



Effect of Brief Pharmacist Counseling on Knowledge, Perception, Adherence, and Hemoglobin in Second-Trimester Pregnancy at a Community Health Center

Sri Suprapti^{1*}, Endang Darmawan², Eliza Dwinta¹, Win Win Khaing Shwe³, Emelda Emelda¹, Fadilatul Layalli¹, Ratih Devi Alfiana⁴

¹ Pharmacy Study Program, Faculty of Medicine and Health Sciences, Universitas Alma Ata, Jalan Brawijaya No. 99, Tamantirto, Kasihan, Bantul, Yogyakarta, 55183, Indonesia

² Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Ahmad Dahlan University, Jalan Prof. DR. Soepomo Sh, Warungboto, Umbulharjo, Yogyakarta, 55164, Indonesia

³ Department of Social, Economic, and Administrative Pharmacy, Faculty of Pharmacy, Mahidol University, 447 Thanon Si Ayutthaya, Thung Phaya Thai, Ratchathewi, Bangkok 10400, Thailand

⁴ Department of Midwifery, Faculty of Medicine and Health Sciences, Universitas Alma Ata, Jalan Brawijaya No. 99, Tamantirto, Kasihan, Bantul, Yogyakarta, 55183, Indonesia

*Corresponding author: srisuprapti@almaata.ac.id

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Abstract

Background: Anemia in pregnancy increases the risk of maternal mortality and fetal damage. The primary cause is iron deficiency. In 2018, 73.2% of pregnant women in Indonesia received iron supplements, yet anemia remained common, affecting 48.9% of them. **Objective:** This study aims to investigate the influence of Brief Counseling 5A on knowledge, perception, compliance, and Hb levels in second-trimester pregnant women taking Iron (III) Hydroxide Polymaltose Complex (IPC) tablets at the X's Public Health Center in Yogyakarta. **Methods:** This quasi-experimental study used a pre-test and post-test design without a control group and was conducted from November 2018 to April 2019 with 39 pregnant women. Measurements of knowledge, perception, and compliance were taken at the pre-test (1st day) and post-test (31st day) for those who received Brief Counseling 5A. **Results:** Brief Counseling 5A significantly increased mean pre-test and post-test scores for knowledge, perception, and compliance, with a significance value of 0.001 ($p < 0.050$). The mean pre-test knowledge score was 64.36 ± 2.69 . The post-test score was 90.26 ± 1.60 . The mean pre-test perception score was 28.26 ± 0.56 , and the post-test perception score was 33.31 ± 0.60 . The mean pre-test compliance level score was 56.15 ± 3.28 , and the post-test was 86.41 ± 2.06 . Each parameter had a p -value < 0.05 . Meanwhile, the mean pre-test Hb value was 11.98 ± 0.23 g/dL, while the mean post-test Hb value was 11.67 ± 0.21 g/dL, with a p -value of 0.117. **Conclusion:** Brief Counseling 5A can significantly increase knowledge, perception, and compliance. However, there was no increase in Hb levels among second-trimester pregnant women who consumed IPC tablets at the Public Health Center of Banguntapan III, Bantul.

Keywords: Anemia; Brief Counseling; Knowledge; Public Health Center

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INTRODUCTION

Anemia is defined as a condition characterized by a decrease in hemoglobin concentration or red blood cell count below normal levels, resulting in a reduced oxygen-carrying capacity of the blood to meet physiological needs [1]. In pregnant women, anemia is commonly defined as hemoglobin levels below 11 g/dL, with a slightly lower threshold during the second trimester (<10.5 g/dL) [1,2].

The global prevalence of anemia in pregnancy remains a significant public health concern. The prevalence is particularly high in developing countries, where economic conditions, sociocultural factors, and disparities in healthcare access during pregnancy contribute [2]. The clinical consequences of anemia in pregnancy are serious, affecting both the mother and the newborn. Maternal complications of anemia during pregnancy include an increased risk of mortality, susceptibility to infections, preterm labor, postpartum hemorrhage, and cardiac issues. Fetal complications are equally concerning, with risks of intrauterine growth restriction, preterm birth, perinatal mortality, and long-term neurodevelopmental impairments [3,4]. The causes of anemia are complex and multifactorial. Iron-deficiency anemia is the predominant form of anemia in pregnancy, responsible for approximately half of the cases. It typically results from insufficient iron intake, impaired absorption, or increased physiological demands during gestation. In addition, deficiencies in folate and vitamin B12 are also important factors contributing to anemia in pregnant women [5].

To prevent anemia in pregnancy, the World Health Organization recommends daily or intermittent oral iron-folic acid (IFA) supplementation, alongside essential nutrition interventions [6]. Indonesia has implemented a national program to prevent anemia through iron supplementation, as stipulated in the Minister of Health Regulation No. 88 of 2014, which recommends that pregnant women receive at least 90 iron tablets during pregnancy [7]. Although these recommendations have been implemented, anemia during pregnancy remains common. In 2023, the global prevalence among pregnant women reached 35.5%, showing that it is still a major public health issue [8]. In Indonesia, the prevalence of anemia increased from 37.1% in 2013 to 48.9% in 2018, then decreased to approximately 27.7% in 2023 [9,10]. Although this trend suggests improvement, the current prevalence still falls within the category of a moderate public health problem. This gap highlights that factors beyond supplementation availability, such as adherence, knowledge, perceptions, and counseling quality, play a critical role in anemia prevention during pregnancy.

Noncompliance with iron supplementation among pregnant women remains a significant barrier to preventing anemia. Adherence to iron tablet consumption is significantly associated with anemia outcomes; non-adherent pregnant women have up to 4–5 times higher risk of anemia compared to those who are compliant [11]. Inadequate dietary intake and low adherence to iron tablet consumption have been identified as major contributing factors to anemia in pregnancy [12]. Noncompliance is often influenced by limited knowledge, insufficient information from health workers, and weak interaction between patients and healthcare providers [13]. These findings emphasize the need to strengthen counseling and educational interventions to enhance adherence and reduce the burden of anemia during pregnancy [14,15].

One practical approach for pharmaceutical counseling is Brief Counseling using the 5A strategy, which has proven successful with COPD patients at the Lung Hospital in Bantul [16]. This study aims to assess the impact of 5A Brief counseling on pregnant women's knowledge, perceptions, and compliance with iron supplementation (Iron Polymaltose tablets). Using pre-test and post-test questionnaires over 30 days, the study expects that applying the 5A method will help reduce anemia rates among pregnant women in Bantul.

MATERIALS AND METHODS

Materials

The research was conducted at the "X" Public Health Center, with data collected prospectively from November 2018 to April 2019. Accidental sampling was used, targeting pregnant women in their second trimester (gestational age <27 weeks) who were taking Iron Polymaltose and also receiving routine prenatal care at the Public Health Center. The study included 39 participants selected through total sampling. The instrument for this research was a pre- and post-test questionnaire with closed-ended questions. The 5A questionnaire and the Brief Counseling Module were validated by experts, including psychologists, doctors, and pharmacists. Validation and reliability tests yielded valid results, with Cronbach's alpha values of 0.816 for knowledge, 0.638 for perception, and 0.782 for compliance.

Method

This study used a quasi-experimental pre-test and post-test design without a control group. Participants who met the inclusion criteria and provided informed consent were asked to complete socio-demographic information. A structured questionnaire was used to assess knowledge, perception, and compliance with iron supplementation. Clinical outcome was assessed based on hemoglobin (Hb) levels.

The pre-test was conducted at the initial health center visit on day 1st. Participants then received a modified 5A brief counseling session on the use of iron polymaltose tablets among pregnant women. The iron supplement contained 100 mg of elemental iron as the iron (III) hydroxide polymaltose complex (IPC). Participants were advised to take one tablet once daily for 30 days, according to the supplementation regimen provided at the public health center.

The modified 5A brief counseling included assessment of participants' knowledge, perception, current use of iron supplementation, and barriers to regular tablet intake; education on anemia in pregnancy, the benefits and correct use of iron polymaltose, dosage and frequency of administration, and the importance of regular daily intake; agreement on a practical plan to support appropriate iron supplement use; assistance in overcoming barriers such as forgetfulness, nausea and gastrointestinal discomfort; and arrangement of follow-up monitoring. Participants were instructed to take one iron supplement tablet once daily, preferably during or immediately after meals, and to take it regularly at the same time each day.

Data collection was conducted prospectively for 30 days. Monitoring was performed on day 15, while the post-test assessment was conducted on day 31. The 30-day observation period was based on the routine practice of prescribing 30 iron supplement tablets for 30 days during pregnancy [17–19]. In addition, recent evidence indicates that an adequate response to oral iron therapy is reflected by an increase in hemoglobin of approximately 1–2 g/dL within 3–4 weeks [20]. Therefore, a 30-day observation period was considered appropriate for evaluating changes in knowledge, perceptions, compliance, and hemoglobin levels following the modified 5A brief counseling intervention.

Ethical Considerations

The Health Ethics Committee (KEPK) of the Faculty of Medicine, University of Muhammadiyah Surakarta, granted ethical approval for the study under number 1678/B.1/KEPK-FKUMS/XI/2018.

Data Analysis

The Wilcoxon test was used to evaluate mean knowledge, perception, and compliance scores before and after the assessments.

RESULTS AND DISCUSSION

According to the socio-demographic data (Table 1), most pregnant women in the second trimester are adults aged 26–46 years (59.0%), considered the optimal pregnancy age. Maternal age is significantly associated with anemia, with younger and older age groups having a higher risk compared to women in the optimal reproductive age range [21]. Most participants had a high school education (69.2%), which plays an important role in shaping health literacy and understanding of anemia prevention. Lower educational levels are associated with a higher risk of anemia due to limited access to health information and services [22].

Table 1. Characteristics of a second-trimester pregnancy consuming IPC tablets

Characteristics	Frequency (n=39) (n, %)
Age (Year)	
Teenager (17-25)	16 (41.0)
Adult (26-46)	23 (59.0)
Education	
Low (Primary-Junior High School)	12 (30.8)
High School (High School-Degree)	27 (69.2)
Occupation	
Working	19 (48.7)
Housewife	20 (51.3)
History Of Anemia	
Yes	7 (17.9)
No	32 (82.1)

In terms of occupation (Table 1), more than half of the respondents were housewives (53.3%), representing a common pattern in developing countries. Socioeconomic factors, including employment status, are recognized as important determinants of anemia, with women with financial resources often facing reduced access to adequate nutrition and healthcare services [21]. The incidence of anemia in pregnant women can also be affected by their work activities. Those engaged in strenuous work may have reduced capacity to meet

both their own and their fetus's nutritional needs, as energy reserves are depleted by their activities. Additionally, most participants had no prior history of anemia. Anemia during pregnancy may develop due to increased physiological iron requirements [23].

The results of this study (Table 2) indicate a marked improvement in knowledge, compliance, and perception among second-trimester pregnant women following the intervention. Before the intervention, most participants had moderate knowledge (54%), while only 31% demonstrated high knowledge. After the intervention, the proportion of participants with high knowledge increased substantially to 92.3%, with no respondents remaining in the moderate category (Table 2). This shift is supported by the significant increase in mean knowledge score from 64.36 ± 2.69 to 90.26 ± 1.60 ($\Delta = 25.89$; $p < 0.001$) (Table 4). These findings confirm that brief counseling is an effective strategy for enhancing pregnant women's cognitive understanding of iron supplementation and anemia prevention. The effectiveness of counseling in improving knowledge is consistent with previous studies.

Table 2. The results of the descriptive analysis of pre-test and post-test levels of knowledge and compliance of second-trimester pregnancy consuming IPC tablets

Variable	Frequency	
	n	%
Knowledge		
Pre-test (n=39)		
Low	6	15.0
Moderate	21	54.0
High	12	31.0
Post-test (n=39)		
Low	3	7.70
Moderate	0	0.0
High	36	92.30
Compliance		
Pre-test (n= 39)		
Low	14	35.9
Moderate	17	43.6
High	8	20.5
Post-test (n= 39)		
Low	0	0.0
Moderate	6	15.4
High	33	84.6

Educational interventions significantly improve maternal knowledge regarding anemia and iron supplementation during pregnancy [24,25]. Another study reported a significant increase in knowledge scores among pregnant women following one-to-one counseling interventions [26]. Adequate knowledge enables individuals to recognize the importance of iron supplementation and understand the risks associated with anemia. Good knowledge significantly increased the likelihood of adherence to iron-folate supplementation (AOR=3.1) [27].

Regarding perceptions, the proportion of participants with positive perceptions increased from 25.6% in the pre-test to 71.8% in the post-test. In comparison, the proportion with negative perceptions decreased from 74.4% to 28.2% (Table 3). This change is supported by a significant increase in mean perception score (28.26 ± 0.56 to 33.31 ± 0.60 ; $\Delta = 5.05$; $p < 0.001$) (Table 4). This suggests that the intervention not only improved cognitive understanding but also influenced attitudes and beliefs toward iron supplementation. Previous studies have demonstrated that perception and beliefs about medication, including concerns about side effects, play a crucial role in determining adherence behavior among pregnant women [28]. Sariyati's study found a strong association between education and compliance with iron supplementation among pregnant women. Knowledge acquired through learning shapes beliefs and also influences behavior. Higher motivation, driven by expertise, enhances compliance with iron tablet consumption, as behavior is more sustainable when grounded in understanding [29]. Another study reported a significant improvement in attitudes following counseling

interventions ($p=0.001$) [30]. Furthermore, a new scoping review concluded that counseling interventions are effective in shaping positive perceptions and attitudes toward iron-folic acid supplementation through interactive and tailored communication strategies [14].

Table 3. The results of the descriptive analysis of pre-test and post-test levels of perception of second-trimester pregnancy consuming IPC tablets

	Frequency of Perception	
	n	%
Pre-test		
Negative	29	74.4
Positive	10	25.6
Post-test		
Negative	11	28.2
Positive	28	71.8

The most pronounced effect of the intervention was observed in adherence. The proportion of respondents with high adherence increased from 20.5% to 84.6%, while the proportion with low adherence decreased from 35.9% to 0% (Table 2). This result is supported by a significant increase in mean adherence score from 56.15 ± 3.28 to 86.41 ± 2.06 ($\Delta=30.26$; $p<0.001$) (Table 4). This finding suggests that improvements in knowledge and perception translate into meaningful behavioral change.

Table 4. Comparison of mean changes in knowledge level, perceptions, compliance, pre-test, and post-test in pregnancy who received a brief counseling 5A

Variable	Mean score ($\bar{X} \pm SE$)		Change (Δ) pre-test and post-test	p-value pre-test and post-test
	Pre-test	Post-test		
Knowledge	64.36 ± 2.69	90.26 ± 1.60	25.89 ± 2.54	0.001*
Perception	28.26 ± 0.56	33.31 ± 0.60	5.05 ± 0.74	0.001*
Compliance	56.15 ± 3.28	86.41 ± 2.06	30.26 ± 3.21	0.001*

Note: SE: Standar Error; *means there is significantly different ($p<0.001$)

Adherence to iron supplementation is a critical determinant in the prevention and management of anemia during pregnancy. Counseling by health professionals significantly improved adherence to iron-folic acid supplementation ($aOR = 2.97$; $p = 0.002$) [31]. Another study reported that counseling was an independent predictor of adherence ($AOR = 2.29$) [32]. Additionally, a structured counseling approach, including the 5A model, is highly effective at improving adherence through personalized engagement and reinforcement mechanisms [14]. Importantly, this study highlights the interconnected pathway between knowledge, perception, and adherence. Improved knowledge enhances awareness, positive perception strengthens motivation, and together they facilitate sustained adherence. Despite significant improvements in knowledge, perception, and adherence, this study did not find a statistically significant improvement in hemoglobin (Hb) levels. The mean Hb slightly decreased from 11.98 ± 0.23 to 11.67 ± 0.21 ($\Delta=0.43$; $p=0.117$) (Table 5).

Table 5. Comparison of pre-test and post-test Hb values

Variable	Mean Score ($\bar{X} \pm SE$)		Change (Δ) pre-test and post-test	p-value
	Pre-test	Post-test		
Value of Hb	11.98 ± 0.23	11.67 ± 0.21	0.43	0.117

This finding (Table 5) is inconsistent with the results of other studies. El-Kholy et al. (2023) reported a significant increase in Hb levels following pharmacist-led counseling interventions ($p<0.001$) [33]. Additionally, Palivela et al. (2021) found that improved adherence was associated with better Hb outcomes ($aOR=2.4$) [31]. Anemia in pregnancy is multifactorial. Aside from iron deficiency, factors such as chronic energy deficiency, micronutrient deficiencies (e.g., folate and vitamin B12), infections, and overall nutritional status also contribute to hemoglobin levels [34]. Therefore, improving adherence to iron supplementation alone may not immediately translate into improved Hb levels.

From a clinical perspective, the absence of immediate improvement in Hb does not diminish the importance of the intervention. Improved adherence is an important intermediate outcome expected to contribute to better

hematological and pregnancy outcomes over time. This is particularly relevant considering that anemia during pregnancy is associated with adverse outcomes such as preterm birth, low birth weight, and maternal complications[35,36].

Given these insights, a 5A brief counseling session can effectively engage pregnant women, enhance their understanding of their condition, and address treatment challenges. Health workers, especially pharmacists, play a significant role in educating about anemia and the use of iron supplements during pregnancy. This study has several strengths, including the use of a structured counseling approach (the 5A model), a comprehensive assessment of cognitive, affective, and behavioral outcomes, and a statistically robust pre-post analysis. However, this study is limited by the small sample size of anemic pregnant women, which reduces the generalizability of the relationship between IPC tablet use and anemia incidence. Future research should include comprehensive blood tests, including Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red Blood Cell (RBC), Total Iron-Binding Capacity (TIBC), and Iron Status, to assess iron deficiency anemia in pregnant women better.

CONCLUSION AND SUGGESTIONS

Providing a 5A brief counseling session by pharmacists significantly improved knowledge, perceptions, and compliance among second-trimester pregnant women taking iron (III) hydroxide polymaltose complex tablets. Nevertheless, no significant increase in hemoglobin levels was observed after the 31-day intervention. Future studies should adopt a randomized controlled design with a longer follow-up period to detect clinically meaningful changes in hemoglobin. It is also recommended to combine pharmacist-led counseling with comprehensive dietary assessment and adherence monitoring. Health authorities may consider integrating structured brief counseling into the routine antenatal care pathway at community health centers. These findings highlight the essential role of pharmacists in maternal health education. Even though hemoglobin did not rise in the short term, the marked improvement in knowledge, perception, and compliance can contribute to better long-term adherence and anemia prevention strategies, ultimately supporting maternal and fetal health outcomes in primary care settings.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. World Health Organization. Guideline on hemoglobin cutoffs to define anemia in individuals and populations. Geneva: World Health Organization; 2024. Available from: <https://www.who.int/publications/i/item/9789240088542>
2. Karami M, Chalesghar M, Salari N, Akbari H, Mohammadi M. Global prevalence of anemia in pregnant women: a comprehensive systematic review and meta-analysis. *Maternal and Child Health Journal*. 2022; 26:1473–87. <https://doi.org/10.1007/s10995-022-03450-1>
3. Chen Y, Zhong T, Song X, Zhang S, Sun M, Liu X, et al. Maternal anemia during early pregnancy and the risk of neonatal outcomes: a prospective cohort study in Central China. *BMJ Pediatrics Open*. 2024;8:e001931. <https://doi.org/10.1136/bmjpo-2023-001931>
4. Obeagu GU, Obeagu EI. Complications of anemia in pregnancy: an updated overview for healthcare professionals. *Medicine*. 2025;104: e44246. <https://doi.org/10.1097/MD.00000000000044246>
5. Benson AE, Shatzel JJ, Ryan KS, Hedges MA, Martens K, Aslan JE, et al. The incidence, complications, and treatment of iron deficiency in pregnancy. *Eur J Haematol*. 2022; 109:633–42. <https://doi.org/10.1111/ejh.13870>
6. World Health Organization. WHO global anemia estimates: key findings, 2025. Geneva: World Health Organization; 2025. Available from: <https://www.who.int/publications/i/item/9789240113930>
7. Kementerian Kesehatan Republik Indonesia. Peraturan Menteri Kesehatan Nomor 51 Tahun 2016 tentang Standar Produk Suplementasi Gizi. Jakarta: Kementerian Kesehatan Republik Indonesia; 2016. Available from: <https://peraturan.bpk.go.id/Details/114009/permenkes-no-51-tahun-2016>

8. Kusumawardani N. Adherence to iron supplementation influences anemia in pregnancy. *INPHARNMED J.* 2020;4(2):21–33. <https://doi.org/10.21927/inpharmmed.v4i2.1376>.
9. Ministry of Health, Republic of Indonesia. Laporan Nasional Risesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019. Available from: <https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/>.
10. Badan Kebijakan Pembangunan Kesehatan. Laporan tematik Survei Kesehatan Indonesia (SKI) tahun 2023: potret Indonesia sehat. Jakarta: Kementerian Kesehatan Republik Indonesia; 2024. Available from: <https://repository.badankebijakan.kemkes.go.id/id/eprint/5537/>
11. Nurbaiti N. Compliance of pregnant women consuming iron tablets to anemia events: a cross-sectional study in Darul Imarah Aceh Besar District. *Science Midwifery.* 2022;10(2):1118–23. Available from: <https://midwifery.iocspublisher.org/index.php/midwifery/article/view/463>
12. Widji Utomo AP, Nurdianti DS, Padmawati RS. Rendahnya asupan zat besi dan kepatuhan dalam mengonsumsi tablet besi berhubungan dengan kejadian anemia pada ibu hamil di Wilayah Kerja Puskesmas I Kembaran, Banyumas. *Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics).* 2016;3:41–50. [https://doi.org/10.21927/ijnd.2015.3\(1\).41-50](https://doi.org/10.21927/ijnd.2015.3(1).41-50)
13. Sumiati S, Nanda N, Putri RDS, Anitasari B. Relationship between pregnant women's compliance in consuming iron tablets with hemoglobin levels. *Jurnal Konseling dan Pendidikan.* 2025; 13:232–40. <https://doi.org/10.29210/1153700>
14. Atmadani R, Akrom A, Urbayatun S, Tuwar MN. Counseling intervention on iron-folic acid adherence and clinical outcomes among pregnant women and women planning to be pregnant: a scoping review. *Journal of Public Health and Development.* 2024; 22:320–35. <https://doi.org/10.55131/jphd/2024/220124>
15. Kusumawardani N, Darmawan E, Suprapti S, Dwinta E, Estiningsih D, Emelda. Pharmacist counseling can change adherence to iron supplementation and physical activity lifestyle of anemic pregnant women in Yogyakarta, 2021. <https://doi.org/10.2991/ahsr.k.211105.023>
16. Akrom A, Nurwijayanti A. Brief counseling and mobile phone short message service (SMS) increase patient compliance. *International Journal of Pharma Medicine and Biological Sciences.* 2015. <https://doi.org/10.18178/ijpmbs.4.3.175-179>
17. Youssef AM, Shata AF, Kamal HM, El-Saied Y, Ali OF. A comparative study of efficacy, tolerability, and compliance of oral iron preparations for iron deficiency anemia in pregnant women. *American Journal of Medicine and Medical Sciences.* 2014; 2014:244–9. <https://doi.org/10.5923/j.ajmms.20140406.09>
18. Martínez-Mesa J, González-Chica DA, Duquia RP, Bonamigo RR, Bastos JL. Sampling: how to select participants in my research study? *An Bras Dermatol.* 2016; 91:326–30. <https://doi.org/10.1590/abd1806-4841.20165254>
19. Heryadi PL, Sauriasari R, Andrajati R. The influence of pharmacist counseling on changes in hemoglobin levels of pregnant women at a community health center in Indonesia. *Asian Journal of Pharmaceutical and Clinical Research.* 2017; 10:114. <https://doi.org/10.22159/ajpcr.2017.v10s5.23111>
20. Snook J, Bhala N, Beales ILP, Cannings D, Kightley C, Logan RP, et al. British Society of Gastroenterology guidelines for the management of iron deficiency anemia in adults. *Gut.* 2021;70:2030–51. <https://doi.org/10.1136/gutjnl-2021-325210>
21. Um S, Sopheab H, Yom A, Muir JA. Anemia among pregnant women in Cambodia: a descriptive analysis of temporal and geospatial trends and logistic regression-based examination of factors associated with anemia in pregnant women. *PLOS ONE.* 2023;18: e0274925. <https://doi.org/10.1371/journal.pone.0274925>
22. Balcha WF, Eteffa T, Tesfu AA, Alemayehu BA, Chekole FA, Ayenew AA, et al. Factors associated with anemia among pregnant women attending antenatal care: a health facility-based cross-sectional study. *Annals of Medicine & Surgery.* 2023; 85:1712–21. <https://doi.org/10.1097/MS9.0000000000000608>
23. Raut AK, Hiwale KM. Iron deficiency anemia in pregnancy. *Cureus.* 2022. <https://doi.org/10.7759/cureus.28918>
24. Berhane A, Belachew T. Effect of picture-based health education and counselling on knowledge and adherence to preconception iron-folic acid supplementation among women planning to be pregnant in Eastern Ethiopia: a randomized controlled trial. *Journal of Nutritional Science.* 2022;11:e58. <https://doi.org/10.1017/jns.2022.51>
25. Reshid M, Anato A. Community-based nutrition education and counselling provided during pregnancy: effects on knowledge and attitude towards iron-folic acid supplementation. *Journal of Nutritional Science.* 2024;13:e59. <https://doi.org/10.1017/jns.2024.59>

26. Egryani NPR, Saktini F, Susilaningsih N, Puspitasari VD, Gumay AR. The effect of one-to-one counseling on pregnant women's knowledge about anemia in Semarang. IOP Conference Series: Earth and Environmental Science. 2017; 55:012036. <https://doi.org/10.1088/1755-1315/55/1/012036>
27. Taye M, Mohammed T, Taye W, Glagn M, Yihune M. Compliance with iron-folate supplementation among pregnant women in Southern Ethiopia: a multi-center cross-sectional study. Reproductive Health. 2025;22:22. <https://doi.org/10.1186/s12978-025-01944-z>
28. Noptriani S, Simbolon D. Probability of non-compliance to the consumption of iron tablets in pregnant women in Indonesia. Journal of Preventive Medicine and Hygiene. 2022;63: E456–63. <https://doi.org/10.15167/2421-4248/jpmh2022.63.3.2340>
29. Widji Utomo AP, Nurdianti DS, Padmawati RS. Rendahnya asupan zat besi dan kepatuhan mengonsumsi tablet besi berhubungan dengan kejadian anemia pada ibu hamil di Wilayah Kerja Puskesmas I Kembaran, Banyumas. J Gizi Diet Indones. 2015;3(1):41–50. [https://doi.org/10.21927/ijnd.2015.3\(1\).41-50](https://doi.org/10.21927/ijnd.2015.3(1).41-50)
30. Suryaningrum A, Firmansyah, Rakhma LR, Soviana E. The effect of providing nutritional counseling on the level of knowledge, attitudes and compliance with Fe tablets consumption for pregnant women with anemia in the Grogol Community Health Center area. Media Gizi Indonesia (National Nutrition Journal). 2024;19(1SP):8–19. <https://doi.org/10.20473/mgi.v19i1SP.8-19>
31. Palivela D, Shehnaz S, Chaturvedula L. Effect of direct monitoring by family members and counseling by health professionals on iron-folic acid supplementation: a cross-sectional study among pregnant women in Puducherry, India. J Family Community Med. 2021; 28:85. https://doi.org/10.4103/jfcm.JFCM_445_20
32. Seid MA, Gebru AS, Yimer A, Ali K, Yesuf A, Sirage N, et al. Exploring adherence to iron and folic acid supplementation in pregnant women at rural health facilities in Waghimra zone, Northern Ethiopia. BMC Pregnancy Childbirth. 2025; 25:1060. <https://doi.org/10.1186/s12884-025-08119-5>
33. El-Kholy AA, El Kholy EA, Abdulaziz Al Abdulathim M, Hassan Abdou A, Ahmed Dafaalla Karar H, Abdelrhim Bushara M, et al. Prevalence and associated factors of anemia among pregnant women and the impact of clinical pharmacist counseling on their awareness level: a cross-sectional study. Saudi Pharmaceutical Journal. 2023; 31:101699. <https://doi.org/10.1016/j.jsps.2023.101699>
34. Lipoate NI, Masrul M, Nindrea RD. Nutritional contributors to maternal anemia in Indonesia: chronic energy deficiency and micronutrients. Asia Pacific Journal of Clinical Nutrition. 2020;29: S9–17. [https://doi.org/10.6133/apjcn.202012_29\(S1\).02](https://doi.org/10.6133/apjcn.202012_29(S1).02)
35. Wang R, Xu S, Hao X, Jin X, Pan D, Xia H, et al. Anemia during pregnancy and adverse pregnancy outcomes: a systematic review and meta-analysis of cohort studies. Frontiers in Global Women's Health. 2025;6. <https://doi.org/10.3389/fgwh.2025.1502585>
36. Herlina T, Kustio Prillia W, Amukti DP, Suminingtyas IA, Kusumawardani N. Analisis hubungan kepatuhan suplementasi tablet besi dengan karakteristik ibu melahirkan bayi dengan berat lahir rendah di RSUD Wonosari, Yogyakarta. Jurnal Ilmu Kefarmasian. 2026;7. <https://journal.ummat.ac.id/index.php/farmasi/article/view/34945/pdf>