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Social Determinants of Health Related to the Prevalence of Anemia in Pregnant Women in UPT. Singkawang Tengah City Health Center II, Singkawang City

Yully Asmariana
Universitas Strada Indonesia, Indonesia
Email: yuliakbidskw@gmail.com

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ABSTRACT

The maternal mortality rate (MMR) in Indonesia remains high, with postpartum bleeding and iron deficiency anemia as the main causes. Anemia in pregnant women is influenced by nutritional factors, diet, environment, and social determinants of health, so that it has the potential to increase the risk of morbidity and mortality in mothers and babies. This study aims to analyze the social determinants of health—including employment, parity, body mass index (BMI), age, chronic energy deficiency (KEK) conditions, and nutritional status—on the prevalence of anemia in pregnant women in UPT Puskesmas Singkawang Tengah II Kota Singkawang. The research design uses an analytical survey with a cross-sectional approach in July–December 2025. The results of the univariate analysis showed a prevalence of anemia of 39.6%. Bivariate analysis found meaningful relationships between occupation (p=0.040), BMI (p=0.045), mid-upper arm circumference (p=0.026), and nutritional status (p=0.008) with anemia, while parity (p=0.918) and age (p=0.098) were not significantly related. Multivariate analysis showed mid-upper arm circumference (p=0.039; OR=0.56; 95% CI: 0.32–0.97) and nutritional status at risk (p=0.011; OR=1.76; 95% CI: 1.14–2.72) as the dominant factors for anemia prevalence. This study emphasizes the importance of ANC screening, balanced nutrition interventions, and monitoring of KEK status from the beginning of pregnancy to reduce the risk of anemia and support healthy mothers, safe childbirth, and healthy babies.

INTRODUCTION

The Maternal Mortality Rate (AKI) includes all deaths that occur during pregnancy, childbirth, and postpartum period. In 2023, there were 4,482 cases of maternal deaths, decreasing to 4,150 cases. The main causes of death include 1,351 cases of non-obstetric conditions in pregnancy, 988 cases of hypertension during pregnancy, childbirth, and postpartum periods, and 955 cases of obstetric hemorrhage (Ministry of Health of the Republic of Indonesia, 2024). Postpartum bleeding is one of the causes of AKI of around 30%–50%. The risk of postpartum bleeding increases along with low thresholds of anemia, which is related to the need for substance supplementation (Glonnegger, Glenzer, Lancaster, Barnes, & Drygalski, 2023).

Iron deficiency is the main factor in anemia in pregnant women, characterized by a decrease in hemoglobin levels which has a negative impact on the mother and fetus. Dietary and environmental factors have been shown to affect hemoglobin levels and iron status (Lownds, Alvernaz, Melkun, & Bernabé, 2024). Iron deficiency is the most common cause of anemia in women of productive age, with a prevalence of 50%, while 38% of all pregnant women in the world experience anemia (Glonnegger et al., 2023), (Campbell et al., 2024). This condition is most commonly found in low- and middle-income countries (Glonnegger et al., 2023).

The main factors that cause iron deficiency anemia include low iron intake from food, absorption disorders due to type of consumption or gastrointestinal problems, and the presence of chronic diseases. Physiological conditions that increase iron requirements, such as menstruation and pregnancy, also increase the risk of iron deficiency. If iron deficiency anemia is not treated during pregnancy, it can have serious consequences for both mother and baby, including increased morbidity and mortality rates, risk of premature birth, intrauterine fetal death (IUFD), intrauterine growth retardation (IUGR), and infants with low birth weight (Sichalwe et al., 2025). In addition, this condition is also associated with neurocognitive disorders as well as anemia in infants (Campbell et al., 2024).

Women of reproductive age have a high risk of iron deficiency (ID) and anemia (Campbell et al., 2024). The condition of anemia appears when the number of red blood cells or hemoglobin levels is below the normal limit. Hemoglobin plays an important role in transporting oxygen, so a lack of red blood cells or hemoglobin will reduce the ability of blood to supply oxygen to body tissues. As a result, people with anemia often experience symptoms such as fatigue, feeling weak, dizzy, and shortness of breath. The ideal need for hemoglobin to support physiological functions is different in each individual, influenced by factors such as age, gender, living environment, health habits, and reproductive status of women (Barman, 2024).

Anemia due to iron deficiency is closely related to physical and cognitive growth inhibitions in children, as well as decreased female productivity. This condition is more often experienced by women with a high workload and minimal rest time, so the risk of iron deficiency is even greater. In terms of diet, low consumption of fruits, vitamin C, and nuts in women is also a factor causing anemia. The prevalence and distribution of anemia in a population is influenced by the complex interaction between ideological, environmental, sociocultural, and physiological factors. This creates a clear global gap between developed and developing countries, while showing a lack of attention to the predictive factors of iron deficiency anemia (Barman, 2024). Symptoms commonly experienced by people with anemia include fatigue, decreased concentration, limited physical work capacity, and dizziness (Campbell et al., 2024).

The increase in anemia cases in pregnancy is influenced by a number of determinant factors, including maternal age, body mass index (BMI), occupation, and parity, where age has an important role in the occurrence of anemia (Nurhasanah et al., 2023). To reduce the risk of iron deficiency from the beginning of pregnancy, efforts are needed to overcome gaps in the social determinants of health. The application of balanced nutrition and the provision of blood-boosting tablets to all pregnant women from the beginning to before childbirth is a strategic step in preparing for a healthy pregnancy, preventing postpartum bleeding, and supporting the birth of healthy, intelligent, and stunting-free babies (Dewi & Mardiana, 2021). Based on this background, this study aims to analyze the social determinants of health including employment, parity, BMI, age, chronic energy deficiency conditions (SEZ), and nutritional status with the prevalence of anemia in pregnant women at the UPT Singkawang Tengah II Health Center, Singkawang City. This research is expected to provide practical benefits for health workers and maternal health program managers in Puskesmas, especially in developing more targeted screening and intervention strategies. By identifying the social determinants that have the most influence on anemia, such as upper arm circumference and nutritional status, the results of the

study can be the basis for increasing the effectiveness of antenatal care (ANC) services, optimizing the provision of iron supplementation, and specific nutritional counseling according to the needs of pregnant women. The impact is expected to reduce the prevalence of anemia, reduce the risk of pregnancy and childbirth complications, and support the achievement of the target of reducing AKI at the local and national levels.

METHOD

This is an analytical survey research with a cross sectional approach. This research was conducted at UPT. Singkawang Tengah II Health Center in Singkawang City in July – December 2025. Population is data on all pregnant women who have checked their pregnancy recorded in the reporting book in the Maternal and Child Health section from January 2024 – May 2025. Samples are by purposive sampling, which is the selection of samples based on inclusion criteria set by the researcher. From the available population, 371 pregnant women who met the inclusion criteria were obtained. Then the data were analyzed using univariate analysis, bivariate using chi-square and followed by multivariate tests with Binary Logistic Analysis to find out the variables that had the most influence on the prevalence of anemia.

RESULT AND DISCUSSION

1. Univariate Analysis

Table 1. Distribution of Social Determinants of Health and Prevalence of Anemia at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Variable		Quantity (N)	Percentage (%)
Jobs	Not Working	149	40,2
	Work	222	59,8
	Total	371	100,0
Parity	Risky	164	44,2
	No Risk	207	55,8
	Total	371	100,0
IMT	Risky	219	59,0
	No Risk	152	41,0
	Total	371	100,0
Age	Risky	88	23,7
	No Risk	283	76,3
	Total	371	100,0
Arm Circumference	Risky	69	18,6
	No Risk	302	81,4
	Total	371	100,0
Nutritional Status	Risky	179	48,2
	No Risk	192	51,8
	Total	371	100,0
Prevalence of Anemia	Risky	147	39,6
	No Risk	224	60,4
	Total	371	100,0

Source: secondary data processed in 2025

Table 1 shows that the percentage of respondents in the work group was 59.8% who were working, the risk parity was 44.2%, the risk BMI was 59.0%, the age at risk was 23.7%, the arm circumference at risk (<23.5 cm) was 18.6%, the nutritional status at risk was 51.8% and the prevalence of anemia at risk was 39.6%.

2. Bivariate Analysis

a. The Relationship between Work and the Prevalence of Anemia in Pregnant Women

Table 2. Distribution of Occupational Relations with Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Jobs	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Work	68	46,3	80	53,7	149	100	0,040	1,318 (1,03 – 1,68)
Not Working	78	35,1	144	64,9	222	100		

Source: secondary data processed in 2025

From table 2, it can be seen that the respondents who worked (46.3%) were slightly larger than the respondents who did not work. The results of the statistical test yielded p=0.040, meaning that there is a meaningful relationship between work and the prevalence of anemia in pregnant women.

b. Parity Relationship with Prevalence of Anemia in Pregnant Women

Table 3. Parity Distribution with Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Parity	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Risky	64	39,0	100	61,0	164	100	0,918	0,98 (0,76 – 1,25)
No Risk	83	40,1	124	59,9	207	100		

Source: secondary data processed in 2025

Table 3 shows that the parity of risk (39.0%) of anemia in pregnancy is slightly smaller than that of non-risk (40.1%). The results of the statistical test yielded p=0.918, meaning that there was no meaningful relationship between parity and the prevalence of anemia in pregnant women.

c. The Relationship between Body Mass Index (BMI) and the Prevalence of Anemia in Pregnant Women

Table 4. Distribution of the Relationship between Body Mass Index and Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

IMT	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Risky	77	35,2	142	64,8	219	100	0,045	0,76 (0,59 – 0,98)
No Risk	70	46,1	82	53,9	152	100		

Source: secondary data processed in 2025

Table 4 shows that the BMI at risk of anemia in pregnancy (35.2%) is slightly smaller than that of those who are not at risk (46.1%). The results of the statistical test showed

p=0.045, meaning that there is a significant relationship between BMI and the prevalence of anemia in pregnant women.

d. Relationship between Age and Prevalence of Anemia in Pregnant Women

Table 5. Distribution of Age with Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Age	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Risky	42	47,7	46	52,3	88	100	0,098	1,29 (0,99 – 1,68)
No Risk	105	37,1	178	62,9	283	100		

Source: secondary data processed in 2025

Table 5 shows that the age at risk of anemia in pregnancy (47.7%) is slightly greater than that of those who are not at risk (37.1%). The results of the statistical test showed p=0.098, meaning that there was no meaningful relationship between age and the prevalence of anemia in pregnant women.

e. The Relationship between Arm Circumference (Lila) and the Prevalence of Anemia in Pregnant Women

Table 6. Distribution of Arm Circumference with Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Arm Circumference	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Risky	36	52,2	33	47,8	69	100	0,026	1,42 (1,08 – 1,86)
No Risk	111	36,8	191	63,2	302	100		

Source: secondary data processed in 2025

Table 6 shows that the arm circumference at risk of anemia in pregnancy (52.2%) is slightly larger than that of those at no risk (36.8%). The results of the statistical test yielded p=0.026, which means that there is a significant relationship between age and the prevalence of anemia in pregnant women.

f. The Relationship between Nutritional Status and the Prevalence of Anemia in Pregnant Women

Table 7. Distribution of the Relationship between Nutritional Status and Anemia Prevalence at UPT. Singkawang Tengah Municipal Health Center II Singkawang City

Nutritional Status	Prevalence				Total	%	Value p	PR
	Anemia		No Anemia					
	N	%	N	%				
Risky	58	32,4	121	67,6	179	100	0,008	0,69 (0,53 – 0,91)
No Risk	89	46,4	103	53,6	192	100		

Source: secondary data processed in 2025

Table 7 shows that the nutritional status of those at risk of anemia in pregnancy (52.2%) is slightly greater than that of those who are not at risk (36.8%). The results of the statistical test showed p=0.008, meaning that there was a significant relationship between nutritional status and the prevalence of anemia in pregnant women.

3. Multivariate Analysis

Table 8. Initial Model of Multivariate Candidate Variables Binary Analysis of Logistics Related to Social Determinants of Health

with the Prevalence of Anemia in the UPT. Singkawang Tengah Municipal Health Center II Singkawang City Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Jobs	-.390	.222	2.934	1	.087	.684	.443	1.056
IMT	.237	.227	1.093	1	.296	1.268	.812	1.979
Arm Circumference	-.579	.280	4.281	1	.039	.560	.324	.970
Nutritional Status	.565	.222	6.469	1	.011	1.760	1.138	2.720
Constant	.288	.223	1.672	1	.196	1.334		

Source: secondary data processed in 2025

The variable that was a candidate for multivariate analysis at the beginning produced a probability value smaller than 0.05 ($p<0.05$) consisting of arm circumference with anemia ($p=0.039$) and nutritional status with anemia ($p=0.011$). Then the initial and final models of multivariate analysis with the same results. The arm circumference of the SEZ with a value of $p=0.039$ ($p<0.05$) with the value of exp(B) = 0.56 (0.32 – 0.97) means that the arm circumference of the SEZ is likely to be anemia 0.56 to the prevalence of anemia compared to non-SEZ respondents. Risky nutritional status with a probability value of less than 0.05 with a value of $p=0.011$ with an exp(B) value = 1.76 (1.14 – 2.72), meaning that respindens with nutritional status at risk have a possibility of anemia prevalence in pregnant women of 1.76 times compared to SEZ status with an arm circumference less than the predetermined standard.

Anemia is a condition in which the number of red blood cells is insufficient to meet the body's physiological needs. Hemoglobin (Hb) levels are below 11 g/dl for women. As many as 41.8% of pregnant women worldwide, in Africa as many as 57.1% of the prevalence of anemia with 17.2 million cases. Anemia in pregnant women is caused by iron deficiency, vitamin B12 and folic acid are one of the largest global burdens in the world and have a prevalence of 50% (Nasir, Ayele, Aman, & Hussein, 2024). Indicators of anemia are measured through hemoglobin (Hb) level checks. Hb binds to and carries oxygen from the lungs for distribution throughout the body's tissues. Hb deficiency can cause anemia which can cause morbidity and mortality for sufferers (WHO, 2011).

The magnitude of anemia in pregnant women showed that the magnitude of anemia was 121 (30.9%) with (95% CI: 26.4, 35.4) with an average hemoglobin of 11.38 g/dL (SD ± 1.50). The magnitude of mild, moderate, and severe anemia among pregnant women was 73 (18.7%), 42 (10.7%), and 6 (1.5%), respectively. The highest magnitude of anemia, 89 (73.6%) and 86 (71.1%), was observed in women living in urban areas and those who had no history of deworming in the past 6 months. The prevalence of anemia among women under the age of 18 was 75% (12 out of 16 pregnant women). Regarding the severity of anemia, the majority of respondents, namely 73 (60.3%), 42 (34.7%), and 6 (5%) respondents, suffered from mild, moderate, and severe anemia, respectively. Regarding iron supplementation, pregnant women who did not take iron supplementation during pregnancy were 3.5 times more likely (AOR = 3,588, 95% CI: 1,794–7,175) to develop anemia than pregnant women who took iron supplementation (Nasir et al., 2024).

In the prevalence of anemia based on employment status, it can be seen that pregnant women who work have a prevalence of anemia of 46.3%, higher than those who do not work (35.1%). A p-value of 0.040 indicates that this difference is statistically significant, with a PR of 1.318 (CI 1.03–1.68), meaning that working women have a 1.3 times higher risk of anemia. This condition can be associated with a less regular diet, and limited physical activity. This is in line with research that women workers tend to have higher health awareness due to the demands of work productivity (Kinyoki, Osgood-Zimmerman, Bhattacharjee, & Burden, 2021).

The study conducted stated that pregnant women who work can improve the economic status of their families and have their own income so that they can meet their nutritional needs and are not dependent on their husbands (Kinyoki et al., 2021); (Oktavianti, Dewi, & Nurhayati, 2024). On the other hand, working mothers affect their health conditions when the workload is too heavy which risks affecting the nutritional status of pregnant women. Where every strenuous physical activity every day while the food intake is not sufficient, pregnant women are very vulnerable to chronic energy deficiency, while nutritional problems have an impact on increasing the prevalence of anemia in pregnant women (Oktavianti et al., 2024). In addition, pregnant women of workers experience iron deficiency in the body and lack of vitamin C intake which can help iron absorption. Lack of intake and loss of iron stores will increase the risk of anemia (Lasiyo & Ramdhan, 2024).

In the table showing risk parity (39.0%), anemia in pregnancy was slightly smaller than in non-risk (40.1%). The results of the statistical test yielded p=0.918, meaning that there was no meaningful relationship between parity and the prevalence of anemia in pregnant women.

Having a large family size is one of the determining factors that is independently related to malnutrition during pregnancy. The study revealed that pregnant women who came from households with more than five members had a higher prevalence of malnutrition. Large family sizes can lead to inadequate food intake. Pregnant women are more susceptible to food insecurity and are associated with inadequate nutritional intake for two fundamental reasons. First, physiological changes occur during pregnancy. A woman's nutritional needs increase during pregnancy require increased nutrition during pregnancy, and when these needs are not met, it can lead to weight loss and fatigue. Second, women have sociological vulnerabilities. Studies show that, during periods of declining food supply, women experience a decrease in consumption compared to men. Furthermore, women are expected to reduce their consumption to protect babies and young children and have an impact on malnutrition in pregnant women (Belete et al., 2023). This is in line with the result p=0.300 in the table Obstetrics and pregnancy-related characteristics of pregnant women in rural Jimma Zone, South Ethiopia (n=367) Significantly no association with the prevalence of anemia in pregnant women (Kuma, Tamiru, & Belachew, 2021).

In accordance with the results of the study, as many as 448 pregnant women with an average age of 25.68 (± 5.16) years were involved in this study. The prevalence of malnutrition among pregnant women was 47.9% (95% CI: 43%-53%). From the analysis, malnutrition was more likely to occur in respondents who had five or more family members (APR = 1.19; 95% CI = 1.02–1.40), low dietary diversity (APR = 1.58; 95% CI = 1.13–2.21) and those with anemia (APR = 4.27; 95% CI = 3.17–5.76) (Belete et al., 2023).

Another factor, the age of the pregnant woman, showed a significant association with anemia during pregnancy; The probability of developing anemia in pregnant women aged 25–34 years was 60.9% (OR = 0.391, 95% CI: 0.173–0.883), and those ≥35 years of age were 6.8% (OR = 0.068, 95% CI: 0.011–0.444) less likely to develop anemia than pregnant women aged 15–24 years. (Nasir et al., 2024).

Of the 594 pregnant women studied, the average hemoglobin level (± standard deviation) was 10.7 (±0.1) g/dL, and the prevalence of anemia was 54.4% (323/594). The proportion of moderate and severe anemia in pregnant women was 49.2% (95% CI: 45.1%–53.2%) and 5.2% (95% CI: 3.7%–7.3%), respectively. Multivariate analysis shows that the young age of the mother (Lingani et al., 2024)

BMI at risk of anemia in pregnancy (35.2%) was slightly smaller than those at no risk (46.1%). The results of the statistical test showed p=0.045, meaning that there is a significant relationship between BMI and the prevalence of anemia in pregnant women.

Pregnant women are vulnerable and tend to develop physiological and pathological anemia. Maternal anemia is a burden worldwide, especially in developing countries, and Asia is one of the high prevalence of anemia increasing the risk of maternal mortality besides Africa and Latin America. Maternal anemia is defined as hemoglobin (Hb) <11 g/dL, or hematocrit (Hct) <33% levels in all trimesters of pregnancy as defined by the World Health Organization (WHO, 2024).

Anemia in pregnancy is also associated with malnutrition and low socioeconomic conditions (Kinyoki et al., 2021); (Oktavianti et al., 2024). Nutritional status can be measured using a variety of parameters, such as weight, height, body mass index (BMI), triceps skin folds, or upper arm circumference (Kurdanti, Khasana, & Wayansari, 2020). However, BMI is most commonly used in the field of research in developing countries. Low maternal Body Mass Index (BMI) has a strong relationship with maternal and infant health in line with the results of the study that BMI at the first antenatal visit of women who come for delivery in tertiary care hospitals, is 36.6% underweight, 52.5% is normal body mass index, and 10.9% is overweight. During the first antenatal visit, 58.4% experienced anemia, while 53.5% experienced mild anemia during the last antenatal visit. Each of the 39.6% of antenatal women had normal Hb% levels during their first antenatal care visit, while 46.5% had normal Hb% levels during their last antenatal visit. Mode of delivery; spontaneous vaginal delivery 45.5%, vacuum delivery 3.0%, emergency cesarean delivery 50.5%. Preterm labor was statistically significant among those whose first antenatal care visit was after the 11th week of pregnancy. Meanwhile, emergency cesarean delivery is statistically significant among those who are underweight (Koirala, Raddi, & Dalal, 2022).

The results of the study with maternal hemoglobin levels, especially in those with moderate and severe anemia, resulted in an increase in the incidence of newborns at risk of low birth weight (BBLR) to an increased risk of neonatal and infant mortality recorded as many as 106,143 were obtained with 53,348 (50.5%) women with anemia, 24,670 (23.2%) with mild anemia, 25,937 (24.3%) with moderate anemia and 2,188 (2.0%) with severe anemia. Moderate (OR 1.20; 95% CI 1.06 to 1.35) and severe (OR 1.89; 95% CI 1.46 to 2.44) were associated with an increased chance of neonatal mortality. Similar estimates were observed for moderate and severe anemia and infant mortality. No increased risk was noted for mild anemia (Tsamantioti, Alfvén, Hossin, & Razaz, 2025).

BMI is calculated as body weight divided by the square of height (kg/m2). Height and weight were measured during the first prenatal visit and before delivery weight was remeasured using standard measurement techniques. The BMI category is identified in accordance with international standards. Respondents were categorized into three BMI groups: normal weight (≥ 18.5–24.9 kg/m2), overweight (≥ 25.0–29.9 kg/m2), and obesity (≥ 30.0 kg/m2). Weight change is calculated as the difference between prenatal and pre-pregnancy weight (Marchewka-długońska et al., 2025).

This is in line with research in Poland, the prevalence of overweight and obesity is also a concern for women of reproductive age. About 45% of women aged 18 to 49 years have an overweight problem. Among women aged 18–29, the percentage of those who are overweight and obese is almost 34%, while in the 40–49 age group, the figure rises to more than 63%. Undoubtedly, this increased prevalence of overweight and obesity among women as they age may be due to a higher likelihood of postpartum weight retention from previous pregnancies (Marchewka-długońska et al., 2025).

The research test in the case of pre-pregnancy weight in multipara was statistically significantly higher than primipara ($p<0.001$) and parity of second and third children and so on ($p<0.001$) and mean BMI before pregnancy with the post hic Tukey test revealed in primipara with second pregnancy ($p=0.006$); Second and third pregnancies ($p<0.001$) (Marchewka-długońska et al., 2025)

Table 6 shows that the age at risk of anemia in pregnancy (47.7%) is slightly greater than that of those who are not at risk (37.1%). The results of the statistical test showed $p=0.098$, meaning that there was no meaningful relationship between age and the prevalence of anemia in pregnant women.

The prevalence of anemia was found to be 30.9% (95% CI: 26.4, 35.4%). Factors significantly associated with a reduced risk of anemia included high dietary diversity (OR = 0.217, 95% CI: 0.105–0.451), no history of excessive menstrual bleeding (OR = 0.162, 95% CI 0.076–0.345), age 25–34 years (OR = 0.391, 95% CI 0.173–0.883), and ≥ age 35 years (OR = 0.068, 95% CI 0.011–0.444). In contrast, mild upper arm circumference (LILA) (<23 cm) (OR = 4.939, 95% CI 2.330–10.469), no use of contraception (AOR = 4.935, 95% CI 2.207–11.032), and no use of iron supplements (OR = 3.588, 95% CI 1.794–7.175) were significantly associated with an increased risk of anemia (Nasir et al., 2024).

According to the WHO classification, anemia in this study was found to be a moderate-level public health problem. High dietary diversity, no previous history of excessive menstrual bleeding, and age were significantly associated with a reduced risk of anemia, whereas the standard upper arm circumference (LILA) (<< 23 cm) established, not taking iron supplements was significantly associated with an increased risk of anemia. Therefore, promoting a diverse diet among pregnant women, providing counseling on the benefits of iron-folic acid supplements, and improving women's education and empowerment is essential (Nasir et al., 2024).

Measurement of the circumference of the middle upper arm. The measurement of the circumference of the middle upper arm is an average of three measurements to the nearest centimeter using a non-elastic flexible band. This measurement is taken midway between the end of the shoulder (acromionic process) and the elbow end (olecranon process) of the left arm that hangs freely (Kuma et al., 2021). Anemia in pregnant women was found to be significantly

related to high dietary diversity, upper arm circumference (LILA) nutrition measurement (LILA) <23 cm. Anemia in pregnant women was found to be a moderate-level public health problem at the study site (30.9%) according to the WHO threshold value for public health significance. Nutritional status is significantly associated with anemia during pregnancy; pregnant women with an upper arm circumference of less than 23 cm had a 4.939 times higher chance of developing anemia compared to pregnant women with a LiLA greater than or equal to 23 cm (Nasir et al., 2024).

Pregnant women with LILA measurements of <23 cm were five times more likely to develop anemia than their peers (OR = 5.0, 95% CI: 2.14–12.7). This is in line with the results of LILA measurements below 23 cm can be an indicator of malnutrition, which is the most common cause of anemia. In addition, it can be attributed to the adverse impact of protein and other macronutrient deficiencies on the bioavailability and storage of iron and other hematopoietic nutrients as routine interventions from WHO and nutrition management guidelines with standards (Dufera et al., 2024).

Measurement Anthropometry of the middle upper arm circumference (LILA), is a cost-effective and clinically accessible indirect indicator of body composition. LILA measurement to obtain an area Muscle arms. The use of these indices as a reference to the standard thresholds, or percentiles, developed in healthy cohort validation studies can be used to indicate malnutrition. Our study aims to improve our understanding of the role of LILA anthropometric measurements in assessing nutritional status and identifying malnutrition in patients (Roscoe, Allen, & Mcdermott, 2025).

Prevalence maternal malnutrition is very high by WHO standards, and low monthly average household incomes, women's education levels, poor nutritional attitudes, and inadequate dietary diversity scores are associated with malnutrition. Therefore, policies and programs aimed at reducing maternal malnutrition are urgently needed. Socioeconomic strengthening and nutritional counseling during pregnancy are also recommended to improve nutritional status.(Demisew, Gemede, & Ayele, 2024).

The results of the study with the prevalence and determinants of malnutrition among pregnant women. Of the pregnant women, 74 (22.2%) experienced malnutrition with substandard LILA and 260 (77.8%) had normal LILA. In bivariate analysis, average monthly household income, education level of pregnant women, level of education of husbands, employment of pregnant women, employment of husbands, nutritional knowledge and attitudes, and diversity of foods were associated with malnutrition. However, in multivariate regression analysis, only average monthly household income, education level, nutritional attitudes, and outcomes were significantly associated with malnutrition during pregnancy. Pregnant women who earn below average are more likely to be malnourished than those who earn above the set standard. In addition, pregnant women who do not have Good attitudes towards nutrition are more likely to be malnourished than those with a college education level or above (Demisew et al., 2024).

The results of the binary analysis test of the variable logistics that were candidates for multivariate analysis at the beginning produced a probability value smaller than 0.05 ($p<0.05$) consisting of arm circumference ($p=0.039$) and nutritional status ($p=0.011$). Then the initial and final models of multivariate analysis with the same results. The arm circumference of the SEZ with a value of $p=0.039$ ($p<0.05$) with the value of exp(B) = 0.56 (0.32 – 0.97) means that

the arm circumference of the SEZ is likely to be anemia 0.56 to the prevalence of anemia compared to non-SEZ respondents. Risky nutritional status with a probability value of less than 0.05 with a value of p=0.011 with an exp(B) value = 1.76 (1.14 – 2.72) means that respinden with a nutritional status at risk has a possible prevalence of anemia in pregnant women of 1.76 times.

CONCLUSION

The prevalence of anemia among pregnant women at UPT Puskesmas Singkawang Tengah II in Singkawang City remains high at 39.6%, with mid-upper arm circumference (SEZ) and at-risk nutritional status emerging as the dominant social determinants of health influencing this condition. Bivariate analyses also revealed significant associations with occupation and body mass index (BMI), while parity and age showed no meaningful relationships. These results underscore the critical need for early pregnancy monitoring of nutritional status and SEZ, alongside routine ANC screening and balanced nutrition interventions, to mitigate anemia risks and promote healthy mothers, safe deliveries, and thriving babies. For future research, longitudinal studies could explore the long-term impacts of targeted nutrition programs on maternal and fetal outcomes in similar Indonesian health center settings, incorporating additional socioeconomic factors like household income and access to fortified foods.

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