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ORIGINAL RESEARCH

DETERMINANTS OF ANEMIA IN THE THIRD TRIMESTER OF PREGNANCY IN MOJOKERTO

Faktor Risiko Anemia pada Kehamilan Trimester Ketiga di Mojokerto

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ABSTRACT

Background: Anemia is a pregnancy complication that increases the morbidity and mortality of mother and baby during pregnancy and until puerperium. In 2015, the incidence of anemia in Indonesia was 23%. **Purpose:** The aim of this study was to determine factors that influence anemia in the third trimester of pregnancy. **Methods:** The study was conducted on pregnant women in Mojokerto. This study used a case-control design. The sample calculation results obtained 70 cases and 70 controls. The primary and secondary data were obtained from the MCH book and from interviews conducted according to questionnaire guidelines. Data were analyzed via chi-squared test and logistic regression test. **Results:** The factors that influence anemia in the third trimester of pregnancy were found to be age (p value = 0.04; OR 2.08; 95% CI = 1.04–4.16), occupation (p value = 0.02; OR = 2.27; 95% CI = 1.15–4.47), birth interval (p value = 0.03; OR = 2.25; 95% CI 1.08-4.69), nutritional status (p value = 0.02; OR = 2.33; 95% CI = 1.14- 4.82), knowledge [about anemia] (p value = 0.01; OR = 3.17; 95% CI = 1.41-7.09), income per month (p value = 0.03, OR = 2.25; 95% CI =1.08–4.69), smoking activity (p value = 0.04; OR = 2.00; 95% CI = 1.02–3.92), perception (p value = 0.02; OR = 2.20; 95% CI = 1.10–4.40) , and spousal support (p value = 0.01; OR = 2.63; 95% CI = 1.16 – 5.93) **Conclusion:** The most influential factors on anemia in the third trimester of pregnancy were birth interval, nutritional status, and knowledge.

ABSTRAK

Latar Belakang: *Anemia merupakan salah satu komplikasi kehamilan*

yang meningkatkan morbiditas dan mortalitas ibu dan bayi selama masa kehamilan sampai masa nifas. Pada tahun 2015, angka kejadian anemia di Indonesia sebesar 23% **Tujuan:** *Tujuan penelitian ini adalah untuk mengetahui faktor-faktor yang mempengaruhi anemia pada kehamilan trimester III.* **Metode:** *Penelitian dilakukan pada ibu hamil di Mojokerto. Desain penelitian ini adalah case control design. Hasil perhitungan sampel diperoleh 70 kasus dan 70 kontrol. Data primer dan sekunder diperoleh dari buku KIA dan dilakukan wawancara dengan pedoman keusioner. Data dianalisis dengan menggunakan uji chi square dan uji regresi logistik.* **Hasil:** *Faktor-faktor yang mempengaruhi anemia kehamilan trimester III adalah umur (p value = 0,04; OR 2,08; 95% CI = 1,04 – 4,16), pekerjaan (p value = 0,02; OR = 2,27; 95% CI = 1,15 – 4,47), jarak lahir (p value = 0,03; OR = 2,25; 95% CI 1,08-4,69), status gizi (p value = 0,02; OR = 2.33; 95% CI = 1.14- 4,82), pengetahuan (p value = 0.01; OR = 3.17; 95% CI = 1.41-7.09), pendapatan per bulan (p value = 0,03, OR = 2,25; 95% CI =1,08 – 4,69), aktivitas merokok (p value = 0,04; OR = 2,00; 95% CI = 1,02 – 3,92), persepsi (p value = 0,02; OR = 2,20; 95% CI = 1,10 – 4,40) , dan dukungan pasangan (p value = 0,01; OR = 2,63; 95% CI = 1,16 – 5,93).* **Kesimpulan:** *Faktor yang paling berpengaruh terhadap anemia pada kehamilan trimester III adalah jarak kelahiran, status gizi, dan pengetahuan.*

INTRODUCTION

Women's health is the main parameter of public health, as women create new life and sustain all family members. Anemia is one of the key global public health problems; while it occurs in all age groups, prevalence is higher among pregnant women. Anemia is a condition in which the number of red blood cells in the body decreases as measured by the concentration of hemoglobin (Hb). Anemia in pregnancy is a condition where the concentration of hemoglobin in pregnant women is below 11g/dl. The definition of anemia differs in each trimester (< 11g/dl in the first trimester, < 10.50 g/dl in the second trimester, < 11 g/dl in the third trimester). Seventy-five percent of the incidence of pregnancy anemia is due to iron deficiency. Globally, the prevalence of pregnancy anemia is approximately 41.80%; this figure ranges from 35 to 60% in Africa, Asia and Latin America and is less than 20% in developed countries (Di Renzo et al., 2015).

The prevalence of pregnancy anemia in Indonesia amounted to 63.50% in 1995, 40.10% in 2001, 24.50% in 2007 and 23% in 2015. Of total anemia in Indonesia, 37.10% occurred in pregnant women; this figure was 36.40% in urban areas and 37.80% in rural areas (Natalia, Sumarmi, & Nadhiroh, 2016), moreover, the incidence of anemia in pregnant women in Indonesia has increased from 2013 to 2018: in 2013, the proportion was 37.10%, increasing to 48.90% in 2018 (Ministry of Health RI, 2018; Puspitasari, Aliviameita, Rinata, Yasmin, & Saidah, 2020).

Coverage for delivery of 90 iron (Fe) tablets ("blood tablets") to pregnant women reached 80.81% in Indonesia in 2017, however, the target of the national strategic plan was 90% by this time, meaning that the iron tablet distribution did not reach the desired target. Pregnant women with anemia also run the risk of suffering bleeding during childbirth that can result in death. Pregnancy anemia leads to an increase in the incidence of prematurity, maternal mortality, infant mortality rate and infection, along with iron deficiency (Tanziha, Damanik, Utama, & Rosmiati, 2016).

In addition to affecting the growth and development of the fetus in the womb, anemia in pregnant women also affects infants after birth (Ministry of Health RI, 2018), specifically by causing impaired cognitive function in adolescents and adults (Ministry of Health RI, 2016). Based on preliminary studies from the Mojokerto district health office's secondary data, postpartum hemorrhage is one of the causes of the high maternal mortality rates in Mojokerto district, which continue to increase: the rates were 117 per

100,000 live births in 2012. 134 per 100,000 live births in 2013, 90.70 per 100,000 live births in 2014, 116 per 100,000 live births in 2015, 140 per 100,000 live births in 2016 and 174 per 100,000 live births in 2017.

Women experience anemia more frequently when pregnant because the need for iron is almost doubled (approximately 45% greater than before pregnancy) but blood cells increase at a slower rate than blood plasma, a condition called hemodilution (Triharini et al., 2018). This also occurs due to the menstrual cycle experienced by women every month; without the consumption of iron tablets and foods that contain lots of iron (such as liver, fish, and meat), this can result in reduced immunity and increased risk of anemia during pregnancy. It is therefore important to begin giving blood tablets to girls from adolescence onwards to reduce the incidence of pregnancy anemia, postpartum hemorrhage, low birth weight, and stunting (Ministry of Health RI, 2018).

The main causes of anemia in pregnancy are micronutrient deficiencies (vitamins A and B12, riboflavin, and folic acid), diseases caused by parasites and bacteria, infections such as malaria, worms, HIV and birth defects in congenital red blood cells such as thalassemia. Twenty to eighty percent of pregnancy anemia is caused by iron deficiency. This occurs because of poverty (in that nutrient intake is very lacking), gender inequality, and lack of knowledge about good eating behaviors to promote health during pregnancy (Rismawati & Rohmatin, 2018). Socioeconomic factors affecting pregnancy anemia include parity > 3, illiteracy, low family income, number of ANC visits, and duration of taking Fe tablets (Taner et al., 2015). This study aims to analyze the risk factors that influence the incidence of anemia in the third trimester of pregnancy in Mojokerto district.

METHODS

The design of this study was an observational case-control approach. The study began with the identification of third-trimester pregnant women who are anemic and non-anemic, and then carried out retrospective research to identify the most significant risk factors for the incidence of pregnancy anemia. The study population comprises a case population of all third-trimester mothers who have anemia and a control population of all third-trimester pregnant women with normal pregnancy at Public Health Center (PHC) of Dlanggu in Mojokerto District in 2019.

Based on the calculation results, a minimum sample of 61 people was obtained with P2 and OR drawn from the research of Herawati and Astuti (2010). To anticipate data loss, 10% was added, such that the size increased to 70 people. Moreover, as the case and control group comparison ratio is 1:1, the total sample was 140 people. The dependent variable of this study was pregnancy anemia, while the independent variable was the social determinants of third-trimester pregnant women. The research sample was taken randomly according to inclusion and exclusion criteria. Inclusion criteria for sampling were all third-trimester pregnant women who came to the PHC of Dlanggu, pregnant women who were willing to have hemoglobin checks, and pregnant women who had hemoglobin check results in the third trimester of pregnancy, while the exclusion criteria were pregnant women who came to the PHC of Dlanggu but had not taken and were not willing to take a hemoglobin test. Hemoglobin was examined using the cyanmethemoglobin method; this was carried out by medical laboratory personnel in the PHC of Dlanggu.

The operational definition of the variables used in this study are as follows: *pregnancy anemia* is a condition of third-trimester pregnant women as seen from an Hb level < 11 gr%, divided into two categories ("yes" and "no") using a nominal scale; *mother's age* is the mother's life span from birth to the birth of her last child, which is divided into "at risk" (< 20 and > 35) and "no risk" (20–35) using an ordinal scale; *education* is a formal education level consisting of "primary" and "higher" as measured by an ordinal scale; *work* refers to activity engaged in by the mother that is able to generate wages, and is divided into "unemployed" and "employed" on a nominal scale; *nutritional status* is the nutritional state of pregnant women, determined by the circumference of the upper arm, and categorized as either "poor" or "good" using an ordinal scale; *parity* is the number of deliveries the mother has experienced, divided into either "at risk" (1 or ≥ 4) and "no risk" (2–3) with an ordinal scale; *birth interval* is the time span between the previous pregnancy and the last pregnancy, divided into < 2 years and ≥ 2 years using an ordinal scale; *monthly income* is an amount of money generated from routine activities carried out every month, consisting of "less than average" and "more than average" on an ordinal scale; *smoking activity* is a habit of smoking or being exposed to cigarettes every day, divided into

"yes" or "no" using a nominal scale; *knowledge* is the degree of the mother's knowledge about pregnancy anemia, categorized as either "poor" or "good" on an ordinal scale; *perception* is the mother's perception of anemia, including positive and negative perceptions as measured by an ordinal scale; *family support* refers to the support the mother receives from the family for antenatal care, while *husband's support* is the support she gets from the husband for antenatal care—these two variables are categorized as either "poor" or "good" on an ordinal scale; *ANC visits* are the number of visits made to check up on the pregnancy at health services, divided into < 6 times and ≥ 6 times using an ordinal scale.

Before data collection, an ethical test was conducted by the ethics team of LPPM STIKes Majapahit Mojokerto with ethics letter number 008/KEPK-SM/X/2019. Primary data collection was conducted via interviews with respondents of 10–15 minutes in length, using a questionnaire. Collected data was then processed via editing, coding, scoring, sorting, data entry, and then cleaning. Descriptive univariate analysis was conducted to study the sample characteristics, after which a bivariate analysis was performed to determine whether there is an influence of the independent variables on the dependent variable using logistic regression tests and employing the Odds Ratio (OR) and 95% confidence interval (CI). Data were analyzed using logistic regression tests.

RESULTS

As can be seen from Table 1, most of the respondents are in the non-risk age group (61.40%), have high education (75.70%), have jobs that generate wages other than being a housewife (46.40%), have poor nutritional status (66.40%), birth spacing of more than two years (77.90%), risky parity (52.90%), family income that exceeds than the average income family of all respondents (68.60%), had a smoking family (50.70%), reported negative perceptions (67.90%), reported that their husbands were less supportive (75, 70%), had good knowledge about pregnancy anemia (73.60%), and had made fewer than six ANC visits.

The results of the bivariate analysis showed that the risk factors that influenced anemia in the third trimester of pregnant women in this study were age (p value = 0.04, OR = 2.08, 95% CI = 0.24–0.96), occupation (p value = 0.03, OR = 2.13, 95% CI = 1.08–4.19), nutritional status (p value = 0.02, OR = 2.34, 95% CI = 1.14–4.82), birth interval (p value = 0.00, OR = 4.69, 95% CI = 1.86–11.83), income per month (p value = 0.03, OR = 2.25, 95% CI = 0.21–0.93), smoking activity (p value = 0.03, OR = 2.12, 95% CI = 1.08–4.16), perception (p value = 0.04, OR = 2.08, 95% CI = 1.01–4.29), spousal support (p value = 0.02, OR = 2.63, 95% CI = 1.16–5.93), knowledge (p value = 0.00, OR = 0.32, 95% CI = 0.14–0.71), and frequency of antenatal care visits (p value = 0.03, OR = 2.12, 95% CI = 1.08–4.16).

The statistical test results obtained from the logistic regression tests showed that the factors with the most significant influence on anemia in pregnant women are birth interval, nutritional status, and knowledge. The Nagelkerke R Square value is 0.41, which means that the ability of the independent variable to explain the dependent variable (anemia) is 41.30%, while 58.70 % of the dependent variable (anemia) is controlled by the model or other factors (Table 2).

DISCUSSION

Age

Results showed that more than half of the respondents were in the age group that was not at risk. This result showed that age has a significant effect on anemia in pregnant women: mothers at a higher-risk age are more likely to have anemia during pregnancy compared to mothers who are not at risk. These findings are in line with another study conducted by Amallia, Afriyani, & Utami (2017) showing that age affects the degree of anemia in pregnant women. The ages of risk for pregnant women are below 20 and above 35 years of age, while the age range without risk is 20–35 years. This is because mothers aged 20–35 years are of healthy reproductive age; hence, their reproductive organs are in optimal condition and have a lower risk of pregnancy problems such as anemia relative to those who are less than 20 years old or more than 35 years. This is also in line with current research stating that age is related to the incidence of anemia, because at the age of < 20 years, the uterus and the hormones produced by the reproductive system are not yet working optimally.

Level of Education

The results showed that most respondents had a higher education level and did not experience anemia. Education does not have a significant effect on anemia in pregnant women. This is in line with research conducted by Amallia, Afriyani,

& Utami (2017), which found that education has no effect on anemia in pregnant women. Another study conducted in Northern Ethiopia yielded dissimilar results to the current study. That research showed that the prevalence of anemia was higher among pregnant women who have a lower education level compared to those with a higher level of education (Gebre & Mulugeta, 2015).

Education, in general, is an effort that is planned to influence other people, individuals, groups or communities so that they do what is expected by educational behavior. A high level of education will affect someone's knowledge and perspective on many things, including anemia (Notoatmodjo, 2012), however, the results of the current study indicate that pregnant women who have a higher education still experience anemia due to the influence of other factors, namely exposure to cigarette smoke and the workload that must be done by pregnant women.

Occupation

The current results showed that more than half of the respondents were employed. Occupation has a significant effect on anemia in pregnant women: unemployed pregnant women were more likely to experience anemia compared to their employed counterparts. This research was not consistent with research conducted by Rai, Kawengian, & Mayulu (2016), which states that occupation does not affect the hemoglobin level of pregnant women, however, pregnant women who work will have additional income, so that they can increase their purchasing power to meet their nutritional needs during pregnancy (Lebso, Anato, & Loha, 2017).

Nutritional status

The current results showed more than half of the respondents had good nutritional status. These results indicate that nutritional status significantly affects anemia. Pregnant women with low nutritional status are at greater risk of anemia compared to pregnant women with good nutritional status. This study is in line with the results of research conducted by Ervina & Juliana (2017) stating that Chronic Energy Deficiency (CED) affects the incidence of anemia in pregnant women. CED is a condition in which pregnant women have poor nutritional intake, particularly as regards energy sources in the form of macronutrients and micronutrients. These nutrients are also required in the formation of erythrocytes, which increase during pregnancy. If pregnant women experience CED, this will increase the risk of anemia during pregnancy (Tanziha, Damanik, Utama, & Rosmiati, 2016).

Parity

The current results both showed that most respondents have at-risk parity and indicated that parity does not significantly affect anemia in pregnant women, as the proportion of anemia among pregnant women with at-risk and no-risk parity was the same. This is in line with research conducted by Gari, Tsegaye, & Ketema (2020), which showed that parity did not have a significant association with anemia.

Parity is defined as the number of times that women have given birth to a fetus with a gestational age of 24 weeks or more, regardless of whether the child was born alive or was stillborn (Astriana, 2017).

Birth Interval

The current results showed that most respondents have a birth interval of fewer than two years. Birth interval has a significant effect on anemia in pregnant women. The results of this study are in line with research conducted by Kassa, Muche, Berhe, & Fekadu (2017) stating that a shorter birth interval is associated with anemia in pregnant women. Birth interval plays a role in the health condition of pregnant women. The ideal birth interval is ≥ 2 years; this time span will allow the mother's body to recover physiologically after going through pregnancy, childbirth, and breastfeeding. A shorter birth interval will not give the mother's body enough time to recover depleted nutrition.

Income per Month

The current results showed that respondents had an income of more than 1 million rupiah. These results indicate that income has a significant effect on anemia in pregnant women, as mothers with low income are more likely to experience anemia compared to mothers with high income. This research was consistent with other studies conducted in Southern Ethiopia, which found a higher prevalence of anemia reported among women of lower socio-economic status. This may be because pregnant women with high income are able to purchase good food, which is essential to reducing the risk of anemia in pregnancy (Lebso, Anato, & Loha, 2017).

Table 1
Univariate Analysis Research Variables Impacting Anemia in the Third Trimester of Pregnancy in Mojokerto, 2019

Variable	n	%
Anemia		
Yes	70	50.00
No	70	50.00
Age (Years)		
At risk (< 20 and > 35)	54	38.60
No risk (20–35)	86	61.40
Level of Education		
Primary	34	24.30
Higher	106	75.70
Occupation		
Unemployed	64	45.70
Employed	76	54.30
Nutritional status		
Poor	47	33.60
Good	93	66.40
Parity		
At-risk	25	17.70
No risk	115	82.10
Birth Interval (Years)		
<2	109	82.10
≥2	31	17.70
Income Per Month		
Less than average	44	31.40
More than average	98	68.60
Smoking activity		
Yes	72	51.40
No	69	48.60
Knowledge		
Poor	37	26.40
Good	103	73.60
Perception		
Negative	55	39.30
Positive	85	60.70
Family Support		
Poor	58	41.40
Good	82	58.60
Spousal Support		
Poor	34	24.30
Good	106	75.70
Frequency of Antenatal Care Visits (Times)		
< 6	79	56.40
≥ 6	61	43.60
Total	140	100.00

Smoking Activity

The current results showed that more than half of respondents were exposed to smoke. These results indicate that exposure to cigarette smoke has a significant effect on anemia in pregnant women. This is in line with the results of research conducted by Safitri & Syahrul (2015) showing that pregnant women who are exposed to cigarette smoke will be at risk of developing anemia 4.09 times greater than pregnant women who are not exposed to cigarette smoke.

In the current study, the pregnant women were not active smokers but passive smokers. A passive smoker is someone who breathes air

polluted by cigarette smoke (environmental tobacco smoke, or ETS). The free radicals contained in tobacco smoke cause disorders of iron, hemoglobin, and red blood cell metabolism; thus, the concentration of red blood cells will decrease, which results in anemia in pregnant women (Mistry et al., 2018).

Knowledge

Most respondents in this study have good knowledge about anemia, which has a significant effect on anemia incidence. The variable "knowledge" refers to pregnant women knowing information about anemia; better knowledge will positively affect their behavior. Anemia is a health problem that is often experienced by pregnant women. Iron requirements increase during pregnancy, because the mother has to provide the fetus she is carrying with the iron it requires. In addition, pregnant women experience a proportionate increase in the amount of blood plasma (hemodilution), which causes anemia during pregnancy (Macdonald & Magill-Cuerden, 2011).

The results of the current study are in line with another study conducted by Winardi & Andani (2018), which also showed that pregnant women with a good level of knowledge about anemia will take measures to prevent anemia (for example, consuming nutritious foods and regularly taking Fe tablets).

Perception

More than half of respondents have positive perceptions about anemia, which has a significant effect on anemia incidence. Mothers with negative perceptions will be at greater risk of anemia compared to mothers with positive perceptions. This research was in accordance with other research conducted by Narsih & Hikmawati (2020), which showed that perception has a significant effect on anemia. The lower the perception of vulnerability and the perceived benefit, the less good behaviors the respondents adopted to prevent anemia, which affected their hemoglobin levels.

Perception is a process that is preceded by a sensory process, namely the receipt of a stimulus through the five senses. Mothers who have a positive perception of anemia will try to take preventive measures to prevent anemia: for example, taking Fe tablets regularly, consuming foods that are nutritious and contain iron, and checking their hemoglobin levels regularly to detect anemia early (Notoatmodjo, 2012).

Family Support

The results of the current study showed that more than half of respondents have positive family support, and moreover that family support did not significantly affect anemia in pregnant women. This is not in line with another study, which showed that mothers who have negative or poor support will have a higher risk of anemia compared to mothers who receive adequate support from their husbands. The husband's support is a form of social interaction in which there is a relationship that provides tangible mutual assistance; this assistance will place individuals who are involved in a social system, who in turn will be able to give love and attention to both families and partners (Nurzia, 2016)

This difference in results is due to the fact that pregnant women with anemia in the present study are divided roughly equally between the "poor" and "good" family support groups. This also occurred in another study conducted by Anggraini (2017), which states that family support has no effect on compliance with taking iron tablets (one of the measures to prevent anemia).

Spousal Support

Most the respondents in the current study have good spousal support, and this was found to significantly affect the occurrence of anemia in pregnant women. Mothers who have poor spousal support will have a higher risk of anemia compared to mothers who get support from their husbands. The results of the current study are in line with research conducted by Hardaniyati & Ariendha (2018) stating that spousal support affects the incidence of anemia.

The family, especially the husband, plays an important role in support during pregnancy. Support and attention from the husband will increase the wife's sense of comfort and security during pregnancy. This support can affect the wife's behavior during the pregnancy; for example, taking Fe tablets regularly and consuming adequate nutrition during pregnancy, helping her to avoid the risk of anemia (Dagun, 2002).

Frequency of Antenatal Care Visits

More of half of the respondents reported fewer than six ANC visits. The frequency of ANC visits was not found to have a significant effect on anemia. The results of this study are not in line with the research conducted by Natalia, Sumarmi, & Nadhiroh (2016), which states that ANC regularity does affect the incidence of anemia. Their study stated that pregnant women who did

not regularly attend ANC were four times more likely to experience anemia than pregnant women who did. Likewise, research conducted by Antono (2017) found a significant relationship between the frequency of ANC visits and anemia in third-trimester pregnant women at Nganjuk Hospital.

During their ANC visits, pregnant women receive information about the importance of nutrition during pregnancy and the dangers of pregnancy anemia. In addition, pregnant women will also receive Fe tablet supplements and regular monitoring of their hemoglobin levels, which aids in preventing anemia during pregnancy (Macdonald & Magill-Cuerden, 2011).

Table 2
Final Model of Multivariate Analysis using Simple Logistic Regression

| Variable | Incidence of Anemia | | | | p-value | OR (95% CI) |
| | No | | Yes | | | |
	n	%	n	%		
Age (Years)						
At risk (<20 & >35)	21	15.00	33	23.60	0.04	2.08
No risk (20-35)	49	35.00	37	26.40		1.04–4.17
Level of Education						0.63
Primary	20	14.30	14	10.00	0.24	0.29–1.37
Higher	50	35.70	56	40.00		
Occupation						2.27
Unemployed	25	17.90	39	27.90	0.02	1.15–4.47
Employed	45	32.10	31	22.10		
Nutritional Status						2.34
Poor	17	12.20	30	21.40	0.02	1.14–4.82
Good	53	37.90	40	28.60		
Parity						0.91
At-risk	13	9.30	12	8.60	0.83	0.39–2.16
No risk	57	40.70	58	41.40		
Birth Interval (Years)						2.25
< 2	45	32.10	63	45.00	0.03	1.08–4.69
≥ 2	25	17.90	7	5.00		
Income Per Month						2.25
Less than average	16	11.40	28	20.00	0.03	1.08–4.69
More than average	54	38.60	42	30.00		
Smoking Activity						2.00
Yes	30	21.40	42	30.00	0.04	1.02–3.92
No	40	28.60	28	20.00		
Knowledge						3.17
Poor	11	7.80	26	18.60	0.00	1.42–7.09
Good	59	42.10	44	31.40		
Perception						2.20
Negative	21	15.00	34	24.30	0.02	1.10–4.41
Positive	49	35.00	36	25.70		
Family Support						1.42
Poor	26	18.60	32	22.80	0.30	0.73–2.80
Good	44	31.40	38	27.20		
Spousal Support						2.63
Poor	11	7.80	23	16.50	0.02	1.16–5.93
Good	59	42.20	47	33.50		
Frequency of Antenatal Care Visits (Times)						
< 6	34	24.30	45	32.10	0.06	1.91
≥ 6	36	25.70	25	17.90		0.97–3.75
Total	70	50.00	70	50.00		

In the current study, ANC visits did not affect the incidence of anemia in pregnant women; this was due to several factors, including knowledge and perception. Most of the respondents had good knowledge about anemia, while more than half had positive perceptions about anemia. Knowledge and positive perceptions encourage pregnant women to take anemia prevention measures (for example, consuming nutritious foods and regularly taking Fe tablets). Thus, anemia during pregnancy can be prevented (Notoatmodjo, 2012).

CONCLUSION

The factors with the strongest influence on pregnancy anemia were birth interval, nutritional status, and knowledge. Pregnant women with too-short birth intervals, poor nutritional status, and poor knowledge should be paid more attention. Iron and folic acid supplementation for all pregnant women should be strengthened by midwives and government organizations as part of routine antenatal care. The prevention of anemia should be focused on the use of long-acting family planning methods to prevent short birth intervals, promote early diagnosis of anemia, and reinforce anemia-related knowledge among women.

CONFLICT OF INTEREST

There were no conflicts of interest during the course of the research, from finance, licensing and data collection to the preparation of research reports.

AUTHOR CONTRIBUTIONS

In this study, DI was in charge of coordinating the socialization and licensing of proposals, arranging instruments, data collection, processing, data analysis, preparation of reports and publication of research results. ADS was in charge of administering the research ethics test, conducting validity and reliability tests of instruments, collecting data, processing data and preparing reports. SP helped to coordinate research ethics tests and assisted in data collection and the presentation of research results. GS assisted with data collection and analysis and the publication of research results.

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