He is really supportive. He doesn't just tell me theories or give orders. From the time I was pregnant, to breastfeeding, and feeding the child, he's always been there. He also always believes in me."
(Respondent 2)

Some mothers did not specifically identify key factors for themselves. However, the desire to have a healthy and smart child became a strong internal motivation for them. This strong motivation drove them to continue striving to provide the best, including giving nutritious complementary foods.

"Sometimes I feel really lazy to cook, especially when I'm tired. I have to handle all the household chores on my own. But when it comes to feeding my child, it's really a must. They need to eat properly to stay healthy."
(Respondent 7)

The strength of this study lies in the selection of mothers who consistently implemented good nutrition practices across all the four national nutrition programs during the first 1000 days of life. This consistent compliance is key to ensuring continuous caregiving to achieve optimal child growth and development. Other studies have assessed maternal compliance with each nutrition program separately, so they did not capture the continuity of good practices across different caregiving stages. This study also has limitations, such as the variation in maternal employment status being limited to Two key factors for good maternal practices across national nutrition programs were access to information (mostly initiated by mothers) and support from husbands and family. Information availability improved knowledge, while family support helped maintain motivation, especially when facing challenges. Health workers, particularly midwives, provided guidance on iron tablet consumption and breastfeeding but not complementary feeding or VAC supplementation. Healthcare workers should play a larger role in supporting complementary feeding, such as through regular educational sessions at *Posyandu*, leveraging good attendance. The MCH book should be used effectively in these sessions, and involving family members, especially husbands, in nutrition education is crucial for support and motivation just two categories: full-time homemakers (not working) and office-working mothers. The working-from-home model, which has become quite common today, was not included in the respondent characteristics as this phenomenon did not exist at the time the study was conducted.

CONCLUSIONS

Two key factors for good maternal practices across national nutrition programs were access to information and support from husbands. Information availability improved knowledge, while family support helped maintain motivation, especially when facing challenges. Health workers, particularly midwives, provided guidance on IFA tablet consumption and breastfeeding but not complementary feeding or VAC supplementation. Healthcare workers should play a

larger role in supporting complementary feeding, such as through regular educational sessions at *Posyandu*, leveraging good attendance. Effective use of the MCH book in these sessions, and involving family members, especially husbands, in nutrition education is crucial for support and motivation.

ACKNOWLEDGEMENT

We would like to extend our sincere thanks to all the study respondents for their excellent participation in this study, to the *Posyandu* cadres and midwives who assisted in sampling and introducing the potential respondents. We also express our gratitude to Dewi Fatmaningrum, Avliya Quratul Marjan, and Arnati Wulansari for their valuable help in data collection in the field, and to Airin Roshita, PhD, Professor Hardinsyah, PhD, Ibu Atmarita, PhD, Anuraj Shankar, MD, PhD, and Professor Rina Agustina, MD, PhD for their input and guidance.

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

All authors declare no conflict of interest regarding this article. This study and publication were conducted with funding support from SEAMEO RECFON and is part of the first author's doctoral study, which was funded by the Higher Education Network Ring Initiative (HENRI) Program, sponsored by the US Agency for International Development–Indonesia (Cooperative Agreement AID-497-A-11-00002) for the Harvard School of Public Health, in collaboration with SEAMEO RECFON, Universitas Indonesia, Universitas Mataram, Universitas Andalas, the Summit Institute of Development, and Helen Keller International.

AUTHOR CONTRIBUTIONS

LAW: conceptualization, data collection, analysis, and interpretation, writing–review and editing; HK: Guidance and supervision, review original article; ELA: Guidance and supervision, review original article; DO: Guidance and supervision, review original article.

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