Jurnal Info Kesehatan
Vol. 23, No. 1, March 2025, pp. 124-133
P-ISSN 0216-504X, E-ISSN 2620-536X
DOI: *10.31965/infokes.Vol23.Iss1.1858*
Journal homepage: *https://jurnal.poltekkeskupang.ac.id/index.php/infokes*

RESEARCH Open Access

Dietary Intake and Pregnancy Characteristics on Maternal Anemia Status

Harna[1a*], Mertien Sa'pang[2b], Andi Muh Asrul Irawan[3c]

[1] Program Study of Nutrition, Universitas Esa Unggul, West Jakarta, Jakarta, Indonesia
[2] Program Study of Dietisien, Universitas Esa Unggul, West Jakarta, Jakarta, Indonesia
[3] Program Study of Nutrition, A-Azhar University of Indonesia, South Jakarta, Jakarta, Indonesia

[a] Email address: harna@esaunggul.ac.id
[b] Email address: mertien.sapang@esaunggul.ac.id
[c] Email address: asrul.irawan@uai.ac.id

Received: 7 December 2024 Revised: 31 January 2025 Accepted: 2 February 2025

Abstract
Anemia during pregnancy remains a significant global health concern, affecting a substantial portion of the worldwide population. The prevalence of anemia is particularly high among pregnant women, especially in developing countries like Indonesia. Anemia during pregnancy can lead to severe complications for both mother and fetus, including increased mortality risk, premature birth, low birth weight, and cognitive impairment. Purpose: This study aimed to identify factors contributing to anemia, specifically examining food intake and pregnancy characteristics. A cross-sectional study was conducted from June to September 2023 at Parung Panjang Health Center, Bogor Regency, involving 135 pregnant women. Data collection included hemoglobin measurements using an easy touch device and nutritional intake assessment through SQ-FFQ interviews. Analysis was performed using SPSS version 23 with chi-square testing. The study revealed significant correlations between parity, intake of calcium, and vitamin C with anemia status ($p<0.05$). Most participants were in their third trimester, predominantly unemployed, and had low education levels. There was no significant association between nutrition status, age, family income and infection story with anemia status ($p>0.05$). While the majority of women had adequate iron intake, no significant association was found between iron intake and anemia status ($p>0.05$). The study identified parity, intake of calcium, and vitamin C as significant factors associated with anemia in pregnant women. These findings emphasize the importance of comprehensive nutritional support and monitoring during pregnancy, particularly focusing on adequate micronutrient intake and considering parity status in anemia prevention strategies.

Keywords: Anemia, Iron, Parity, Pregnant Women.

Corresponding Author:

Harna
Department of Nutrition, Universitas Esa Unggul, West Jakarta, Jakarta, Indonesia
Email: harna@esaunggul.ac.id

1. INTRODUCTION

Anemia is a global public health problem that affects all age groups across both developing and developed countries. Worldwide, 1.93 billion people are living with anemia. Among these groups, women of reproductive age, particularly those who are pregnant, have the highest vulnerability to anemia. According to WHO statistics from 2011, anemia prevalence reaches 29% in non-pregnant women and increases up to 38% in pregnant women aged 15-49 years (WHO, 2014). WHO categorizes anemia in pregnant women based on prevalence: <5% is insignificant, 5-19% is mild, 20-39% is moderate, and ≥40% represents a serious public health problem. In Indonesia, the prevalence of anemia in pregnant women is 27.7% (Kementerian Kesehatan Republik Indonesia, 2023). Based on the prevalence data, Indonesia has been classified as having a moderate public health concern regarding maternal anemia, necessitating immediate intervention strategies to address this significant health issue. The prevalence of anemia in pregnant women in West Java in 2020 reached 32.5%, particularly in Bogor Regency. In 2023, the prevalence of anemia in pregnant women increased to 37.1%, placing Bogor Regency as the third highest for cases of anemia in pregnant women in West Java.

Anemia during pregnancy can have severe adverse effects on both mother and baby. Pregnant women with severe anemia face double the risk of death compared to those without severe anemia (Helmy et al., 2018; Smith et al., 2019). Anemia is the main cause of maternal and fetal morbidity and mortality in developing countries. Anemia during pregnancy is clinically defined as a hemoglobin level of <11 g/d. This condition can lead to premature birth, low birth weight, fetal cognitive impairment, and fetal death (Sifakis & Pharmakides, 2000; Smith et al., 2019). Maternal complications include preeclampsia, antepartum hemorrhage, puerperal infection, and thromboembolic complications that can cause uterine subinvolution, lactation failure, and delayed wound healing (Geta et al., 2022).

Anemia during pregnancy is a significant health concern caused by multiple factors. When the increased nutritional demands of pregnancy aren't met through proper diet and supplements, anemia can develop. Several health conditions increase the risk of anemia, including parasitic infections that impair nutrient absorption, malaria that affects red blood cells, and chronic diseases that alter blood composition and iron metabolism (Jufar & Zewde, 2014; Minasi et al., 2021; Suryanarayana et al., 2017). Social factors also play a crucial role in pregnancy-related anemia. These include poverty limiting access to nutritious foods, distance from healthcare facilities, inadequate spacing between pregnancies, delayed prenatal care, and multiple pregnancies that deplete maternal nutrients (Harna et al., 2020; Tulu et al., 2019).

Nutritional intake are key to preventing anemia. Studies show that irregular meals and lack of dietary variety increase anemia risk, especially when women don't follow their prescribed iron supplement routines (Lebso et al., 2017). Research has also found strong links between anemia during pregnancy and nutritional measurements like mid-upper arm circumference (MUAC) and body mass index (BMI) (Harna et al., 2023; Lipoeto & Nindrea, 2020; Sari et al., 2025; Tan et al., 2020; Tulu et al., 2019). Despite extensive research on pregnancy, related anemia, key knowledge gaps remain. Current studies rarely examine how multiple risk factors interact, especially in Indonesia. Research typically focuses on individual factors rather than their complex interactions, and evidence is lacking on interventions that address multiple risk factors together.

Previous research showed that there was a relationship between age, education, and parity with the incidence of anemia in pregnant women (Lestiarini et al., 2025). A comprehensive literature review has demonstrated significant correlations between antenatal care (ANC) visits, maternal parity, maternal age, and pregnancy intervals with the incidence of anemia among pregnant women in the Durian Bungkuk Health Center service area (Hariyanti et al., 2025). However, it is noteworthy that some studies have yielded inconsistent results regarding these associations. Given the high prevalence of maternal anemia in Bogor Regency and the current

lack of region-specific research, further investigation is warranted to examine the relationships between these variables and anemia occurrence among pregnant women in this geographical area. This study aims to identify factors causing anemia through a comprehensive approach including food intake and pregnancy characteristics at Parung Panjang Health Center in Bogor Regency, West Java.

2. RESEARCH METHOD

A quantitative research approach utilizing a cross-sectional design was implemented during a four-month period, from June to September 2023 at Parung Panjang Health Center in Bogor Regency, West Java. The population in this study was 412 pregnant women, through purposive sampling methodology, the study recruited 135 participants, with the sample size determined by minimum calculation requirements using the Slovin formula. The established inclusion criteria were: (1) pregnant women registered at Parung Panjang Health Center; (2) Have a KIA book; (3) Pregnant women who did not have preeclampsia, diabetes, and other chronic diseases. The exclusion criteria consisted of: (1) currently following a weight loss diet program; (2) incomplete participation in the research.

In this study, participants were categorized based on several criteria. Anemia status was evaluated by measuring hemoglobin levels using an easy touch device, where normal results were ≥ 11 gr/dL, and anemia <11 gr/dL. To collect information about nutritional intake, researchers conducted in-depth interviews using validated SQ-FFQ (Semi-Quantitative Food Frequency Questionnaire). Daily consumption results were processed using Nutrisurvey software and compared with RDA (Recommended Dietary Allowance) standards. Pregnant women's nutritional intake for macronutrients was then classified into two categories: inadequate (<90% or 110% RDA) and adequate (90-110% RDA). Micronutrient intake classified into two categorized as adequate (> 77% RDA) or inadequate (≤ 77% RDA). In terms of age, they were grouped into risk categories (<20 years or >35 years) and non-risk categories (20-35 years). For pregnancy interval, the risk category < 2 years, while non-risk was ≥2 years. Employment Status is divided into two categories: Not Working and Working. Education Level is divided into two categories: Basic Education (no schooling-Junior High School) and Higher Education (Senior High School and University). Monthly Household Income is divided based on Bogor Regency's minimum wage: <4,500,000 IDR and ≥4,500,000 IDR.

Data processing was performed using SPSS version 23 program with two types of analysis: univariate and bivariate. Univariate analysis provides descriptive overview for each research variable, while bivariate analysis was applied to evaluate relationships between variables in determining malnutrition causal factors in pregnant women. Variables selected for bivariate analysis were based on previous studies showing significant associations (p-value<0.05) and theoretical relevance to anemia in pregnancy. Hypothesis testing was conducted through chi-square method with 95% confidence interval. This research has also received ethical approval from the Esa Unggul University Research Ethics Commission with number: 0923-10.001/DPKE-KEP/FINAL-EA/UEU/X/2023.

3. RESULTS AND DISCUSSION

Table 1. Characteristics of Respondents

Characteristic	n (135)	%
Gestational Age		
Trimester 1	21	15.6
Trimester 2	50	37.0
Trimester 3	64	47.4
Mother's Age		

Characteristic	n (135)	%
20-35 years	32	23.7
<20 and >35 years	103	76.3
Mother's Occupation		
Unemployed	128	94.8
Employed	7	5.2
Mother's Education		
Low	86	63.7
High	49	36.3
Family Income		
<4.500.000	102	75.6
≥4.500.000	33	24.4

Table 1 shows that the most of the participants (47.4%) were in their third trimester, while most mothers (76.3%) was the 20-35 age range. A significant majority were unemployed (94.8%) and had low education (63.7%). Financial constraints were evident, as 75.6% of families earned less than Rp4,500,000 in local currency. These findings indicate a population facing multiple socioeconomic challenges during pregnancy.

Table 2. Factors associated with anemia status during pregnancy

Variables	Anemia Status				Total		p-value
	Normal		Anemia				
	N	%	n	%	n	%	
Parity							
Primipara	54	40	25	18.5	79	58.5	0.047*
Multipara	46	34.1	10	7.4	56	41.5	
Nutrition Status							
Normal	18	13.3	8	5.9	26	19.3	0.619
Undernutrition	82	60.7	27	20	109	80.7	
Age							
Low Risk	25	18.5	7	5.2	32	23.7	0.648
High Risk	75	55.6	28	20.7	103	76.3	
Income							
< UMR	75	56.4	27	20.3	102	75.6	0.571
≥ UMR	23	17.3	10	6	33	24.4	
Pregnancy Interval							
Low Risk	21	15.6	5	3.7	26	19.3	0.463
High Risk	79	58.5	30	22.2	109	80.7	
Infection History							
None	5	3.7	2	1.5	7	5.2	0.583
Yes	95	70.4	33	24.4	128	94.8	

Table 2 showed that the most participants were primipara (58.5%), with 40% showing normal status and 18.5% having anemia. In this study the anemia prevalence is significant increasing with parity ($p<0.05$). Previous studies have shown that parity is significantly associated with the incidence of anemia in pregnant women (Harna et al., 2020; Shah et al., 2020; Vionalita & Permata, 2020). The relationship between parity and anemia in pregnant women is a significant concern in maternal health care. Multiple pregnancies can lead to depleted iron stores and reduced hemoglobin levels, particularly when pregnancies occur in close succession. Women with higher parity are more susceptible to nutritional deficiencies due to the cumulative effect of repeated pregnancies on their body's resources. Each pregnancy and childbirth process depletes maternal iron reserves, and without adequate time for

replenishment between pregnancies, the risk of anemia increases substantially. This is further complicated by the physiological demands of pregnancy, including increased blood volume and the need for additional nutrients to support fetal development (Aznam & Inayati, 2021; Permatasari et al., 2021; Shah et al., 2020). Regarding nutrition status, a majority of pregnant women (80.7%) were undernourished, among whom 60.7% maintained normal hemoglobin levels while 20% had anemia. There no significant associations between nutrition status with anemia status in pregnant women (p>0.05). The results of this study differ from previous studies which showed that there is a relationship between nutritional status and the incidence of anemia in pregnant women (Nainggolan et al., 2022). Pregnant women with undernutrition also tend to have low iron reserves before pregnancy. During pregnancy, iron requirements increase dramatically to support fetal growth, placenta formation, and increased blood volume. Without adequate reserves and sufficient intake, the risk of anemia becomes higher (Harna et al., 2024).

The study found that 76.3% of pregnant women into the high-risk age category, with 55.6% showing normal status and 20.7% having anemia. There is no significant between age with incidence of anemia in pregnant women (p>0.05). Maternal age significantly impacts anemia risk during pregnancy. Women aged ≥35 years face higher risks due to decreased nutrient absorption, pre-existing conditions, and complications affecting iron metabolism. Conversely, teenage mothers are vulnerable due to competing nutritional needs with the fetus, poor dietary habits, and limited prenatal care knowledge. There was no significant associations between family income with the incidence of anemia in pregnant women (p > 0.05). Family income affects anemia in pregnant women in four ways: limited access to iron-rich nutritious foods, reduced access to healthcare and routine pregnancy check-ups, increased risk of infection due to suboptimal living conditions, and nutrition being deprioritized due to more pressing living needs.

Pregnancy interval can impacts anemia risk in pregnant women. Intervals shorter than 24 months can increase maternal anemia risk due to insufficient nutrient replenishment, especially iron. Limited time between pregnancies often results in inadequate absorption of nutrients essential for healthy hemoglobin levels. Studies show mixed results regarding this relationship. While some research indicates a clear association between short intervals and anemia, others find no significant association. These variations may reflect differences in study methodology, populations, and definitions of adequate interval (Bansal et al., 2020; Onwuka et al., 2020).

There was no significant associations between infection history with the incidence of anemia in pregnant women (p > 0.05). Infection can cause anemia in pregnant women through several mechanisms. First, infection interferes with iron absorption in the intestines, which inhibits red blood cell formation. Second, when infection occurs, the body produces the hormone hepcidin which inhibits iron absorption and utilization. Third, infection can cause damage to red blood cells and disrupt the production of new blood cells in the bone marrow. Finally, the body needs more iron to fight infection and repair damaged tissue, while iron absorption is impaired, thus worsening the anemia condition (Minasi et al., 2021; Tan et al., 2020).

Table 3. Relationship between dietary intake with the anemia status

Variables	Anemia Status				Total		p-value
	Normal		Anemia				
	n	%	n	%	n	%	
Energy Adequacy Level							
Adequate	78	57.8	30	22.2	108	80	0.462
Inadequate	22	16.3	5	3.7	27	20	

Variables	Anemia Status				Total		p-value
	Normal		Anemia				
	n	%	n	%	n	%	
Protein Adequacy Level							
Adequate	83	61.5	28	20.7	111	82.2	0.798
Inadequate	17	12.6	7	5.2	24	17.8	
Fat Adequacy Level							
Adequate	95	70.4	35	25.9	130	96.3	0.327
Inadequate	5	3.7	0	0	5	3.7	
Carbohydrate Adequacy Level							
Adequate	83	61.5	28	20.7	111	82.2	0.798
Inadequate	17	12.6	7	5.2	24	17.8	
Calcium Adequacy Level							
Adequate	34	25.2	4	3	38	28.1	0.015*
Inadequate	66	48.9	31	23	97	71.9	
Iron Adequacy Level							
Adequate	77	57	30	22.2	107	79.3	0.339
Inadequate	23	17	5	3.7	28	20.7	
Vitamin C Adequacy Level							
Adequate	32	23.7	4	3	36	26.7	0.025*
Inadequate	68	50.4	31	23	99	73.3	

Table 3 shows the relationship between nutrient adequacy levels and anemia status in pregnant women. Of the total sample, the majority of pregnant women had adequate energy intake (80%), with 57.8% having normal status and 22.2% experiencing anemia. Regarding protein adequacy, 82.2% of pregnant women had adequate intake, where 61.5% were normal and 20.7% were anemic. Almost all pregnant women (96.3%) had adequate fat intake levels, with 70.4% normal and 25.9% anemic. Carbohydrate adequacy levels showed a similar pattern to protein, where 82.2% of pregnant women had adequate intake. Table 3 also show that there was no significant association between energy, protein, fat and carbohydrate adequacy level with anemia status ($p>0.05$). The lack of association between protein intake and anemia incidence in pregnant women in this study can be explained by several factors. First, the majority of pregnant women in the study had adequate protein intake, so there was no significant variation in protein intake status among respondents. Additionally, iron absorption is not only influenced by protein intake but also by other factors such as iron bioavailability in food, the presence of iron absorption inhibitors, and the physiological condition of pregnant women.

Previous studies have shown that protein intake is associated with the incidence of anemia in pregnant women. Protein plays a crucial role in iron metabolism and transportation in the body. Adequate protein intake supports the formation of hemoglobin and other proteins involved in iron absorption and utilization. Several research findings indicate that pregnant women with low protein intake have a higher risk of developing anemia compared to those with adequate protein consumption. This relationship can be attributed to protein's function in forming transferrin and other transport proteins essential for iron metabolism (Dewi et al., 2022; Kangalgil et al., 2021).

The relationship between calcium intake and anemia in pregnant women shows a significant correlation ($p=0.015$) based on the study results. Among the participants, only 28.1% had adequate calcium intake, with 25.2% of these women having normal hemoglobin levels and 3% experiencing anemia. Conversely, a substantial 71.9% of pregnant women had inadequate calcium intake, with 48.9% maintaining normal hemoglobin levels while 23% were

anemic. This significant association can be explained by several mechanisms. Calcium plays an indirect role in iron metabolism and absorption. Adequate calcium levels are essential for maintaining proper cell function and hormone regulation, which can affect iron absorption and utilization. Additionally, calcium's role in maintaining bone health and preventing excessive bone turnover during pregnancy may influence iron availability for hemoglobin synthesis (Humayun et al., 2021; Sulibursk a et al., 2024). However, it's important to note that while calcium intake shows a statistical relationship with anemia, this association should be interpreted cautiously as other factors, such as dietary patterns, iron bioavailability, and overall nutritional status, also play crucial roles in anemia development during pregnancy.

The relationship between iron intake and anemia in pregnant women, based on the study results, shows that 79.3% of pregnant women had adequate iron intake, with 57% having normal hemoglobin levels and 22.2% experiencing anemia. Among those with inadequate iron intake (20.7%), 17% maintained normal hemoglobin levels while 3.7% were anemic. However, this relationship was not statistically significant ($p>0.05$). The lack of significant association between iron intake and anemia in this study could be attributed to several factors. First, iron absorption efficiency varies greatly depending on the type of iron consumed (heme vs. non-heme iron) and the presence of absorption enhancers or inhibitors in the diet. Second, the body's iron utilization is influenced by various physiological factors during pregnancy, including increased blood volume and the competing demands of fetal development.

Additionally, while dietary iron intake is important, other factors such as pre-pregnancy iron stores, iron supplementation compliance, and the presence of underlying health conditions can significantly impact anemia status. Iron is essential for hemoglobin formation during pregnancy. The body absorbs iron through the small intestine, with increased efficiency during pregnancy to meet maternal and fetal needs. Iron binds to transferrin in the blood and travels to bone marrow, where it helps form hemoglobin. Each hemoglobin molecule contains four iron atoms in its heme groups. Pregnancy increases blood volume by 30-50%, requiring more hemoglobin and iron. The fetus needs iron for its own development, obtaining it through the placenta. Insufficient iron leads to reduced hemoglobin and pregnancy-related anemia. The body first uses stored iron from the liver, but when depleted, hemoglobin production suffers (Benson et al., 2021; Cappellini et al., 2020; Dilantika et al., 2024; Ghiffari et al., 2021).

Regular monitoring of iron and hemoglobin levels during pregnancy ensures proper supplementation and healthy outcomes. The relationship between vitamin C intake and anemia in pregnant women shows a significant correlation ($p=0.025$) according to the study findings. Only 26.7% of pregnant women had adequate vitamin C intake, with 23.7% having normal hemoglobin levels and 3% experiencing anemia. Meanwhile, a considerable 73.3% of pregnant women had inadequate vitamin C intake, where 50.4% maintained normal hemoglobin levels while 23% were anemic. This significant association can be explained by vitamin C's crucial role in iron metabolism. Vitamin C is a powerful enhancer of iron absorption, particularly for non-heme iron found in plant-based foods. It converts iron into a more readily absorbable form and helps overcome the effects of iron absorption inhibitors present in many foods. Furthermore, vitamin C aids in the mobilization of iron from storage sites in the body, making it available for hemoglobin synthesis (Badriyah, 2021; Dilantika et al., 2024; Rahmadani et al., 2021). The high percentage of pregnant women with inadequate vitamin C intake (73.3%) is concerning, as it may contribute to reduced iron absorption efficiency, potentially leading to anemia. This finding emphasizes the importance of adequate vitamin C consumption during pregnancy, either through diet or supplementation, to optimize iron absorption and prevent anemia.

The limitations of this study include several aspects. First, this study used a cross-sectional design that only describes variable relationships at one point in time, thus unable to determine definitive cause-effect relationships. Second, data collection relying on respondent

self-reporting may contain recall bias. The implications of this study for health policy include the need to strengthen routine anemia screening programs, especially for high-risk groups. Nutrition programs need to be enhanced with a focus on education and supplementation for pregnant women from low-income families. Additionally, comprehensive health service integration is needed, encompassing infection prevention and nutritional status monitoring within antenatal care programs.

4. CONCLUSION

The conclusion of this study was several factors including maternal age, nutritional status, family income, pregnancy spacing, and infection history showed no significant associations with anemia. This is due to other factors not measured in this study (confounding factors) that may influence the relationship between the variables studied. These findings emphasize the importance of focusing interventions on nutritional supplementation, particularly calcium and vitamin C. Calcium and vitamin C are important for pregnant women with anemia. Vitamin C enhances the absorption of plant-based iron and supports red blood cell formation. Calcium is needed for fetal bone and teeth formation, but it can inhibit iron absorption. Interventions can be implemented by separating calcium and iron consumption by at least 2 hours, consuming vitamin C together with plant-based iron, and monitoring nutrient intake during antenatal care.

REFERENCES

Aznam, A. E., & Inayati, L. (2021). Relationship Between Age and Parity with Incidences of Anemia in Pregnant Women in Mayangrejo. *Jurnal Biometrika Dan Kependudukan*, *10*(2), 130–137.

Badriyah, N. (2021). Relation Between of Nutritional Status and Vitamin C Conditions with Hemoglobin Levels in Anemic Pregnant Women in The Working Area of Pauh Public Health Center, Padang City. *Science Midwifery*, *9*(2), 317–322. Retrieved from: http://midwifery.iocspublisher.org/index.php/midwifery/article/view/104

Bansal, R., Bedi, M., Kaur, J., Kaur, K., Shergill, H. K., Khaira, H. K., & Suri, V. (2020). Prevalence and factors associated with anemia among pregnant women attending antenatal clinic. *Adesh University Journal of Medical Sciences & Research*, *2*(1), 42–48. https://doi.org/10.25259/AUJMSR_8_2020

Benson, C. S., Shah, A., Stanworth, S. J., Frise, C. J., Spiby, H., Lax, S. J., Murray, J., & Klein, A. A. (2021). The effect of iron deficiency and anaemia on women's health. *Anaesthesia*, *76*, 84–95. https://doi.org/10.1111/anae.15405

Cappellini, M. D., Musallam, K. M., & Taher, A. T. (2020). Iron deficiency anaemia revisited. *Journal of Internal Medicine*, *287*(2), 153–170. https://doi.org/10.1111/joim.13004

Dewi, S. S. S., Hasibuan, D. A., Aswan, Y., Harahap, M., & Anggraini, W. (2022). Relationship between diet and physical activity with the event of anemia in pregnant women. *International Journal of Public Health Excellence (IJPHE)*, *1*(2), 87–92. https://doi.org/10.55299/ijphe.v1i2.36

Dilantika, C., Sitorus, N., & Saebah, N. (2024). The Important Role of Iron, Protein and Vitamin C With the Incident of Anemia. *Journal of Indonesian Specialized Nutrition*, *1*(3), 121–130.

Geta, T. G., Gebremedhin, S., & Omigbodun, A. O. (2022). Prevalence and predictors of anemia among pregnant women in Ethiopia: Systematic review and meta-analysis. *PloS One*, *17*(7), e0267005. https://doi.org/10.1371/journal.pone.0267005

Ghiffari, E. M., Harna, H., Angkasa, D., Wahyuni, Y., & Purwara, L. (2021). Kecukupan Gizi, Pengetahuan, dan Anemia Ibu Hamil. *Ghidza: Jurnal Gizi Dan Kesehatan*, *5*(1), 10–23. https://doi.org/10.22487/ghidza.v5i1.186

Hariyanti, A., Kirana, R., Megawati, M., & Hapisah, H. (2025). Faktor-Faktor yang Berhubungan dengan Kejadian Anemia Pada Ibu Hamil Di Wilayah Kerja Puskesmas

Durian Bungkuk Tahun 2024. *Seroja Husada: Jurnal Kesehatan Masyarakat*, *2*(2), 126–143. Retrieved from: https://jurnal.researchideas.org/index.php/husada/article/view/215

Harna, H., Irawan, A. M. A., Rahmawati, R., & Sa'pang, M. (2023). *Kekurangan Energi Kronik (KEK) Pada Ibu Hamil* (1st ed.). Yogyakarta: PT. Penamuda Media.

Harna, H., Muliani, E. Y., Sa'pang, M., Dewanti, L. P., & Irawan, A. M. A. (2020). Prevalensi dan Determinan Kejadian Anemia Ibu Hamil. *JIK (Jurnal Ilmu Kesehatan)*, *4*(2), 78–83. https://doi.org/http://dx.doi.org/10.33757/jik.v4i2.289

Harna, H., Rahmawati, R., Irawan, A. M. A., & Sa'pang, M. (2024). Prevalence and determinant factors of Chronic Energy Deficiency (CED) in pregnant women. *AcTion: Aceh Nutrition Journal*, *9*(1), 65–73. http://dx.doi.org/10.30867/action.v9i1.1443

Helmy, M. E., Elkhouly, N. I., & Ghalab, R. A. (2018). Maternal anemia with pregnancy and its adverse effects. *Menoufia Medical Journal*, *31*(1), 7-11. Retrieved from: https://www.menoufia-med-j.com/journal/vol31/iss1/2/

Humayun, N., Bashir, S., & Khalid, S. (2021). Comparison of Nutrients Intake among Pregnant Anemic & Non-Anemic Women. *Journal of Nutrition and Food Security*, 6(3), 226-231. Retrieved from: https://jnfs.ssu.ac.ir/browse.php?a_id=334&sid=1&slc_lang=en

Jufar, A. H., & Zewde, T. (2014). Prevalence of anemia among pregnant women attending antenatal care at tikur anbessa specialized hospital, Addis Ababa Ethiopia. *J Hematol Thromb Dis*, *2*(125), 1-6.

Kangalgil, M., Sahinler, A., Kırkbir, I. B., & Ozcelik, A. O. (2021). Associations of maternal characteristics and dietary factors with anemia and iron-deficiency in pregnancy. *Journal of Gynecology Obstetrics and Human Reproduction*, *50*(8), 102137. https://doi.org/10.1016/j.jogoh.2021.102137

Kementerian kesehatan Republik Indonesia. (2023). *Survei Kesehatan Indonesia (SKI)*. Kementerian Kesehatan Republik Indonesia.

Lebso, M., Anato, A., & Loha, E. (2017). Prevalence of anemia and associated factors among pregnant women in Southern Ethiopia: A community based cross-sectional study. *PloS One*, *12*(12), e0188783. https://doi.org/10.1371/journal.pone.0188783

Lestiarini, E., Zakiah, Z., Kristiana, E., & Yuniarti, Y. (2025). Analisis Faktor-Faktor Yang Berhubungan Dengan Kejadian Anemia Pada Ibu Hamil di Wilayah Kerja Puskesmas Alalak Selatan. *Jurnal Penelitian Multidisiplin Bangsa*, *1*(8), 1262–1269. https://doi.org/10.59837/jpnmb.v1i8.231

Lipoeto, N. I., & Nindrea, R. D. (2020). Nutritional contributors to maternal anemia in Indonesia: Chronic energy deficiency and micronutrients. *Asia Pacific Journal of Clinical Nutrition*, 29, S9-S17. https://doi.org/10.6133/apjcn.202012_29(S1).02

Minasi, A., Susaldi, S., Nurhalimah, I., Imas, N., Gresica, S., & Candra, Y. (2021). Faktor yang Mempengaruhi Kejadian Anemia pada Ibu Hamil. *Open Access Jakarta Journal of Health Sciences*, *1*(2), 57–63. https://doi.org/10.53801/oajjhs.v1i3.21

Nainggolan, O., Hapsari, D., Titaley, C. R., Indrawati, L., Dharmayanti, I., & Kristanto, A. Y. (2022). The relationship of body mass index and mid-upper arm circumference with anemia in non-pregnant women aged 19–49 years in Indonesia: Analysis of 2018 Basic Health Research data. *PloS One*, *17*(3), e0264685. https://doi.org/10.1371/journal.pone.0264685

Onwuka, C. C., Ugwu, E. O., Obi, S. N., Onwuka, C. I., Dim, C. C., Eleje, G. U., Ezugwu, E. C., Agu, P. U., Nwagha, U. I., & Ozumba, B. C. (2020). Effects of short inter-pregnancy interval on maternal and perinatal outcomes: A cohort study of pregnant women in a low-income country. *Nigerian Journal of Clinical Practice*, *23*(7), 928–933. Retrieved from: https://www.ajol.info/index.php/njcp/article/view/197712

Permatasari, P. B., Rachmawati, R., Baska, D. Y., Widiyanti, D., & Mizawati, A. (2021). Hubungan Usia Kehamilan, Paritas, dan Jarak Kehamilan dengan Kejadian Anemia pada

Ibu Hamil di Puskesmas Anggut Atas Kota Bengkulu. *Skripsi*, Poltekkes Kemenkes Bengkulu.

Rahmadani, G., Almurdi, A., & Endrinaldi, E. (2021). The Effect of Vitamin C Consumption on Increasing Hemoglobin and Ferrithin Levels of Pregnant Anemia Who Receive Blood Supplements. *Science Midwifery*, *10*(1, October), 1–5. Retrieved from: Retrieved from http://midwifery.iocspublisher.org/index.php/midwifery/article/view/128

Sari, E. N., Zakiah, Z., Megawati, M., & Dewi, V. K. (2025). Faktor-Faktor Yang Mempengaruhi Kejadian Anemia Pada Ibu Hamil Di Wilayah Kerja Puskesmas Teluk Tiram Kota Banjarmasin Tahun 2024. *Seroja Husada: Jurnal Kesehatan Masyarakat*, *2*(2), 521–535. https://doi.org/10.59837/jpnmb.v1i8.296

Shah, T., Warsi, J., & Laghari, Z. (2020). Anemia and its association with parity. *The Professional Medical Journal*, *27*(05), 968–972. https://doi.org/10.29309/TPMJ/2020.27.05.3959

Sifakis, S., & Pharmakides, G. (2000). Anemia in pregnancy. *Annals of the New York Academy of Sciences*, *900*(1), 125–136. https://doi.org/10.1111/j.1749-6632.2000.tb06223.x

Smith, C., Teng, F., Branch, E., Chu, S., & Joseph, K. S. (2019). Maternal and perinatal morbidity and mortality associated with anemia in pregnancy. *Obstetrics and Gynecology*, *134*(6), 1234-1244. https://doi.org/10.1097/AOG.0000000000003557

Sulibursk a, J., Cholik, R., Kocyłowski, R., & Bakinowska, E. (2024). Relationship between prepregnancy BMI and the concentrations of iron, calcium, and magnesium in serum and hair during the first trimester of pregnancy in women. *Journal of Trace Elements in Medicine and Biology*, *83*, 127388. https://doi.org/10.1016/j.jtemb.2024.127388

Suryanarayana, R., Chandrappa, M., Santhuram, A. N., Prathima, S., & Sheela, S. R. (2017). Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. *Journal of Family Medicine and Primary Care*, *6*(4), 739–743. https://doi.org/10.4103/jfmpc.jfmpc_33_17

Tan, J., He, G., Qi, Y., Yang, H., Xiong, Y., Liu, C., Wang, W., Zou, K., Lee, A. H., & Sun, X. (2020). Prevalence of anemia and iron deficiency anemia in Chinese pregnant women (IRON WOMEN): a national cross-sectional survey. *BMC Pregnancy and Childbirth*, *20*, 1–12. https://doi.org/10.1186/s12884-020-03359-z

Tulu, B. D., Atomssa, E. M., & Mengist, H. M. (2019). Determinants of anemia among pregnant women attending antenatal care in Horo Guduru Wollega Zone, West Ethiopia: Unmatched case-control study. *PloS One*, *14*(10), e0224514. https://doi.org/10.1371/journal.pone.0224514

Vionalita, G., & Permata, N. T. (2020). The relationship between age of pregnant women and parity with the incidence of anemia in third semester pregnant women. *International Conference of Health Development. Covid-19 and the Role of Healthcare Workers in the Industrial Era (ICHD 2020)*, 125–128. https://doi.org/10.2991/ahsr.k.201125.021

WHO. (2014). *Global nutrition targets 2025: anaemia policy brief*. World Health Organization. Retrieved from: https://www.who.int/publications/i/item/WHO-NMH-NHD-14.4