Original Article :

Analysis Of Anemia Incidence In Third-Trimester Pregnancy

Revinovita Revinovita[1], Asni Johari[2], M.Naswir[2], Solha Elrifda[3]

1. Midwifery Departement, Merangin College of Health Sciences, Jambi, Indonesia
2. Educational Sciences Doctoral Program, Jambi University, Jambi, Indonesia
3. Nursing Departement, Health Polytechnic of Ministry of Health Jambi, Jambi, Indonesia.

Received on Oct 15, 2024, accepted for publication on Feb 03, 2025, https://dx.doi.org/10.5455/mjhs.2025.02.009

Corresponding author:

Revinovita Revinovita, E-mail: revinovita696@gmail.com

OPEN ACCESS Distributed under Creative Commons CC BY-NC-ND 4.0

Abstract:

Background & Aims:

Anemia ranks third among global health concerns, affecting approximately 74% of pregnant women worldwide. In Indonesia, data from the 2018 Basic Health Research (BHR) revealed that 48.9% of pregnant women suffer from anemia. Notably, a staggering 84.6% of these cases occur within the 15-24 age group. This study seeks to delve into the prevalence of anemia among third-trimester pregnant women within the Muara Jernih Health Center's jurisdiction in Indonesia.

Methods:

This research adopts an observational analytic approach, employing a cross-sectional design. Conducted within the Muara Jernih Health Center's jurisdiction over a span of three months in 2023, the study enlisted 149 randomly selected pregnant women meeting specific criteria—namely, those in their third trimester within the center's area. Data analysis utilized both univariate and bivariate methods, employing the Chi Square test at a 95% confidence level with a critical limit of 0.05, facilitated by the SPSS version 23.0 application.

Results:

The majority of respondents, totaling 88 individuals (59.1%), were found to suffer from anemia. Additionally, a significant portion of the 91 respondents (61.1%) exhibited poor knowledge on the subject. Moreover, most of the 101 respondents (67.8%) did not adhere to taking Fe tablets as prescribed. Among the 149 respondents studied, the majority of those surveyed, 94 individuals (63.1%), reported low income. Both knowledge levels and adherence to Fe tablet consumption, alongside income, demonstrated significant associations with the incidence of anemia in third-trimester pregnant women, with a p-value <0.05.

Conclusion:

To enhance health and mitigate the occurrence of anemia among pregnant women, particularly during the third trimester, several measures can be undertaken. These include augmenting pregnant women's knowledge, ensuring consistent intake of Fe tablets, and ensuring that family income is sufficient to access healthcare services and provide nutritious food for expectant mothers.

Keywords:

Pregnant women, Anemia, Knowledge, Fe Consumtion, Income

Introduction:

According to data from the World Health Organization (WHO) in 2017, the global prevalence of anemia in pregnant women is 41.8%[1–3]. In Asia, the prevalence is even higher, at 48.2%. Anemia in pregnant women increases the risk of premature birth, maternal and child mortality, and infectious diseases[4,5]. Iron deficiency anemia in mothers can adversely affect fetal growth and development during pregnancy and beyond [5,6]. The 2018 Riskesdas survey found that 48.9% of pregnant women in Indonesia suffer from anemia, with 84.6% of these cases occurring in the 15-24 age group. To prevent anemia, it is recommended that every pregnant woman receive at least 90 iron tablets (TTD) during pregnancy [7].

In 2021, the coverage of pregnant women in Indonesia receiving at least 90 iron tablets was 84.2%, up from 83.6% in 2020. The provinces with the highest coverage are Bali (92.6%), Jambi (92.1%), and East Java (91.3%). Conversely, the provinces with the lowest coverage are West Papua (37.5%), Papua (56.8%), and Southeast Sulawesi (64.1%) [7].

Jambi Province ranks second in the highest coverage of TTD administration. Among its 11 districts/cities, Merangin Regency stands out with a coverage rate of 92.47%, making it the fifth highest district for TTD administration as of 2021 [8]. Merangin comprises 27 Puskesmas, with the Muara Jernih Puskesmas reporting the highest incidence of anemia. Muara Jernih consists of six villages (Kapuk, Medan Baru, Pulau Aro, Muaro Seketuk, Muaro Jernih, and Rantau Ngarau). According to PKM Muara Jernih data from January to June 2023, there were 149 pregnant women in these villages, with 146 cases of anemia.

Lack of knowledge exacerbates the issue of anemia in adolescent girls, leading to more severe consequences. These girls are future mothers, and anemia increases their risk of maternal mortality, premature births, low birth weight, and complications such as uterine contraction issues, inability to defecate, and postpartum hemorrhaging, which often results in death[1,9,10].

Anemia can develop during pregnancy even without a prior history. A primary cause is iron deficiency, as the need for iron increases with the progression of gestational age. Additional factors include irregular consumption of iron tablets, improper food processing, and short intervals between pregnancies[11–13].

Physiologically, hemoglobin levels in pregnant women are naturally lower than in non-pregnant women. Various factors such as age at pregnancy, infectious diseases, gestational age, birth spacing, educa-

tion, and malnutrition can affect hemoglobin levels during pregnancy [2,14]. Pregnant women are diagnosed with anemia if their hemoglobin levels fall below 11.0 g/dL. Anemia during pregnancy can lead to complications for both the mother and the fetus. It disrupts the delivery of oxygen and nutrients from the mother to the placenta and fetus, potentially resulting in impaired fetal growth and development, abortion, prolonged labor, puerperal sepsis, neonatal asphyxia, and maternal and fetal death[14–16].

Parents' income significantly influences the quality and quantity of food consumed by family members. A high family income increases the ability to purchase better-quality and more abundant food, whereas a decrease in family income reduces food purchasing power. Low income is associated with a higher risk of nutrient deficiencies, which can lead to anemia[1,3].

Screening for anemia in pregnant women and identifying factors affecting hemoglobin levels are crucial programs to prevent poor pregnancy outcomes. This study was initiated due to the lack of recent research on factors associated with anemia in third-trimester pregnant women in the PKM Muara Jernih Working Area. Researchers are particularly interested in investigating these factors.

Methods:

Study design, Setting:

This observational analytic research uses a cross-sectional design and was conducted over three months in 2023 in the Muara Jernih Health Center Working Area. The study involved 149 randomly selected pregnant women who met the criteria of being in their third trimester.

Participants and Instruments

The dependent variable in this study is anemia in third-trimester pregnant women, defined as hemoglobin levels below 11 g/dL, measured by checking hemoglobin levels recorded in the MCH Book. The independent variables are knowledge of pregnant women, This variable assesses the pregnant women's knowledge about anemia, measured by a questionnaire with a score range of 0-100; compliance with Fe tablet consumption, This variable measures how consistently pregnant women consume iron (Fe) tablets during pregnancy; Compliance is categorized as compliant (if consuming more than 90 Fe tablets) and non-compliant (if consuming fewer than 90 Fe tablets), assessed through a questionnaire; Family Income: this variable represents the income earned by pregnant women's households per month, used to meet daily family needs. The income is categorized as low if it is below the minimum wage of Jambi Province (2,943,033 IDR) and high if it is equal to or above the minimum wage.

The validity and reliability of the questionnaire on mothers' knowledge of anemia and adherence to iron tablet consumption are crucial to ensure that the questionnaire can be effectively used in research. Validity measures the extent to which the questionnaire measures what it is intended to measure. The results of the validity test show that the items in the questionnaire have significant correlations, with $r = 0.72$ ($p < 0.01$) for knowledge about anemia and $r = 0.65$ ($p < 0.01$) for adherence to iron tablet consumption, indicating that the questionnaire is valid for use.

Reliability measures the consistency or stability of the results of the questionnaire when used repeatedly. The results of the reliability test using Cronbach's Alpha show $\alpha = 0.82$ for the questionnaire on mothers' knowledge of anemia and $\alpha = 0.79$ for the questionnaire on adherence to iron tablet consumption, indicating that both questionnaires have good internal consistency.

Data collection:

The data collection was conducted by the research team, who distributed questionnaires to the selected pregnant women. The initial step involved providing informed consent to the participants, explaining the study's general objectives and instructions on how to complete the questionnaire. Before filling out the questionnaire, the pregnant women signed the informed consent form to indicate their willingness to participate. No gifts or monetary incentives were given to the participants either before or after the study.

Ethical consideration:

This study obtained ethical approval from the Health Research Ethics Commission of the Jambi University with number 766/UN21.6/LT/2024.

Data analysis:

Data analysis was conducted in two stages. First, univariate analysis was used to describe the characteristics of each research variable. Next, bivariate analysis was performed to examine the potential relationships between the independent and dependent variables. The Chi-Square statistical test, with a 95% confidence level and a significance threshold of 0.05, was used to determine the relationships between the variables. The analysis was carried out using the SPSS version 23.0 software.

Results:

The results of this research are presented in the accompanying table, followed by the detailed narrative below:

Table 1 indicates that the majority of pregnant women who participated in this study are aged 20-35 years. Most of them are not employed, with 94 participants (63.1%) falling into this category. Additionally, a significant portion of the participants have a low level of education, with

95 women (63.8%) having only completed elementary school, lower secondary school, or high school.

Table1: Distribution of Participants Characteristics:

Characteristics	Total	Percentage
Age		
< 20 and >35 y.o	73	49
35-20 y.o	76	51
Occupation		
Employed	55	36.9
Unemployed	94	63.1
Educational level		
Low (elementary school, middle school, high school)	95	63.8
High (diploma, bachelor›s, master›s, doctoral schools)	54	36.2

Table 2 indicates that 88 respondents (59.1%) suffered from anemia. The majority of respondents, 91 (61.1%), had poor knowledge. Additionally, 101 respondents (67.8%) were not compliant with taking Fe tablets. Among the 149 respondents studied, 94 (63.1%) had low income.

Table2 : Distribution of variables in third trimester pregnancy:

Variables	Total	Percentage
Anemia incidence		
Yes	88	59,1
No	61	40,9
Knowledge		
Poor	91	61,1
Sufficient	34	22,8
Good	24	16,1
Compliance		
Non-Compliant	101	67,8
Compliant	48	32,2
Income		
Low	94	63,1
High	55	36,9

In Table 3, it can be reported that both knowledge, adherence to Fe tablet consumption, and income are significantly associated with the incidence of anemia in third-trimester pregnancy, with a p-value of less than 0.05.

Table3: The relationship of independent variables with the incidence of anemia in third trimester pregnancy:

	Anemia in Pregnancy				P-value
	Anemic		Non-anemic		
Knowledge	**n**	**%**	**n**	**%**	
Poor	60	65,9	31	34,1	0,015
Sufficient	20	58,8	14	41,2	
Good	8	33,3	16	66,7	
Compliance					0,005
Non-Compliant	68	67,3	33	32,7	
Compliant	20	41,7	28	58,3	

Income					0,039
Low	62	66,0	32	34,0	
High	26	47,3	29	52,7	

Discussion:

The results of statistical tests indicate a relationship between knowledge and the incidence of anemia. According to the researcher's assumption, knowledge strongly correlates with anemia incidence in pregnant women during the third trimester, as insufficient knowledge among pregnant women adversely affects their health behavior, particularly during pregnancy.

Regarding the frequency distribution of knowledge among pregnant women, it is evident that a majority of respondents have limited knowledge due to their educational background and lack of information about anemia. Many respondents are unaware of the benefits of taking Fe tablets, and some do not understand the importance of consuming Fe tablets during pregnancy. Furthermore, respondents often fail to adhere to Fe tablet consumption regularly because they do not perceive a direct correlation with their pregnancy. Even mothers with good knowledge about the benefits of Fe tablets sometimes struggle to maintain regular consumption due to work commitments, resulting in occasional lapses in their intake.

Low knowledge among pregnant women about anemia during pregnancy can adversely affect their health. The less they know, the higher the likelihood of mothers experiencing anemia during pregnancy. Even mothers with high knowledge are not immune to anemia if they fail to consume iron-rich foods and Fe tablets during pregnancy [10,17].

Knowledge significantly influences people's behaviors, as it can change perceptions and habits. Increased knowledge can alter how people perceive diseases and can shift behaviors from negative to positive. Moreover, knowledge shapes beliefs. Reproductive health knowledge, including understanding the importance of prenatal check-ups, counseling, recognizing signs, and managing anemia in pregnant women, is crucial in preventing anemia during pregnancy. There is a trend suggesting that lower reproductive health knowledge is associated with higher incidences of anemia[6,18].

Maternal knowledge significantly influences the nutrition of the baby she is carrying, as well as her food consumption patterns, particularly regarding iron-rich foods. Prolonged iron deficiency during pregnancy can lead to anemia [4]. Lack of knowledge about anemia negatively im-

pacts health behaviors, especially during pregnancy. Knowledge-related factors play a crucial role in maintaining daily food consumption patterns to prevent anemia during pregnancy[19]. Nutritional status during pregnancy also needs to be considered, as the requirement for iron increases with advancing gestational age. Additionally, other factors closely associated with the incidence of anemia include the frequency of antenatal care (ANC) visits[20,21].

The results of the Chi-square statistical test showed a significant relationship between adherence to taking Fe tablets and anemia in pregnant women. According to the researcher's assumption, the regularity of taking Fe tablets is linked to the incidence of anemia during pregnancy. Irregular consumption of Fe tablets among pregnant women can lead to malnutrition, which significantly impacts fetal growth and child development. Even pregnant women who regularly consume Fe tablets are not necessarily immune to anemia, as iron intake must also come from iron-rich foods. Statistical testing conducted by the author at PKM Muara Jernih revealed a significant relationship between the regularity of taking Fe tablets and the occurrence of anemia during pregnancy.

Pregnant women need to consume iron (Fe) tablets during pregnancy because their iron requirements increase during this time. It is recommended that each mother regularly consumes at least 90 iron tablets throughout pregnancy, as pregnant women tend to experience a decrease in iron levels. This deficiency occurs because pregnant women share their iron with the fetus, hence the importance of iron supplementation during pregnancy [22]. Health workers recommend and inform pregnant women about this interconnected factor. However, regular consumption of iron tablets does not guarantee that pregnant women will not develop anemia. Mothers must also regularly consume iron-rich foods and get adequate rest according to their trimester of pregnancy. Iron (Fe) supplementation is just one of the efforts made by health workers to prevent anemia during pregnancy[3,15].

It is crucial for pregnant women to consume iron (Fe) tablets during pregnancy because their iron requirement continues to increase throughout gestation. Fe tablets are iron salts in the form of tablets or capsules that, when taken regularly, can increase red blood cell production. Pregnant women experience dilution of their red blood cells, necessitating additional iron to support fetal red blood cell production[14,22,23].

The Chi-square statistical test results between family income variables and anemia in pregnant women showed significant associations. According to the researcher's assumption, family income is related to

the incidence of anemia in third trimester pregnant women. Anemia often occurs in pregnant women with an incidence rate of approximately 20-60%, which varies depending on low family income resulting in iron deficiency anemia.

The size and composition of a family, as well as the family's income level, are associated with the quality and quantity of the diet in the family. A large family size differs from a small family size in terms of food and income distribution. In families with a large number of members, there is less distribution and adequacy of food, leading to malnutrition and resulting in anemia. According to research results, anemia is common among pregnant women, with an incidence rate of approximately 20-60%, varying depending on the family's low-income situation resulting in iron deficiency anemia.

Pregnant women with low family income may face challenges in their diet. Most of their expenditure is directed towards meeting basic food needs, focusing on carbohydrate-rich foods[9,24]. This is because carbohydrate-rich foods are generally cheaper than foods rich in iron, making it difficult to meet their iron requirements, which can contribute to the occurrence of iron deficiency anemia [25–27].

Conclusion:

To improve health and prevent the incidence of anemia in pregnant women, especially in the third trimester of pregnancy, efforts can be made by increasing pregnant women's knowledge, ensuring regular consumption of iron tablets, and ensuring that family income is sufficient to access health services and provide nutritious food for pregnant women.

Recommendation:

Future research should explore the effectiveness of educational interventions that focus on increasing awareness and understanding of anemia prevention, as well as strategies to improve adherence to iron supplementation programs. Additionally, studies examining the role of socioeconomic factors, such as family income and access to healthcare, in preventing anemia during pregnancy are essential to developing comprehensive public health policies. Collaborative efforts between healthcare providers, policymakers, and communities are recommended to address both the medical and socio-economic determinants of anemia prevention in pregnant women.

Financial support and sponsorship:

None

Conflicts of interest:

There are no conflicts of interest**.**

References:

1. Sinawangwulan IP, Dewi YLR, Wekadigunawan CSP. Association between socio-demographic, nutrition

intake, cultural belief, and incidence of anemia in pregnant women in Karanganyar, Central Java. J Matern Child Heal. 2018;3(2):128–37.

2. Serbesa ML, Iffa MT. Pregnant women's knowledge, attitude, and practice regarding the prevention of iron deficiency anemia among Ethiopian pregnant women. Casp J Reprod Med. 2018;4(1):1–7.
3. Gebremedhin S, Samuel A, Mamo G, Moges T, Assefa T. Coverage, compliance and factors associated with utilization of iron supplementation during pregnancy in eight rural districts of Ethiopia: a cross-sectional study. BMC Public Health. 2014;14:1–8.
4. Yamashita T, Roces RED, Ladines-Llave C, Reyes Tuliao MT, Wanjira Kamau M, Yamada C, et al. Maternal knowledge associated with the prevalence of iron and folic acid supplementation among pregnant women in Muntinlupa, Philippines: a cross-sectional study. Patient Prefer Adherence. 2021;501–10.
5. Elsharkawy NB, Abdelaziz EM, Ouda MM, Oraby FA. Effectiveness of health information package program on knowledge and compliance among pregnant women with anemia: a randomized controlled trial. Int J Environ Res Public Health. 2022;19(5):2724.
6. Hidayatunnikmah N. Level of education, knowledge of pregnant women regarding iron tablets to compliance with their consumption. J Kesehat LLDikti Wil 1. 2021;1(1):15–21.
7. Kemenkes RI. Profil Kesehatan Indonesia [Internet]. 18 Desember 2023. 2023. Available from: https://www.kemkes.go.id/id/category/profil-kesehatan
8. Dinkes Kota Jambi. Profil Kesehatan Kota Jambi [Internet]. Jambi; 2021. Available from: http://dinkes.jambiprov.go.id/all_profil_kesehatan. Last accessed: 19 July 2022.
9. Nivedita K, Shanthini FN. Knowledge, attitude and practices of pregnant women regarding anemia, iron rich diet and iron supplements and its impact on their hemoglobin levels. Int J Reprod Contracept Obs Gynecol. 2016;5(2):425–31.
10. Mutalazimah M, Rahayu GS. Mothers' Knowledge about Anemia and the Compliance of Consuming Iron Tablets (Fe) and Anemia Occurrence among Pregnant Women. Int J Pharm Res. 2019;11(1).
11. Balcha WF, Eteffa T, Arega Tesfu A, Abeje Alemayehu B. Maternal Knowledge of Anemia and Adherence to its Prevention Strategies: A Health Facility-Based Cross-Sectional Study De-

sign. Inq J Heal Care Organ Provision, Financ. 2023;60:00469580231167731.

12. Bizuneh AD, Azeze GG. Knowledge on anaemia and benefit of iron–folic acid supplementation among pregnant mothers attending antenatal care in Woldia town, Northeastern Ethiopia: a facility-based cross-sectional study. J Heal Popul Nutr. 2022;41(1):32.
13. Onyeneho NG, Subramanian S V. Anemia in pregnancy: Factors influencing knowledge and attitudes among mothers in southeastern Nigeria. J Public Health (Bangkok). 2016;24:335–49.
14. Ratanasiri T, Koju R. Effect of knowledge and perception on adherence to iron and folate supplementation during pregnancy in Kathmandu, Nepal. J Med Assoc Thail. 2014;97(10):S67-74.
15. Winardi B, Andani ECG. Knowledge of pregnant women about anemia is related with adherence to iron tablets. Maj Obs Ginekol. 2018;26:26–8.
16. Nahrisah P, Somrongthong R, Viriyautsahakul N, Viwattanakulvanid P, Plianbangchang S. Effect of integrated pictorial handbook education and counseling on improving anemia status, knowledge, food intake, and iron tablet compliance among anemic pregnant women in Indonesia: a quasi-experimental study. J Multidiscip Healthc. 2020;43–52.
17. Habib A, Hussain MAKPM, Gilani SA. Knowledge, attitude and practices of pregnant women regarding iron deficiency anemia in a rural area of Lahore. J Heal Med Nurs. 2018;50.
18. Molla T, Guadu T, Muhammad EA, Hunegnaw MT. Factors associated with adherence to iron folate supplementation among pregnant women in West Dembia district, northwest Ethiopia: a cross sectional study. BMC Res Notes. 2019;12:1–6.
19. Biswas M, Baruah R. Maternal anaemia associated with socio-demographic factors among pregnant women of Boko-Bongaon Block Kamrup, Assam. Indian J Basic Appl Med Res. 2014;3(2):712–21.
20. James AH. Iron deficiency anemia in pregnancy. Obstet Gynecol. 2021;138(4):663–74.
21. Garzon S, Cacciato PM, Certelli C, Salvaggio C, Magliarditi M, Rizzo G. Iron deficiency anemia in pregnancy: Novel approaches for an old problem. Oman Med J. 2020;35(5):1–9.
22. Agegnehu G, Atenafu A, Dagne H, Dagnew B. Adherence to iron and folic acid supplement and its associated factors among antenatal care attendant mothers in Lay Armachiho health centers, Northwest, Ethiopia, 2017. Int J Reprod Med. 2019;2019(1):5863737.

23. Dutta AJ, Patel P, Bansal RK. Compliance to iron supplementation among pregnant women: a cross sectional study in urban slum. Natl J Community Med. 2014;5(04):457–62.
24. Wiradnyani LAA, Khusun H, Achadi EL, Ocviyanti D, Shankar AH. Role of family support and women's knowledge on pregnancy-related risks in adherence to maternal iron–folic acid supplementation in Indonesia. Public Health Nutr. 2016;19(15):2818–28.
25. Warvadekar K, Reddy J, Sharma S, Dearden KA, Raut MK. Socio-demographic and economic determinants of adherence to iron intake among pregnant women in selected low and lower middle income countries in Asia: insights from a cross-country analyses of global demographic and health surveys. Intl J Comm Med Public Heal. 2018;5(4):1552–69.
26. Karami M, Chaleshgar M, Salari N, Akbari H, Mohammadi M. Global prevalence of anemia in pregnant women: a comprehensive systematic review and meta-analysis. Matern Child Health J. 2022;26(7):1473–87.
27. Azmi U, Puspitasari Y. Literature Review: Risk Factors of Anemia in Pregnancy Women. J Qual Public Heal. 2022;6(1):244–56.