ORIGINAL RESEARCH

The development of "TAMENG" flipchart for eradication of anemia in pregnancy in Sumber, Kabupaten Probolinggo, Indonesia

Manggala Pasca Wardhana[1]*, Agus Sulistyono[1], Riska Wahyuningtyas[1], Rizqy Rahmatyah[1], Amrina Rosyada[1], Salsabila Nabilah Rifdah[1], Mirani Ulfa Yusrika[2]
[1]Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.
[2]Department of Pediatrics, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

Article Info
Received Dec 28, 2024
Revised May 2, 2025
Accepted May 16, 2025
Published Aug 1, 2025

***Corresponding author:**
Manggala Pasca Wardhana
manggala.pasca
@fk.unair.ac.id

Keywords:
Anemia in pregnancy
Educational intervention
Maternal health
Nutritional status
TAMENG flipchart

ABSTRACT

Objective: This study aimed to evaluate the effectiveness of the "TAMENG" flipchart as an educational tool to improve knowledge about anemia prevention among pregnant women in Sumber, Kabupaten Probolinggo, Indonesia, and to explore associated risk factors for anemia, including nutritional status and supplementation practices.

Materials and Methods: A community-based cross-sectional study was conducted in August 2024 as part of Universitas Airlangga's Community Service Program. Pregnant women attending antenatal care in Sumber, Kabupaten Probolinggo were recruited based on ANC attendance and availability of hemoglobin test results. The "TAMENG" flipchart, designed with culturally relevant visuals and content on anemia prevention, was implemented during interactive education sessions. Demographic data, obstetric histories, and pre- and post-test knowledge assessments were collected. Statistical analysis was performed using chi-square tests to identify significant associations between variables.

Results: Among 65 participants, 35.38% were anemic. Significant factors associated with anemia included nutritional status (60.9% of anemic women had mid-upper arm circumference <23.5 cm; p = 0.019) and history of anemia (30.4% vs. 9.5%; p = 0.032). Knowledge scores significantly improved post-intervention for 90.5% of non-anemic women and 100% of anemic women. Employment status and supplementation practices showed notable trends but were not statistically significant.

Conclusion: The "TAMENG" flipchart effectively increased knowledge and awareness about anemia prevention. Tailored interventions addressing nutritional deficiencies, supplementation adherence, and family involvement can enhance maternal health outcomes in rural communities.

How to cite: Wardhana MP, Sulistyono A, Wahyuningtyas R, et al. The development of "TAMENG" flipchart for eradication of anemia in pregnancy in Sumber, Kabupaten Probolinggo, Indonesia. Majalah Obstetri & Ginekologi (Journal of Obstetrics & Gynecology Science). 2025;33(2):113-120. doi: 10.20473/mog.V33I22025.113-120.

Highlights:

1. The "TAMENG" flipchart significantly improved knowledge about anemia prevention among pregnant women.
2. Nutritional status (mid-upper arm circumference) and history of anemia were strongly associated with anemia prevalence.
3. Community-based, culturally relevant tools like the flipchart can effectively promote sustainable maternal health behaviors.

INTRODUCTION

Anemia occurs when red blood cells are unable to provide enough oxygen to meet tissue requirements. This condition can be detected by low hemoglobin (Hb) levels, erythrocyte counts, and hematocrit (Hct) concentrations.[1] The World Health Organization (WHO) defines anemia in pregnancy as Hb <11 g/dL. Meanwhile, the Centers for Disease Control and Prevention (CDC) defines anemia in pregnancy as Hb <11 g/dL in the first and third trimesters and Hb <10.5 g/dL in the second trimester.[2,3] Iron deficiency accounts for around 50% of pregnant women's anemia. Other causes include deficits in folic acid (B9) and other micronutrients (vitamins A, riboflavin (B2), B6, and B12), acute or chronic infections (such as malaria, hookworm, schistosomiasis, TB, and HIV), and congenital hemoglobin synthesis abnormalities.[1,3] Anemia in pregnancy has a negative impact on the growth and development of the fetus. It can cause difficulties from pregnancy until delivery, including maternal and fetal mortality.[1]

The global prevalence of anemia in pregnancy is 38.2, with Southeast Asia having the highest prevalence (48.75).[2] According to Riset Kesehatan Dasar (Riskesdas) or Indonesian Basic Health Research in 2018, the incidence of anemia among pregnant women in Indonesia was 48.9%, an increase of 11.8% compared to 2013. It can be interpreted that anemia affects up to two out of every five pregnant women in Indonesia.[4] According to data from Dinas Kesehatan Provinsi Jawa Timur or East Java Provincial Health Office, anemia affects 15.6% of all women of reproductive age in East Java. A study in Probolinggo in 2020 found that 501 out of 4075 pregnant women had anemia.[5] Another study reported that the frequency of anemia among pregnant women in Probolinggo was 48.5%.[6] The prevalence of anemia in pregnancy varies with socioeconomic status, lifestyle, diet, attitudes, and health practices.[2]

The provision of iron and folic acid supplements (*tablet tambah darah* or TTD) during pregnancy is one of the initiatives to prevent and treat iron and folic acid deficiency anemia. Through antenatal care (ANC) service standards, the Indonesian Government requires pregnant women to take the supplement daily during pregnancy, or at least 90 tablets. In East Java, only 49.8% of pregnant women received supplementation of more than 90 tablets. In comparison, only 35.6% consumed more than 90.[4] Based on the 2023 Nutrition Plan at the Sumber Community Health Center, the coverage of supplementation only reached 72.2% of the target set at 81%.[7] In Sumber, Kabupaten Probolinggo, the prevalence of anemia among pregnant women highlights the need for effective educational interventions. This study explores the development and impact of the "TAMENG" flipchart as an educational tool designed to address knowledge gaps, promote behavior change for eradicating anemia, and explore the risk factors among pregnant women in Sumber, Kabupaten Probolinggo, East Java, Indonesia.

MATERIALS AND METHODS

Study population and design

This community-based cross-sectional study was part of the 2024 Universitas Airlangga Community Service, implemented in August 2024 in Sumber, Kabupaten Probolinggo. Participants were recruited through community health posts and classes for pregnant women in Sumber, Kabupaten Probolinggo. Inclusion criteria included all pregnant women who had attended at least one antenatal care session and had available hemoglobin laboratory test results. Recruitment involved collaboration with local midwives and community health volunteers, ensuring broad participation across various villages. Data were collected through demographic surveys, obstetric histories, and knowledge assessments (pre- and post-tests). The data recorded and stored both manual and digital entry using initial for the confidentiality is being kept for the researchers only. Informed consent was provided for each individual before participation.

Hypothesis of the study

We hypothesized that TAMENG is effective in evaluating knowledge improvement and is associated with anemia prevalence.

Development of the flipchart

The "TAMENG" flipchart was designed based on input from obstetrics and gynecology specialists. The content covered anemia prevention, dietary practices, and the importance of iron supplementation, the acronym "TAMENG" in Indonesian, a protective shield. Visual aids and culturally relevant illustrations were incorporated to enhance comprehension among participants with low literacy levels. The material underwent a pilot test with a small group of pregnant women and was revised based on their feedback. To ensure the effectiveness of the educational content, the flipchart was reviewed, and later, pre- and post-intervention assessments were conducted to measure the validity and reliability.

Implementation and outcome

The educational activity involved delivering a comprehensive socialization program to pregnant women. In collaboration with health center officers, the research team provided education on anemia's definition, epidemiology, risk factors, clinical symptoms, impacts, and prevention strategies using the "TAMENG" flipchart. This program was integrated with pregnant women's classes and antenatal care examinations. Pre-tests and post-tests were administered to assess changes in community knowledge before and after the sessions. The activity concluded with a discussion session, allowing participants to clarify questions and engage further with the presented material.

Statistical analysis

Numerical data were reported with mean with standard deviation, and categorical data were reported as n(%). Cross-tabulation with a chi-square test was used to examine relationships between variables, with significance set at $p < 0.05$. Pretest and posttest using Mann-Whitney due to not normally distributed data. Data was analyzed using The Statistical Package for the Social Sciences (SPSS) version 29 for Mac (IBM Corp., Armonk, NY, USA).

Ethical clearance

This research is registered in the 2024 Universitas Airlangga Community Service and has received ethical clearance from the Faculty of Medicine, Universitas Airlangga, with number 107/EC/KEPK/FKUA/2024.

RESULTS AND DISCUSSION

A total of 65 pregnant women from 81 registered pregnant women participated in the study (participation rate 80.25%), who came from 9 villages in Sumber. The demographic data (Table 1) revealed that the mean age of participants in the anemia group was 23.45 years, while the mean age in the non-anemia group was 21.86 years. Employment status showed a significant difference between the two groups, with 65.2% of anemic women being housewives compared to 92.9% of non-anemic women ($p = 0.004$). Educational levels were predominantly low in both groups, with 52.2% of women in the anemia group and 45.2% in the non-anemia group having lower education levels.

Maternal history and nutritional status are provided in Table 2. Regarding obstetric and health history, the prevalence of primigravida was similar in both groups, at 60.9% for the anemia group and 61.9% for the non-anemia group ($p = 0.037$). However, a significant history of anemia was more common in the anemic group (30.4%) compared to the non-anemic group (9.5%; $p = 0.032$). Nutritional status also differed notably between the groups, with 60.9% of anemic women having an upper-arm circumference of less than 23.5 cm, compared to 31.0% of non-anemic women ($p = 0.019$).

Regarding supplementation practices (Table 3), routine iron tablet supplementation was more common among non-anemic women (76.2%) than anemic women (56.5%), though the difference was not statistically significant ($p = 0.100$). Finally, the impact of education on knowledge improvement post-intervention was significant. A greater proportion of non-anemic women (90.5%) showed an increase in their knowledge scores compared to 37.7% of anemic women. Knowledge of anemia is provided in Table 4.

The findings underscore the importance of targeted educational interventions in addressing anemia during pregnancy. The "TAMENG" flipchart's success aligns with global studies highlighting the effectiveness of community-based tools in improving maternal health outcomes. Until now, patient education has been conducted using self-made posters that lack standardization. Therefore, the use of standardized educational media such as TAMENG can help unify the knowledge provided, ensuring that the information received by patients is more consistent and of higher quality. For instance, educational programs in rural India and sub-Saharan Africa have demonstrated that visual and interactive learning materials significantly enhance knowledge retention and behavior modification among pregnant women.[8] In line with SDGs goal number 3 of ensuring healthy lives and promoting well-being for all ages, community service programs focusing on maternal and child health are essential. This goal includes targets to reduce maternal mortality, end preventable child deaths, and end the spread of communicable diseases by 2030.[9] Up to one thousand days after delivery, addressing anemia in pregnancy can automatically improve the nutritional status of pregnant women, affecting the growth and development of the fetus and infant.[1,3] Some significant findings in this study are employment status, nutritional status, history of anemia, supplementation practices, and knowledge levels.

Table 1. Demographic data

Variables			Anemia (n=23)	Non-Anemia (n=42)	p-Values
			n (%)	n (%)	
Demographic data					
Age	Mean		23.45	21.86	0.384
	≥19 years		14 (60.9)	30 (71.4)	
	<19 years		9 (39.1)	12 (28.6)	
Village	Cepoko		4 (17.4)	7 (16.7)	0.735
	Gemito		3 (13.0)	6 (14.3)	
	Ledok Ombo		2 (8.7)	1 (2.4)	
	Pandansari		4 (17.4)	5 (11.9)	
	Rambaan		1 (4.3)	3 (7.1)	
	Sumber		3 (13.0)	13 (31.0)	
	Sumberanom		2 (8.7)	1 (2.4)	
	Tukul		3 (13.0)	4 (9.5)	
	Wonokerso		1 (4.3)	2 (4.8)	
Employment status*	Housewife		15 (65.2)	39 (92.9)	0.004*
	Working		8 (34.8)	3 (7.1)	
Education level	Low	No school	3 (13.0)	2 (4.8)	0.288
		Primary school	12 (52.2)	19 (45.2)	
	Intermediate	Middle school	7 (30.4)	14 (33.3)	
	High	High school/above	1 (4.3)	7 (16.7)	
Marriage	First		18 (78.3)	36 (85.7)	0.443
	Second or More		5 (21.7)	6 (14.3)	

*significant

Table 2. Maternal history and nutritional status

Variables			Anemia (n=23)	Non-Anemia (n=42)	p-Value
			n (%)	n (%)	
Maternal history and nutritional status					
Pregnancy*	Primigravida	1	14 (60.9)	26 (61.9)	0.037*
	Multigravida	2	2 (8.7)	12 (28.6)	
		3	5 (21.7)	2 (4.8)	
		4	1 (4.3)	2 (4.8)	
		5	1 (4.3)	0 (0)	
Number of children	0		16 (69.6)	26 (61.9)	0.507
	1		6 (26.1)	14 (33.3)	
	2		0 (0)	1 (2.4)	
	4		1 (4.3)	0 (0)	
	6		0 (0)	1 (2.4)	
History of miscarriage	Yes		6 (26.1)	5 (11.9)	0.145
	No		17 (73.9)	37 (88.1)	
History of anemia*	Yes		7 (30.4)	4 (9.5)	0.032
	No		16 (69.6)	38 (90.5)	
History of hypertension	Yes		2 (8.7)	3 (7.1)	0.822
	No		21 (91.3)	39 (92.9)	
History of bleeding	Yes		1 (4.3)	22 (95.7)	0.939
	No		2 (4.8)	40 (95.2)	
Smoking	Yes		1 (4.3)	1 (2.4)	0.661
	No		22 (95.7)	41 (97.6)	
Menstrual cycle	Regular		22 (95.7)	40 (95.2)	0.939
	Irregular		1 (4.3)	2 (4.8)	
Menstrual period*	2-4 days		7 (30.4)	9 (21.4)	0.026
	5-7 days		14 (61.0)	32 (76.2)	
	>7 days		2 (8.6)	1 (2.4)	
Amount of menstruation	1-2 pads/day		5 (21.7)	15 (35.8)	0.265
	3-4 pads/day		18 (78.2)	24 (57.1)	
	>5 pads/day		0 (0.0)	3 (7.1)	
Antenatal care	Routine		19 (82.6)	37 (88.1)	0.540
	Non-routine		4 (17.4)	5 (11.9)	
Body Mass Index	Normal		22 (95.7)	38 (90.5)	0.454
	Obesity		1 (4.3)	4 (9.5)	
Blood Pressure	Normal		21 (91.3)	37 (88.1)	0.690
	Hypertension		2 (8.7)	5 (11.9)	
Mid-Upper Arm Circumference*	<23.5 cm		14 (60.9)	13 (31.0)	0.019
	>23.5 cm		9 (39.1)	29 (69.0)	

*significant

Table 3. Iron and folic acid supplementation practice

Variables		Anemia (n=23) n (%)	Non-Anemia (n=42) n (%)	p-Value
Iron and Folic Acid Supplementation Practice				
Supplementation Compliance	Routine	13 (56.5)	32 (76.2)	0.100
	Non-routine	10 (43.5)	10 (23.8)	
Supplementation Schedule	Morning	6 (26.1)	9 (21.4)	0.118
	Afternoon	7 (30.4)	5 (11.9)	
	Evening	10 (43.5)	28 (66.7)	
Moment	After eating	19 (82.6)	34 (81.0)	0.869
	Before eating	4 (17.4)	8 (19.0)	
Consumption with	Water	16 (69.6)	36 (85.7)	0.120
	Other drinks (tea, coffee, milk)	7 (30.4)	6 (14.3)	
Side effect	Non	11 (47.8)	21 (50.0)	0.265
	Headache	1 (4.3)	7 (16.7)	
	Nausea-vomiting	11 (47.8)	14 (33.3)	
Control Card*	Routine	7 (30.4)	25 (59.5)	0.025*
	Non-routine	16 (69.6)	17 (40.5)	
Controller	Non	9 (39.1)	16 (38.1)	0.899
	Husband	13 (56.5)	25 (59.5)	
	Family/others	1 (4.3)	1 (2.4)	

Table 4. Knowledge of anemia

Variables		Anemia (n=23) n (%)	Non-Anemia (n=42) n (%)	p-Value
Knowledge of anemia				
Knowledge*	Low	6 (26.1)	1 (2.4)	0.011*
	Intermediate	11 (47.8)	23 (54.8)	
	High	6 (26.1)	18 (42.9)	
Pre-test Score	Median (Min,Max)	60 (10, 80)	70 (10, 90)	0.088
Post-test Score	Median (Min,Max)	80 (50, 90)	90 (50, 100)	0.203
Improvement	Increases	23 (37.7)	38 (90.5)	0.311
	Persists	0 (0)	2 (4.8)	
	Decreases	0 (0)	2 (4.8)	

*significant

Employment and nutritional status showed a significant association with anemia. Housewives were found to be less anemic compared to working women (p = 0.004). This finding may relate to the higher likelihood of housewives adhering to antenatal care recommendations and dietary guidelines due to more flexible schedules. However, it also underscores the need for tailored interventions for working women, who may face time constraints and workplace challenges that hinder healthy behaviors.[10]

Nutritional status can be measured from low mid-upper arm circumference. The prevalence of low mid-upper arm circumference (MUAC <23.5 cm) or chronic energy deficiency (CED) among anemic women (60.9%) compared to non-anemic women (31.0%) (p = 0.019) indicates a strong link between malnutrition and anemia. This highlights the critical role of addressing nutritional deficiencies, particularly in rural areas with limited dietary diversity. Providing fortified foods or nutrition supplementation programs alongside educational tools could enhance the overall impact.[11]

A significant history of anemia (30.4% vs. 9.5%, p = 0.032) among anemic participants reflects the chronic nature of the issue. This finding emphasizes the importance of early screening, consistent monitoring, and integrating anemia prevention strategies into preconception care.[12] While the difference in routine iron supplementation between anemic (56.5%) and non-anemic women (76.2%) was not statistically significant, the results indicate room for improvement. Non-compliance with supplementation may be linked to misconceptions about side effects, as noted in reports of headache, nausea, and vomiting. Interventions should address these barriers by educating women about proper supplementation techniques and managing potential side effects.[13]

The significant improvement in knowledge scores post-intervention highlights the flipchart's effectiveness in bridging information gaps. The stark contrast between pre-intervention knowledge levels (26.1% low in anemic women) and post-intervention scores suggests that educational tools are pivotal in promoting behavior change.[14,15] Future studies should explore how sustained knowledge impacts long-term health outcomes.

Cultural factors, such as traditional dietary practices and perceptions about anemia, play a critical role in intervention success. In Sumber, Kabupaten Probolinggo, dietary staples like rice and vegetables may lack sufficient iron content, necessitating targeted messaging on incorporating iron-rich foods, such as meat, legumes, and fortified products.[16] Moreover, local beliefs about pregnancy-related dietary restrictions may hinder adherence to nutritional advice. Engaging community leaders and incorporating culturally relevant examples can improve acceptance of educational programs.[17]

Additionally, the involvement of primary healthcare cadres and family members, particularly husbands, enhanced the intervention's reach. Previous studies have shown that spousal support significantly influences maternal health behaviors, underscoring the need to include family-centered approaches in anemia prevention strategies.[18]

These findings suggest several actionable recommend-dations. First, integrating flipchart-based education into routine antenatal care services could improve knowledge sustainability about anemia in pregnancy. Second, addressing systemic barriers, such as access to affordable iron supplements and fortified foods, is crucial.[19] Lastly, further research is needed to evaluate the long-term effectiveness of the "TAMENG" flipchart and its adaptability to other rural settings. Exploring its integration with digital platforms could also open up new outreach and education possibilities.[20] The findings underscore the importance of targeted educational interventions. Compared to previous studies, the "TAMENG" flipchart's success aligns with global findings emphasizing the role of community-based education in improving maternal health outcomes. For instance, studies from similar rural Southeast Asian settings have shown that culturally tailored educational tools significantly enhance knowledge and compliance with anemia prevention strategies.[5,6,16] Addressing factors such as nutritional deficits and low educational levels is crucial for the success of anemia eradication programs.[14]

Specific regional factors, such as dietary habits and socioeconomic conditions in Kabupaten Probolinggo, may have influenced the outcomes. The predominance of low educational attainment and nutritional deficits in this population mirrors broader national trends, as reported in Indonesian health surveys. Moreover, the involvement of community health workers and local leaders in delivering the intervention likely enhanced its acceptability and effectiveness. These cultural and social dynamics underscore the importance of locally adapted approaches in addressing anemia.[5–7]

Strength and limitation

This study demonstrates notable strengths, including the application of the culturally adapted "TAMENG" flipchart, which effectively enhanced participants' knowledge regarding anemia prevention. The robust methodological approach, incorporating pre- and post-intervention assessments alongside the involvement of local community leaders and healthcare providers, further increased the study's contextual relevance and acceptability. Moreover, the findings offer practical insights into key factors associated with anemia, such as nutritional deficiencies and employment status, facilitating the development of targeted interventions. Nonetheless, the study is subject to certain limitations, including a relatively small sample size and a focus on a single geographic region, which may constrain the generalizability of the findings. The absence of a control group poses challenges in isolating the intervention's impact, while the short duration of follow-up limits the ability to assess sustained behavioral and health outcomes.

CONCLUSION

The "TAMENG" flipchart is a promising tool for improving anemia awareness and prevention practices among pregnant women in Sumber, Kabupaten Probolinggo. Although that iron supplementation compliance was not significantly associated with anemia prevalence in this study and suggest further investigation. Key findings, such as the significant association between employment status, nutritional deficiencies, and anemia, underline the need for comprehensive strategies, including nutritional supple-mentation, early screening, and tailored interventions for working women. This study also could be use as discussion maternal for designing future health policies in maternal and ANC education program. Future efforts should expand the use of tools like the "TAMENG" flipchart, enhance access to affordable iron-rich supplements, and consider digital adaptations to broaden outreach. By addressing these critical factors and involving family members and community leaders,

sustainable improvements in maternal and fetal health outcomes can be achieved.

DISCLOSURES

Acknowledgment

This study was supported by the 2024 Universitas Airlangga Community Service grant funding. We thank the healthcare professionals and participants who participated.

Conflict of interest

All authors have no conflict of interest.

Funding

Funding sources of the research by the 2024 Universitas Airlangga Community Service.

Author contribution

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting, and approval for publication of this manuscript.

REFERENCES

1. Wibowo N, Irwinda R, Hiksas R. Anemia Defisiensi Besi pada Kehamilan. Jakarta: UI Publishing; 2021.
2. World Health Organization (WHO). THE GLOBAL PREVALENCE OF ANAEMIA IN 2011 [Internet]. Geneva: WHO; 2015. Available from: www.who.int
3. Breymann C. Iron Deficiency Anemia in Pregnancy. Semin Hematol. 2015 Oct 1;52(4):339–47.
4. Kementerian Kesehatan RI. Riset Kesehatan Dasar (RISKESDAS) 2018. 2018.
5. Putri SI, Sumarmi S. Perbandingan Konsumsi Zat Gizi, Status Gizi, dan Kadar Hemoglobin Pengantin Wanita di Wilayah Pantai dan Pertanian Kabupaten Probolinggo. Media Gizi Indonesia. 2014;
6. Azizah AN, Achyar K. Status Gizi Pada Wanita Pranikah Di Wilayah Kerja Puskesmas Puwojati; 2022..
7. Puskesmas Sumber. Laporan Rencana Umum Kegiatan (RUK) Gizi Puskesmas Sumber Tahun 2023. Probolinggo; 2023.
8. Mathias EG, Dhyani VS, Krishnan JB, Rani U, Gudi N, Pattanshetty S. Community based health literacy interventions in India: A scoping review. Vol. 22, Clinical Epidemiology and Global Health. Elsevier B.V.; 2023.
9. UN Women. Women and Sustainable Development Goals [Internet]. 2015 [cited 2024 Dec 1]. Available from: https://www.unwomen.org/en/news/in-focus/women-and-the-sdgs/sdg-3-good-health-well-being
10. Abdisa DK, Jaleta DD, Tsegaye D, Jarso MH, Jaleta GD, Tolesa GF, et al. Effect of community based nutritional education on knowledge, attitude and compliance to IFA supplementation among pregnant women in rural areas of southwest Ethiopia: a quasi experimental study. BMC Public Health. 2023 Dec 1;23(1).
11. Munyogwa MJ, Gibore NS, Ngowi AF, Mwampagatwa IH. Effect of nutritional education intervention to reduce anaemia during pregnancy in Dodoma City, Tanzania: Protocol for a cluster randomized controlled trial. Biol Methods Protoc. 2021;6(1).
12. Alem AZ, Efendi F, McKenna L, Felipe-Dimog EB, Chilot D, Tonapa SI, et al. Prevalence and factors associated with anemia in women of reproductive age across low- and middle-income countries based on national data. Sci Rep. 2023 Dec 1;13(1).
13. Kamel 1wafaa, Abd S, Rahman E, Ahmed AA, Mohamed A, Atwa ES. Effect of Educational Instructions on Pregnant Women's Knowledge and Practice regarding IronDeficiency Anemia. Vol. 13, Original Article Egyptian Journal of Health Care. 2022.
14. Hairiyah S, Toaha A, Abri N, Virawati DI. The Effect of SEKAR (Sumber Edukasi Anemia yang Relevan) Card-Based Nutrition Education on Knowledge and Iron Intake in Pregnant Women. Journal of Health and Nutrition Research. 2023 Nov 30;2(3):146–57.
15. Salam SS, Ramadurg U, Charantimath U, Katageri G, Gillespie B, Mhetri J, et al. Impact of a school-based nutrition educational intervention on knowledge related to iron deficiency anaemia in rural Karnataka, India: A mixed methods pre–post interventional study. BJOG. 2023 Nov 1;130(S3):113–23.
16. Abd Rahman R, Idris IB, Isa ZM, Rahman RA, Mahdy ZA. The Prevalence and Risk Factors of Iron Deficiency Anemia Among Pregnant Women in Malaysia: A Systematic Review. Vol. 9, Frontiers in Nutrition. Frontiers Media S.A.; 2022.
17. Amani Z, Sebayang Sk. The Effect Of Iron Supplementation And Other School-Based Support On Anemia Status In Adolescents: A Systematic Literature Review. Indonesian Midwifery and

Health Sciences Journal [Internet]. 2024 Jul 28;8(3):312–25. Available from: https://e-journal.unair.ac.id/IMHSJ/article/view/58515
18. Kucukkaya B, Basgol S. The effect of perceived spousal support on childbirth self-efficacy on pregnant women in turkey. BMC Pregnancy Childbirth. 2023 Dec 1;23(1).
19. Balcha WF, Eteffa T, Tesfu AA, Alemayehu BA, Chekole FA, Ayenew AA, et al. Factors associated with anemia among pregnant women attended antenatal care: a health facility-based cross-sectional study. Annals of Medicine & Surgery. 2023 May;85(5):1712–21.
20. Mohammad Ali A, Salah H, Awad M, Asmus H, Al-Jawaldeh A. Enhancing nutrition specific interventions through public health policies and public-private partnerships in the Eastern Mediterranean Region: a desk review. F1000Res. 2021 Jan 12;10:17.