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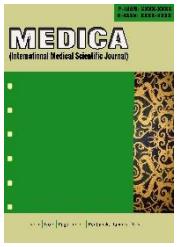

The Relationship between Sociodemographic and Obstetric Characteristics and Adherence to Iron Supplementation among Pregnant Women

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Abstract

The high prevalence of anemia among pregnant women remains a serious public health problem. Adherence to iron supplementation is one strategy to prevent and control anemia during pregnancy. This study aimed to determine the relationship between sociodemographic and obstetric characteristics and adherence to iron supplementation among pregnant women. A cross-sectional study was conducted among 72 pregnant women using total sampling in Cisarua Village, within the service area of Puskesmas Sukabumi, Sukabumi City. Data were collected using validated instruments, including a demographic questionnaire and the Morisky Medication Adherence Scale (MMAS-8). Data were analyzed using chi-square tests and logistic regression. The results showed significant associations between maternal age, education level, employment status, gestational age, parity, diagnosis of anemia, economic status, and information sources and adherence to iron supplementation ($p < 0.05$). Multivariate analysis identified employment status as the strongest predictor of adherence (OR = 445.043), indicating that employed pregnant women were more likely to adhere to iron supplementation than unemployed pregnant women. These findings suggest that sociodemographic and obstetric characteristics are significantly associated with adherence to iron supplementation among pregnant women.

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1. INTRODUCTION

Health development is a critical effort in improving the quality of human resources. The government has incorporated this into the National Medium-Term Development Plan (RPJMN) and the Ministry of Health's Strategic Plan for 2020–2024, with a focus on maternal and child health, reducing stunting, disease control, community-led initiatives, and strengthening the health system. However, one of the main challenges remains the high maternal mortality rate (MMR) (Suhada et al., 2024).

The MMR remains very high. In 2023, approximately 260,000 women died during pregnancy or after childbirth. The majority of these deaths occurred in Sub-Saharan Africa and South Asia, which accounted for about 87% or 225,000 cases (WHO, 2025). Based on the results of the 2020 Long Form Population Survey (LFSP), the MMR in Indonesia was recorded at 189 per 100,000 births (Menkes RI, 2025). One of the causes of maternal mortality is complications that develop during pregnancy (WHO, 2025). Anemia is one of the root causes that needs to be addressed regarding complications during pregnancy (Wang et al., 2025).

The World Health Organization (WHO) in 2025 confirmed that anemia remains a major global health issue, with a prevalence of 30.7% among women of childbearing age, rising to 35.5% among pregnant women, and 39.8% among children. Results from the 2023 Indonesian Health Survey (SKI) confirm that in Indonesia, 27.7% of pregnant women suffer from anemia (Kemenkes RI, 2025). Meanwhile, in West Java, the prevalence of anemia among pregnant women stands at 53.8% (Dinkes Jabar, 2025).

Anemia is a condition in which hemoglobin, hematocrit, and red blood cell levels are below normal. Anemia can have adverse effects on both the mother and the fetus, such as increasing the risk of miscarriage, preterm birth, fetal growth restriction, and impaired placental blood vessel formation due to hindered angiogenesis in early pregnancy (Sari et al., 2024). However, scientific advancements in the fields of medicine and public health are rapidly progressing to address the issue of anemia (Obeagu & Obeagu, 2025), making preventive measures a key strategy that can be implemented, one of which is the administration of iron supplements (Balcha et al., 2023), given that more than 40% of pregnant women worldwide suffer from anemia and about half of these cases are caused by iron deficiency (WHO, 2024).

Adherence to iron supplementation refers to the extent to which pregnant women follow health workers' recommendations to take iron supplements. Adherence to iron supplementation is measured based on the accuracy of the number of tablets taken, the correct method of taking iron supplements, and the frequency of intake per day (Sari et al., 2024). Various factors are considered to play a significant role in adherence to iron supplementation among pregnant women, including maternal age, education, occupation, gestational age, parity, diagnosis of anemia, socioeconomic status, and information sources (Asres et al., 2022; Seid et al., 2025; Wulandari & Pamungkas, 2025).

Age is one of the factors associated with pregnant women's adherence to iron supplement intake. The older a person is, the more mature their ability to think, work, and make decisions (Lestari et al., 2022). Education also influences adherence. Education shapes how pregnant women act and seek causes and solutions in their lives (Jariyah et al., 2024). Employment is the next related factor; pregnant women who are not working have more opportunities to visit healthcare facilities for check-ups (Mutia et al., 2023), including demonstrating adherence with iron supplement intake. Another factor is gestational age, as during the third trimester, iron in the blood is allocated for fetal growth in the uterus, thereby reducing iron absorption. This affects adherence to iron supplementation (Sibuea et al., 2025).

Parity is the next factor; Kusumah (2025) states that a mother who has given birth three or more times tends to pay less attention to her pregnancy, including adherence to taking iron supplements. Furthermore, pregnant women who adhere to taking iron supplements have a lower risk of being diagnosed with anemia compared

to those who do not (Fajriati et al., 2024). Next, Febrianty et al. (2023) revealed that if a pregnant woman is in a financially secure economic status, she will be able to meet all her needs during pregnancy, including taking iron supplements. The next factor is the source of information. The source of information plays a role in stimulating knowledge about the importance of taking iron supplements (Siska et al., 2024).

Previous studies have reported associations between maternal characteristics and adherence to iron supplementation among pregnant women. However, evidence on the combined influence of sociodemographic and obstetric characteristics in Indonesian community settings remains limited, particularly in Cisarua Village within the service area of Puskesmas Sukabumi. Therefore, this study examines the relationship between multiple sociodemographic and obstetric characteristics, including maternal age, education level, employment status, gestational age, parity, diagnosis of anemia, economic status, and information sources, and adherence to iron supplementation among pregnant women, while also identifying the most dominant associated factor through multivariate analysis.

The importance of analyzing factors related to pregnant women's adherence to iron supplementation lies in understanding the determinants of health behavior during pregnancy. The Health Belief Model (HBM) suggests that adherence may be influenced by an individual's perceptions of health risks and the benefits of preventive actions, whereas the Theory of Planned Behavior (TPB) emphasizes the role of attitudes, social influences, and perceived behavioral control in shaping behavior. Maternal sociodemographic and obstetric characteristics, such as age, education, employment status, economic status, and information sources, may influence adherence through these mechanisms. This study aims to identify the relationship between characteristics and pregnant women's adherence to iron supplement intake.

2. METHOD

This study used a cross-sectional analytical design to identify the relationship between certain characteristics and pregnant women's adherence to iron supplement intake. The study was conducted in Cisarua Village, within the service area of the Puskesmas Sukabumi, Sukabumi City. The population consisted of all pregnant women, with a sample size of 72 participants. The sampling technique used was total sampling. Sample selection was based on inclusion criteria, including pregnant women who were willing to participate as respondents and those who had already received iron supplements. Exclusion criteria included pregnant women who were ill and unable to participate in the study.

Data collection took place from December 2024 to May 2025. The data collection instrument consisted of two main components: a demographic questionnaire and a questionnaire on adherence to iron supplement intake. First, the demographic questionnaire included the mother's age, educational level, employment status, gestational age, parity, diagnosis of anemia, economic status, and information sources. The demographic questionnaire was developed based on variables identified in previous studies and was reviewed by maternal health experts to ensure content validity prior to data collection. Second, the medication adherence questionnaire used the Morisky Medication Adherence Scale-8 (MMAS-8), with a Cronbach's alpha reliability of 0.83, indicating reliable results (Laghousi et al., 2021).

Data analysis was performed using the chi-square test for bivariate analysis and logistic regression for multivariate analysis using the Statistical Package for the Social Sciences (SPSS) version 27 for Windows. Prior to logistic regression analysis, multicollinearity among the independent variables was assessed using tolerance values and the Variance Inflation Factor (VIF). Statistical significance was set at $\alpha = 0.05$. Ethical approval was obtained from the Research Ethics Committee of the Sekolah Tinggi Ilmu Kesehatan Sukabumi (No: 001447/KEP STIKES

SUKABUMI/2025). Written consent was obtained from all respondents prior to data collection.

3. RESULTS AND DISCUSSION

Table 1. Frequency Distribution of Mother's Age, Educational Level, Employment Status, Gestational Age, Parity, Diagnosis with Anaemia, Economic Status, Sources of Information, and Adherence to Taking Iron Supplements

Variables	Frequency	Percentage (%)
Mother's age		
At risk	31	43.1
Not at risk	41	56.9
Educational Level		
Elementary - Junior High School	24	33.3
Senior High - College	48	66.7
Employment status		
Not in employment	34	47.2
In employment	38	52.8
Gestational age		
Trimester I	34	47.2
Trimester II	38	52.8
Parity		
Multipara	45	62.5
Primipara	27	37.5
Diagnosed with anaemia		
Anaemia	33	45.8
Not anaemic	39	54.2
Economic status		
< Minimum wage	44	61.1
≥ Minimum wage	28	38.9
Sources of information		
Non-healthcare workers	42	58.3
Healthcare workers	30	41.7
Adherence to taking iron supplements		
Adherent	45	62.5
Non-adherent	27	37.5

Table 1 shows that the majority of respondents were in the low-risk group, totalling 41 people (56.9%), had a high school to university level of education, totalling 48 people (66.7%), were employed, totaling 38 people (52.8%), were in the second trimester of pregnancy, totalling 38 people (52.8%), were multiparous, totaling 45 people (62.5%), were not diagnosed with anaemia, totalling 39 people (54.2%), had an economic status below the minimum wage, totalling 44 people (61.1%), obtained information from non-healthcare workers, totaling 42 people (58.3%), and were compliant with iron supplementation, totalling 45 people (62.5%).

Table 2. Analysis of the Relationship between Mother's Age, Educational Level, Employment Status, Gestational Age, Parity, Diagnosis with Anaemia, Economic Status, Sources of Information with Adherence to Taking Iron Supplementation

Variable	Adherence to taking iron supplements				Total	%	*P-Value*	OR
	Non-adherent	%	Adherent	%				
Mother's age								
At risk	21	67.7	10	32.3	31	100	0.000	12.250

Not at risk	6	14.6	35	85.4	41	100		
Educational Level	20	83.3	4	16.7	24	100		
Elementary - Junior High School	7	14.6	41	85.4	48	100	0.000	29.286
Senior High - College								
Employment status	21	55.3	17	44.7	38	100		
Not in employment	6	17.6	28	82.4	34	100	0.002	5.765
In employment								
Gestational age	18	52.9	16	47.1	34	100		
Trimester I	9	23.7	29	76.3	38	100	0.021	3.625
Trimester II								
Parity								
Multipara	16	59.3	11	40.7	27	100	0.007	4.496
Primipara	11	24.4	34	75.6	45	100		
Diagnosed with anaemia							0.012	4.000
Anaemia	18	54.5	15	45.5	33	100		
Not anaemic	9	23.1	30	76.9	39	100		
Economic status	23	52.3	21	47.7	44	100		
< Minimum wage	4	14.3	24	85.7	28	100	0.003	6.571
≥ Minimum wage								
Sources of information								
Non-healthcare	20	66.7	10	33.3	30	100		
workers	7	16.7	35	83.3	42	100	0.000	10.000
Healthcare workers								

Based on Table 2, the results of the chi-square test show a p-value <0.05, so it can be concluded that there is an association between maternal age (p-value=0.000; OR=12.250), educational level (p-value=0.000; OR=29.286), employment status (p-value=0.002; OR=5.765), gestational age (p-value=0.021; OR=3.625), parity (p-value=0.007; OR=4.496), diagnosis of anaemia (p-value=0.012; OR=4.000), economic status (p-value=0.003; OR=6.571), and source of information (p-value=0.000; OR=10.000) with pregnant women's adherence to iron supplements.

Table 3. Analysis of the Simultaneous Relationship between Mother's Age, Educational Level, Employment Status, Gestational Age, Parity, Diagnosis of Anaemia, Economic Status, and Sources of Information with Adherence to Iron Supplements.

Variable	**B**	***P-Value***	**OR**
Mother's age	5.202	0.023	181.605
Educational level	3.610	0.057	36.958

Employment status	6.098	0.023	445.043
Gestational age	7.498	0.029	1.804
Parity	7.785	0.029	2.405
Diagnosis with anaemia	7.587	0.023	1.972
Economic status	8.754	0.023	6.338
Sources of information	5.440	0.039	230.545
Constant	-24.530	0.016	0.000

R Square = 0,871

Based on Table 3, an R-squared value of 0.871 (Nagelkerke's R-squared) was obtained, meaning that the mother's age, educational level, employment status, gestational age, parity, diagnosis of anaemia, economic status, and source of information collectively account for 87.1% of the variation in pregnant women's adherence to iron supplementation, whilst the remaining 12.9% is attributed to other factors not examined in this study. The results of the multivariate logistic regression analysis showed that all significant variables were associated with pregnant women's adherence to iron supplementation, namely maternal age, educational level, employment status, gestational age, parity, diagnosis of anaemia, economic status, and source of information. The most dominant variable associated with pregnant women's adherence to iron supplementation was employment status, with an Odds Ratio of 445.043; this means that pregnant women in employment were 445.043 times more likely to adhere to iron supplementation than those not in employment.

The results of the study indicate a correlation between the mother's age and pregnant women's adherence to taking iron supplements. This is consistent with the study conducted by Sunarti et al. (2024), which revealed that pregnant women's adherence to taking iron supplements can be influenced by age. This is supported by the study by Fridayani et al. (2024), which found a correlation between the mother's age and adherence to taking iron supplements.

Pregnant women aged under 20 are considered very young to be pregnant, as at that age the body still requires iron to support its own growth. Conversely, pregnancy at the age of over 35 is considered advanced in age, as the body has entered the early stages of degeneration, leading to a decline in organ function and an increased risk of various health problems. Therefore, women aged under 20 and over 35 are more vulnerable to anaemia. This situation makes the consumption of iron supplements crucial as a preventive measure against anaemia during pregnancy; consequently, pregnant women's adherence to taking iron supplements requires greater attention, particularly within these high-risk age groups. The mother's age is one of the factors associated with her adherence to taking iron supplements, with older mothers tending to demonstrate greater awareness and adherence with healthcare professionals' advice compared to younger mothers (Tendean et al., 2025).

Research findings indicate that there is a correlation between educational attainment and pregnant women's adherence to iron supplementation. A study by Rumayomi et al. (2025) suggests that education can influence pregnant women's adherence to iron supplementation. This finding is further supported by Niza et al. (2022), who noted that women with lower educational attainment have a higher prevalence of anaemia due to non-adherence to iron supplementation.

Education is a learning process that encompasses growth, development and change, guiding an individual towards maturity. Education can indicate a person's level of knowledge, which in turn can influence or affect their decision-making or behaviour. The knowledge possessed by pregnant women plays a crucial role in encouraging them to follow instructions in line with that knowledge; consequently, this knowledge tends to lead them to comply with the guidelines regarding the consumption of iron supplements (Analita et al., 2024).

The results of the study indicate a relationship between employment status and pregnant women's adherence to taking iron supplements. This study is consistent with Salsabila et al. (2025), who reported a significant association between employment and adherence to taking iron supplements. This finding is further supported by Ama & Fajarwati (2024), who noted a relationship between employment and adherence to taking iron supplements.

A person's employment can reflect their standard of living, as it influences various aspects of life, including healthcare, through the income earned from that job. Non-working mothers have limited social interaction, so they rarely exchange views with friends in their community on various matters. This leads to a lack of knowledge, particularly regarding health, which results in non-adherence with taking iron supplements. Meanwhile, as a pregnant woman's employment becomes more stable, she will feel that her needs are better met, which in turn will increase her awareness of the importance of health. One outcome of this is adherence with taking iron supplements (Amelia et al., 2024; Satyani & Hikmat, 2024).

The results of the study indicate a relationship between gestational age and pregnant women's adherence to taking iron supplements. This finding is supported by Nabila & Andriani (2023), who state that gestational age has a significant association with pregnant women's adherence to taking iron supplements. This is consistent with the findings of Seidu et al. (2024), who also found a correlation between gestational age and pregnant women's adherence to taking iron supplements.

The nutritional requirements of pregnant women increase as the pregnancy progresses. If there is an increase in iron requirements without sufficient intake, iron stores will decrease and may lead to anaemia. The increased incidence of anaemia as pregnancy progresses is due to physiological changes in pregnancy that begin in the 6th week, namely an increase in plasma volume, which peaks in the 26th week, leading to a decrease in haemoglobin levels. Pregnant women are more prone to anaemia in the third trimester because during this period the foetus builds up its own iron stores as a reserve for the first month after birth. A pregnant woman's iron requirement increases sixfold in the final trimester compared to non-pregnant women. Therefore, the consumption of iron-fortified foods is strongly recommended for pregnant women as it can boost iron levels, and every mother is required to adhere to consuming these foods (Alemu et al., 2025; Salifu et al., 2024).

The results of the study indicate that there is a relationship between parity and pregnant women's adherence to taking iron supplements. This finding is supported by Seid et al. (2025), who found that parity is associated with pregnant women's adherence to taking iron supplements. It is further reinforced by Sihite (2023), who stated that there is a relationship between parity and pregnant women's adherence to taking iron supplements.

Parity refers to the number of children a mother has given birth to, whether live-born or stillborn. First-time pregnancy (primiparity) is associated with high adherence to iron supplements. This is influenced by the fact that mothers are particularly cautious during their first pregnancy, leading them to adhere strictly to iron supplements to ensure the health of both mother and foetus is well maintained. Women who have been pregnant and have given birth more than once (multiparous) are likely to have had unpleasant experiences due to the side effects of taking iron supplements. Consequently, they are reluctant to take iron supplements again (Ejara et al., 2024).

The results of the study indicate a link between a diagnosis of anaemia and pregnant women's adherence to iron supplementation. This study is consistent with Yismaw et al. (2022), who found that non-adherence to iron supplementation among pregnant women significantly increases the likelihood of being diagnosed with anaemia. Every pregnant woman needs to ensure her iron requirements are met during pregnancy. When not pregnant, iron requirements can usually be met through a healthy, balanced diet. However, during pregnancy, the supply of iron from food is

often insufficient, so iron supplements are required. Failure to take iron supplements during pregnancy increases the risk of being diagnosed with anaemia. Pregnant women who take their iron supplements regularly are less likely to be diagnosed with anaemia, which is beneficial for foetal development (Salsabilah & Suryaalamsah, 2022).

The results of the study indicate a correlation between economic status and pregnant women's adherence to taking iron supplements. This finding is supported by Atmadani et al., (2024), who state that there is a correlation between economic status and pregnant women's adherence to taking iron supplements. It is further reinforced by Saeed et al. (2024), who suggest that there is a correlation between economic status and pregnant women's adherence to taking iron supplements.

A person's income is closely linked to their health status. Low income reduces both the quantity and quality of food or the daily nutritional requirements of mothers, leading to a decline in nutritional status. A common nutritional disorder among pregnant women is anaemia. The food sources required to prevent anaemia generally come from protein sources that may be difficult for those on low incomes to afford. This increases the risk of anaemia in pregnant women and accelerates the risk of illness in the mother. Therefore, families on low incomes will be more disciplined in consuming the iron supplements provided by the government through the local health department (Mengistu et al., 2023).

The research findings indicate a relationship between information sources and pregnant women's adherence to taking iron supplements. These findings are consistent that there is a relationship between information sources and pregnant women's adherence to taking iron supplements. Nasution et al. (2025) also noted that there is a correlation between information sources and mothers' adherence to taking iron supplements.

A source of information is a source of data that has been processed and analysed in order to enhance one's knowledge (Emira et al., 2022). Information can be obtained from print or electronic media and healthcare professionals. Adherence refers to an individual's behaviour in line with the actions recommended by healthcare practitioners or the information obtained from these sources. These sources help individuals find useful alternatives for resolving problems during pregnancy (Rahmawati et al., 2025).

Overall, adherence to iron supplementation is a multifactorial behaviour influenced by demographic characteristics, socioeconomic conditions, obstetric factors, and access to health information. These findings support behavioural theories suggesting that adherence results from interactions between individual knowledge, perceived health risks, available resources, and external support systems. Consequently, interventions aimed at improving adherence should address these determinants simultaneously through health education, counselling, and strengthened antenatal care services rather than focusing on a single predictor.

This study has several limitations. First, the relatively small sample size may have affected the stability of the multivariable logistic regression model, as reflected by the extremely large odds ratio observed for employment status. Second, the cross-sectional design precludes causal inference between maternal characteristics and adherence to iron supplementation. Therefore, future studies with larger sample sizes and prospective designs are recommended to validate these findings.

4. CONCLUSION

Based on the findings of this study, maternal age, education level, employment status, gestational age, parity, diagnosis of anemia, economic status, and information sources were significantly associated with adherence to iron supplementation among pregnant women. Employment status was identified as the most dominant factor associated with adherence to iron supplementation. Therefore, Community Health

Centres should strengthen monitoring and support programs for pregnant women, particularly by providing targeted education and counselling for unemployed pregnant women and improving access to reliable health information regarding the importance of iron supplementation during pregnancy. These efforts may contribute to improving adherence to iron supplementation among pregnant women.

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