

Factors Associated With Anemia In Pregnant Women At Banjarsari Public Health Center, Sukatani District, Bekasi Regency

Diana Novriani¹, Sri Kustiyati²

^{1,2} Universitas Aisyiyah

Corresponding Author:

diananovriani3@gmail.com

ARTICLE HISTORY

Received [31 July 2026]

Revised [11 September 2026]

Accepted [14 September 2026]

Keywords :

Anemia, Pregnant Women, Knowledge.

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ABSTRACT

Anemia in pregnant women is a public health problem with a relatively high prevalence both globally and nationally. The prevalence of anemia in pregnant women is 37% globally, 26.0% in Indonesia, 23.09% in West Java Province, and 26.4% in Bekasi Regency. Anemia in pregnancy is caused by various factors, including maternal characteristics and knowledge, which impact the health of both mother and fetus. The objectives of the research; To determine is a relationship between age, education, parity, pregnancy spacing, occupation, nutritional status and knowledge of pregnant women with the incidence of anemia in pregnant women at the Banjarsari Community Health Center, Sukatani District, Bekasi Regency. This research is quantitative, using an observational analytical design using a cross-sectional approach. The sample size was 50 people, using a simple random sampling technique. The statistical test used was the chi-square test. Result; There is a significant relationship between age (p-value 0.004), education (p-value 0.000), parity (p-value 0.006), pregnancy spacing (p-value 0.000), occupation (p-value 0.000), nutritional status (p-value 0.000) and knowledge (p-value 0.000) with the incidence of anemia in pregnant women at the Banjarsari Community Health Center, Sukatani District, Bekasi Regency. There is a relationship between age, education, parity, pregnancy spacing, occupation, nutritional status and knowledge of pregnant women with the incidence of anemia in pregnant women at the Banjarsari Community Health Center, Sukatani District, Bekasi Regency

INTRODUCTION

Data from the West Java Provincial Health Office showed that the prevalence of anemia among pregnant women was approximately 39.05% in 2023 and decreased to 23.09% in 2024 (West Java Provincial Health Office, 2024). Based on data from the Bekasi Regency Health Office, the prevalence of anemia among pregnant women was recorded at 50.05% in 2023 and declined significantly to 26.4% in 2024 (Bekasi Regency Health Office, 2024). According to the 2025 annual report of Banjarsari Public Health Center, Sukatani District, Bekasi Regency, 89.06% of pregnant women received maternal health services, from a target population of 457 pregnant women. A document review conducted at the Obstetrics Clinic of Banjarsari Public Health Center identified 73 pregnant women with hemoglobin levels below 11 g/dL between January and December 2025.

Anemia during pregnancy has adverse effects on both maternal and fetal health, including an increased risk of abortion or miscarriage, premature delivery, impaired intrauterine fetal growth, cardiac decompensation, anxiety, and depression caused by reduced energy levels and difficulty performing daily activities (Ahla & Wijhati, 2025). Anemia among pregnant women is influenced by several maternal characteristics. Women younger than 20 years or older than 35 years are at greater risk because of reproductive organ immaturity or declining reproductive function. In addition, higher levels of education and adequate knowledge can help pregnant women prevent anemia. Physical factors, such as the number of children, closely spaced pregnancies of less than 24 months, and a heavy workload, may also deplete the body's iron reserves. Furthermore, inadequate intake of nutrients such as iron, folic acid, and protein may interfere with optimal hemoglobin formation (Ardela et al., 2023). A preliminary study conducted at Banjarsari Public Health Center through interviews with 10 pregnant women found that six of them had mild anemia, with hemoglobin levels below 11 g/dL, based on records in their Maternal and Child Health handbooks. Most pregnant women with mild anemia were unaware of the effects of anemia on themselves and their fetuses. Their management efforts were limited to consuming iron tablets provided by Banjarsari Public Health Center, without additional intake of foods containing iron and vitamin C, which could support iron absorption. A review of the women's medical records showed that, among the six pregnant women with anemia, two were older than 35 years, three had completed only junior high school, and one was a primigravida younger than 20 years. The occurrence of anemia among pregnant women is influenced by various risk factors. Previous studies have identified several significant factors, including maternal age with a p-value of 0.018 (Sarkosi et al., 2024), educational level with a p-value of 0.040 ($p \leq 0.05$) (Jannah et al., 2025), number of children or parity with a p-value of 0.005 (Handayani et al., 2024), and pregnancy interval with a p-value of 0.031 ($p < 0.05$) (Ardela et al., 2023). Employment status, with a p-value of 0.030 (Sulung et al., 2022), nutritional status, with a p-value of 0.018 (Sarkosi et al., 2024), and knowledge

level, with a p-value of 0.003 (Jasmiati et al., 2025), have also been shown to be significantly associated with anemia among pregnant women.

Maternal characteristics and knowledge related to anemia have not previously been investigated at Banjarsari Public Health Center. Moreover, previous studies have generally relied on secondary data obtained from medical records, which may be prone to bias because pregnant women's hemoglobin levels can change at any time. To address this limitation, the present study uses primary data collected through direct hemoglobin testing using a digital point-of-care testing device to obtain more current and accurate measurements.

RESEARCH METHODS

Univariate Analysis

Univariate analysis is a statistical technique used to analyze each variable independently, without examining its relationship with other variables. It is also commonly referred to as descriptive analysis or descriptive statistics and aims to describe the characteristics of the phenomenon being investigated (Adiputra et al., 2021). In this study, univariate analysis was used to determine the frequency distribution and percentage of respondent characteristics and research variables.

Bivariate Analysis

Bivariate analysis is used to examine a significant relationship between two variables or to determine whether significant differences exist between two or more groups (Adiputra et al., 2021). In this study, bivariate analysis was conducted to examine the relationship between the independent variables and the dependent variable. The analysis employed the chi-square test at a 95% confidence level, with a significance level of $\alpha = 0.05$. The results were interpreted as follows:

- If the p-value was ≤ 0.05 , H_a was accepted, indicating a significant relationship between the independent variable and the dependent variable.
- If the p-value was > 0.05 , H_a was rejected, indicating no significant relationship between the independent variable and the dependent variable (Sembiring et al., 2024).

RESULTS

Results of Bivariate Analysis

Table 1. Relationship Between Maternal Age and the Incidence of Anemia Among Pregnant Women

Maternal Age	Anemic		Non-anemic		p-value
	f	%	f	%	
At risk (<20 years and >35 years)	17	34.0	6	12.0	0.010
Not at risk (20–35 years)	9	18.0	18	36.0	
Total	26	52.0	24	48.0	

Source: Primary Data

Table 2. Relationship Between Parity and the Incidence of Anemia Among Pregnant Women

Parity	Anemic		Non-anemic		p-value
	f	%	f	%	
At risk (grand multiparity)	11	22.0	2	4.0	0.016
Not at risk (multiparity)	15	30.0	22	44.0	
Total	26	52.0	24	48.0	

Source: Primary Data

Table 3. Relationship Between Pregnancy Interval and the Incidence of Anemia Among Pregnant Women

Pregnancy Interval	Anemic		Non-anemic		p-value
	f	%	f	%	
At risk (<24 months)	17	34.0	3	6.0	0.000
Not at risk (≥ 24 months)	9	18.0	21	42.0	
Total	26	52.0	24	48.0	

Source: Primary Data

Table 4. Relationship Between Employment Status and the Incidence of Anemia Among Pregnant Women

Employment Status	Anemic		Non-anemic		p-value
	f	%	f	%	
Employed	15	30.0	2	4.0	0.001
Unemployed/housewife	11	22.0	22	44.0	
Total	26	52.0	24	48.0	

Source: Primary Data

Table 5. Relationship Between Knowledge Level and the Incidence of Anemia Among Pregnant Women

Knowledge Level	Anemic		Non-anemic		p-value
	f	%	f	%	
Poor	12	24.0	2	4.0	0.000
Moderate	12	24.0	9	18.0	
Good	2	4.0	13	26.0	
Total	26	52.0	24	48.0	

Source: Primary Data

DISCUSSION

Relationship Between Maternal Age and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between maternal age and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.010. Most pregnant women in the high-risk age group, namely those aged younger than 20 years or older than 35 years, were anemic, accounting for 17 respondents (34.0%). In contrast, most pregnant women in the non-risk age group of 20–35 years were not anemic, accounting for 18 respondents (36.0%).

According to Wahyuningsih et al. (2024), pregnant women who are younger than 20 years may not be physiologically prepared to provide the conditions required for optimal fetal growth. At a very young age, competition may occur between the nutritional requirements of the fetus and those of the mother, who may still be undergoing physical growth and hormonal development. Meanwhile, pregnant women older than 30 years are more likely to experience anemia because of the gradual depletion of iron reserves resulting from previous reproductive processes (Wahyuningsih et al., 2024).

These findings are consistent with the study conducted by Sari et al. (2022), which identified a significant relationship between maternal age and the incidence of anemia among pregnant women in the working area of Seputih Banyak Public Health Center, Central Lampung Regency, with a p-value of 0.012 (Sari et al., 2022). The findings are also supported by Susanti et al. (2025), who reported a significant relationship between maternal age and anemia among pregnant women at Darul Azhar Public Health Center, with a p-value of 0.000. Of the 72 pregnant women included in their study, 32 were in the high-risk age category, and 29 of them (90.6%) experienced anemia (Susanti et al., 2025). Similarly, Wahyuningsih et al. (2024) found a significant relationship between maternal age and anemia among pregnant women in the working area of Karangjambu Public Health Center, Purbalingga Regency, with a p-value of 0.015.

The researcher is of the view that pregnant women younger than 20 years are biologically at risk because their reproductive organs may not yet be fully developed. Their emotional condition may also be relatively unstable, making them more vulnerable to psychological distress and less attentive to fulfilling their nutritional requirements during pregnancy. Pregnant women aged 35 years or older are also at risk of anemia because of reduced immune function, declining organ function, and the increased likelihood of health problems at this age. These conditions may interfere with nutritional intake and nutrient absorption.

Relationship Between Educational Level and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between educational level and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.000. Most pregnant women with a low level of education, comprising elementary and junior high school graduates, were anemic, accounting for 17 respondents (34.0%). Among pregnant women with a secondary level of education, comprising senior high school, vocational high school, and Islamic senior high school graduates, the majority were not anemic, accounting for 13 respondents (26.0%).

Similarly, most pregnant women with higher education, comprising diploma and bachelor's degree graduates, were not anemic, accounting for nine respondents (18.0%).

According to Wahyuningsih et al. (2024), education is a process of behavioral change directed toward maturity and an improved quality of life. Pregnant women with a higher level of education are generally better able to maintain a balanced dietary pattern. When their dietary intake is appropriate, their nutritional requirements are more likely to be fulfilled, thereby reducing the risk of anemia during pregnancy. Conversely, when pregnant women are unable to select appropriate foods to support fetal growth and development, anemia and other pregnancy complications may occur (Wahyuningsih et al., 2024).

These findings are supported by Ariani et al. (2023), who identified a significant relationship between educational level and anemia among pregnant women at the Syafyeni Specialist Clinic in Curug, Tangerang, with a p-value of 0.001 ($p < 0.05$). Jannah et al. (2025) also found a relationship between a low educational level and the incidence of anemia among pregnant women, with a p-value of 0.040. Similarly, Putri et al. (2025) reported a significant relationship between educational level and anemia among third-trimester pregnant women at Talang Bakung Public Health Center, with a p-value of 0.001. Handayani et al. (2025) also identified a significant relationship between education and anemia among pregnant women at Muhammadiyah Hospital Palembang during 2023–2024, with a p-value of 0.000.

The researcher believes that education influences an individual's ability to make decisions regarding health-related actions. Pregnant women with a higher level of education tend to be more receptive to advice and new information, which may increase their knowledge. Adequate knowledge can encourage positive behavior related to meeting nutritional requirements during pregnancy. The higher the formal educational level of pregnant women, the greater their expected level of health literacy. Health education is an important intervention, particularly in improving health-related behavior. Through higher education, pregnant women are more likely to understand how to maintain their health and prevent factors that could adversely affect their condition during pregnancy.

Relationship Between Parity and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between parity and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.016. Frequent pregnancies and childbirth may increase the risk of complications during pregnancy and delivery, including anemia. The more frequently a woman becomes pregnant and gives birth, the greater the amount of iron lost from her body. When the body's iron reserves are already limited, each subsequent pregnancy may further deplete these reserves and eventually lead to anemia (Wahyuningsih et al., 2024).

These findings are supported by Ariani et al. (2023), who identified a significant relationship between parity and anemia among pregnant women at the Syafyeni Specialist Clinic in Curug, Tangerang, with a p-value of 0.000 ($p < 0.05$). The results are also consistent with those of Susanti et al. (2025), who reported a significant relationship between parity and anemia among pregnant women at Darul Azhar Public Health Center, with a p-value of 0.002. Of the 38 respondents with high-risk parity, 30 respondents (78.9%) experienced anemia.

The researcher believes that parity is associated with the incidence of anemia among pregnant women. High-risk parity, particularly grand multiparity, may increase the likelihood of complications during pregnancy and childbirth. The findings showed that most pregnant women with high-risk parity or grand multiparity were anemic, accounting for 11 respondents (22.0%). In contrast, most multiparous women were not anemic, accounting for 22 respondents (44.0%).

Repeated pregnancies and deliveries may damage blood vessels and the vascular structures of the uterine wall as a consequence of previous childbirth. This condition may reduce blood flow to the placenta and interfere with the circulation of nutrients to the fetus. The more frequently a woman gives birth, the greater her risk of blood loss, which may reduce hemoglobin levels and cause anemia during pregnancy.

Relationship Between Pregnancy Interval and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between pregnancy interval and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.000. Most pregnant women with a high-risk pregnancy interval of less than 24 months were anemic, accounting for 17 respondents (34.0%). In contrast, most pregnant women with a non-risk pregnancy interval of 24 months or longer were not anemic, accounting for 21 respondents (42.0%).

Pregnancy interval refers to the length of time between two consecutive pregnancies. An excessively short pregnancy interval may directly affect both maternal and fetal health. Women who become pregnant again within less than 24 months after their previous delivery are at an increased risk of developing anemia (Andriani et al., 2023).

These findings are supported by Nurhikma et al. (2025), who reported a significant relationship between pregnancy interval and anemia in the working area of Pontap Public Health Center, Palopo City, in 2025, with a p-value of 0.001. Ardela et al. (2023) also found a significant relationship between pregnancy interval and anemia prevention at Putri Ayu Public Health Center, Jambi City, with a p-value of 0.031 ($p < 0.05$).

The researcher believes that an excessively short pregnancy interval, particularly one of less than two years, may adversely affect maternal nutritional and health status and subsequently increase the risk of anemia during pregnancy. This condition occurs because the mother's iron and nutritional reserves may not have fully recovered from the previous pregnancy. A short interval between two pregnancies does not provide sufficient time for the mother's physiological condition, nutritional status, and hemoglobin levels to return to normal. Therefore, the shorter the pregnancy interval, the greater the risk of anemia.

Relationship Between Employment Status and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between employment status and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.001. Most employed pregnant women were anemic, accounting for 15 respondents (30.0%). In contrast, most unemployed pregnant women or housewives were not anemic, accounting for 22 respondents (44.0%).

Wahyuningsih et al. (2024) explain that working women are those who perform activities outside the home to earn an income and support their families. Employment may also serve as a form of self-actualization, allowing women to apply their knowledge and skills and establish social relationships with others in their chosen field of work.

These findings are supported by Ariani et al. (2023), who identified a significant relationship between employment status and anemia among pregnant women at the Syafyeni Specialist Clinic in Curug, Tangerang, with a p-value of 0.001 ($p < 0.05$). Sulung et al. (2022) also reported a significant relationship between employment and anemia among pregnant women, with a p-value of 0.030. Similarly, Azizah et al. (2023) found a significant relationship between maternal employment status and anemia among pregnant women at Wisma Indah Public Health Center, Bojonegoro, in 2022, with a p-value of 0.000.

The researcher believes that employment status is associated with anemia among pregnant women. Excessive workloads and demanding occupational responsibilities may cause extreme fatigue and stress. Workload may also reduce the amount of time available for rest and affect maternal dietary patterns. An unbalanced diet may result in inadequate nutritional intake, including iron deficiency, which can eventually lead to anemia.

Relationship Between Nutritional Status and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between nutritional status and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.000. Most pregnant women with chronic energy deficiency were anemic, accounting for 19 respondents (38.0%). In contrast, most pregnant women without chronic energy deficiency were not anemic, accounting for 21 respondents (42.0%).

According to Wahyuningsih et al. (2024), nutritional status reflects the overall health condition of pregnant women. Pregnant women with chronic energy deficiency may experience relative or absolute health impairments. Nutritional requirements increase during pregnancy compared with the non-pregnant period. Inadequate nutritional intake may cause maternal anemia and reduce the supply of blood carrying oxygen and nutrients to the fetus, thereby interfering with fetal growth and development.

These findings are supported by Ariani et al. (2023), who identified a significant relationship between nutritional status and anemia among pregnant women at the Syafyeni Specialist Clinic in Curug, Tangerang, with a p-value of 0.001 ($p < 0.05$). Wahyuningsih et al. (2024) also reported a significant relationship between nutritional status and anemia among pregnant women in the working area of Karangjambu Public Health Center, Purbalingga Regency, in 2024, with a p-value of 0.000. In addition, Mutoharoh and Indarjo (2024) found a significant relationship between mid-upper arm circumference and anemia among pregnant women in the working area of Grabag II Public Health

Center, with a p-value of 0.008 ($p < 0.05$). The researcher believes that deficiencies in certain nutrients may cause anemia during pregnancy. Anemia reduces the blood's capacity to carry oxygen and nutrients to the fetus, which may subsequently interfere with fetal growth and development. During pregnancy, nutritional requirements must meet the needs of both the mother and the developing fetus. When these requirements are not adequately fulfilled, nutritional problems may occur.

One of the most common nutritional problems among pregnant women is chronic energy deficiency. This condition may impair the body's ability to produce hemoglobin optimally. Hemoglobin is the principal component of red blood cells responsible for binding and transporting oxygen. Low hemoglobin levels consequently result in anemia during pregnancy.

Relationship Between Knowledge Level and the Incidence of Anemia Among Pregnant Women

The results showed a significant relationship between knowledge level and the incidence of anemia among pregnant women at Banjarsari Public Health Center, with a p-value of 0.000. Most pregnant women with poor knowledge were anemic, accounting for 12 respondents (24.0%). Similarly, most pregnant women with a moderate level of knowledge were anemic, accounting for 12 respondents (24.0%). In contrast, most pregnant women with good knowledge were not anemic, accounting for 13 respondents (26.0%).

Knowledge is one of the factors that contribute to the development of health-related behavior. Pregnant women who understand the consequences of anemia and appropriate preventive measures are more likely to adopt positive health behaviors. These behaviors are expected to protect them from the adverse effects and risks associated with anemia during pregnancy (Jasmiati et al., 2025).

These findings are supported by Riza (2023), who identified a significant relationship between knowledge of anemia and the incidence of anemia during pregnancy in Gampong Ceurih, Ulee Kareng District, Banda Aceh, with a p-value of 0.002. A study conducted by Siregar et al. (2024) in the working area of Batunadua Public Health Center in 2023 also found a significant relationship between knowledge and anemia during pregnancy, with a p-value of 0.001, which was lower than the significance level of 0.05. Similarly, Agustin et al. (2024) reported a significant relationship between maternal knowledge and anemia in the working area of Sungai Selan Public Health Center, Central Bangka Regency, with a p-value of 0.037. The researcher believes that adequate knowledge enables pregnant women to recognize the causes, signs, consequences, and preventive measures related to anemia. Pregnant women with good knowledge are more likely to consume nutritious foods, take iron supplements as recommended, attend regular antenatal examinations, and seek healthcare services when symptoms occur. Conversely, limited knowledge may lead to inappropriate dietary practices, poor adherence to iron supplementation, and delayed recognition of anemia. Therefore, improving maternal knowledge through continuous health education is essential to reducing the incidence of anemia during pregnancy.

CONCLUSIONS AND RECOMMENDATIONS

Most pregnant women at Banjarsari Public Health Center were in the non-risk age group of 20–35 years, accounting for 27 respondents (54.0%). Most had a secondary level of education, comprising senior high school, vocational high school, or Islamic senior high school graduates, accounting for 20 respondents (40.0%). Most respondents had non-risk parity, accounting for 37 respondents (74.0%), and a non-risk pregnancy interval of 24 months or longer, accounting for 30 respondents (60.0%). Most respondents were unemployed or housewives, accounting for 33 respondents (66.0%). In terms of nutritional status, 28 respondents (56.0%) did not experience chronic energy deficiency, as indicated by a mid-upper arm circumference of ≥ 23.5 cm. Furthermore, most respondents had a moderate level of knowledge, accounting for 21 respondents (42.0%).

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