



## Research article



# Factors Linked to the Development of Anemia in Pregnant Mothers

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### Abstract

Anemia in pregnancy has a high prevalence. This study aims to determine the factors associated with the incidence of anemia in pregnant women at the Klungkung I Community Health Center Regional Technical Implementation Unit. This research uses quantitative methods with a cross-sectional approach. Respondents in this study totaled 36 respondents. The research instrument used a questionnaire and an ANC register book. The data analysis used was univariate and statistical analysis with a significance level of  $p < 0.05$ . The results of the analysis and univariate analysis were pregnant women with healthy reproduction (69.4%), high education (63.9%), parity of multiparous mothers (77.8%), high economic status (69.4%), frequency of compliance with visits ANC (66.7%), compliance with Fe tablet consumption (69.4%). Bivariate analysis results using the Fisher-exact test on the characteristics of age (0.02), education (0.03), parity (0.01), economic status (0.02), frequency of ANC visits (0.01), and consumption compliance of Fe tablets (0.01). Pregnant women are expected to make ANC visits and consume Fe tablets according to standards so that the health of the mother and fetus remains healthy. Health workers are expected to implement standards for the frequency of ANC visits according to standards and increase education for pregnant women.

## INTRODUCTION

Antenatal care (ANC) includes early identification of disorders associated with pregnancy, early detection of pregnancy problems, and assessment of the mother's overall health during pregnancy [1]. Pregnancy-related anemia is one of the issues that is frequently mentioned as happening during ANC. A disorder known as anemia occurs when there are insufficient red blood cells with hemoglobin, which is necessary for all bodily tissues to get oxygen [2]. Anemia is a common health issue that

affects many people, particularly pregnant and childbearing women. Acute bleeding, folic acid deficiency, and iron deficiency are the three most common causes of anemia during pregnancy [3]. Because anemia is still very common in pregnant women, it is also referred to as a "potential risk for mother and child" [4]. As such, anemia needs to be taken seriously by all medical providers.

According to data from the World Health Organization (WHO), the prevalence of anemia in pregnant women increased with

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increasing gestational age in 2019 and was estimated to be between 35-75% [5]. 48.9% of Indonesian pregnant women had anemia, according to data from the 2018 Basic Health Research (Riskesmas). This figure is higher than the 37.1% reported in the 2013 Riskesmas data. Approximately 84.6% of anemia cases in expectant mothers are found in the 15–24 age range. In Bali Province, the incidence of anemia was 5.07% in 2019 and increased to 5.78% in 2020 [6]. According to Klungkung Regency's health profile statistics from 2021, 4.65% of pregnant women in Klungkung had anemia.

Abortion may have an effect on anemic pregnant women. According to research by Rosadi et al. (2019), 65.2% of pregnant women with anemia had an abortion. This suggests a correlation between pregnant women with anemia and the prevalence of abortion. Anemia during pregnancy may cause first-stage labor to last longer or longer [7]. According to Khairunnisa et al.'s (2019) findings, moms who gave birth when anemic had a prolonged first stage, lasting up to 68.4% [8]. Another factor contributing to postpartum bleeding is anemia. Postpartum hemorrhage affects 77.8% of pregnant women with anemia, according to research by Satriyandari and Hariyati (2017) [9]. Postpartum hemorrhage is 6.33 times more likely to occur in mothers who are anemic during pregnancy [10]. The fetus that pregnant women carry is also affected by anemia. Intrauterine growth retardation (IUGR), preterm birth, low birth weight (LBW), and a higher chance of neonatal mortality are the effects [11].

The novelty of this study lies in its focus on factors related to the incidence of anemia in pregnant women. Although anemia in pregnant women has become a concern in the health field, research examining specific factors that influence the incidence of anemia is still developing. By identifying and analyzing factors that contribute to anemia in pregnant women, this study can provide new insights and a deeper

understanding of the causes and mechanisms of anemia in this population.

The urgency of this research lies in the serious impact of anemia in pregnant women, both for the health of the mother and the development of the fetus she is carrying. Anemia in pregnant women can increase the risk of pregnancy complications, premature birth, low birth weight, and increase the risk of maternal and neonatal death. Therefore, research that strengthens the understanding of the factors that contribute to the incidence of anemia in pregnant women is very important in efforts to prevent and overcome this anemia, so that it can reduce the risk of complications and improve the health of pregnant women and their babies.

Data on visits by pregnant women to the Klungkung I Health Center in 2021 was 486 people. Pregnant women with high risk were 325 people, and pregnant women with anemia were 27 people (8.30%). Meanwhile, in 2022, the number of pregnant women with high risk was 367 people with 495 visits per year and pregnant women with anemia were 62 people (16.34%). The data shows an increase in pregnant women with anemia from 2021 to 2022 by 8.04%. A preliminary study conducted by researchers on September 14 on seven pregnant women with anemia said that two people did not know the benefits of consuming Fe tablets, three people said they often forgot to take Fe tablets, and two people forgot because they were taking care of their children. Based on these data, researchers are interested in finding out more about the factors related to the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit.

## METHODS

This study uses a quantitative method with a cross-sectional approach, with data collection using a survey method.

The population of the study was all pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. The sample of this study was all pregnant women who visited the Klungkung I Health Center Regional Technical Implementation Unit in 2024, namely 36 respondents who met the inclusion and exclusion criteria with the calculation of the sample size determined using the Lemeshow formula.

The types of data collected in this study are primary data and secondary data. Primary data is data obtained directly through interviews with pregnant women including economic status, compliance with consuming Fe tablets. While secondary data is data taken from recording the ANC visit register at the UPTD. Klungkung I Health Center in 2024 including age, education, parity and frequency of ANC. The primary data collection method is carried out by filling out a questionnaire by respondents. Primary data collection is carried out by providing questionnaires to pregnant women with anemia, which are filled out directly by pregnant women during visits to health facilities. The research instruments used are laboratory test results (Hb) and closed questionnaires. Laboratory results (Hb) are obtained from checking the ANC visit book of pregnant women or from the KIA book.

The data collection stage begins with conveying the research objectives, explaining the procedures and providing informed consent stating that respondents are willing to do the research. The researcher then handed over the questionnaire and directed how to fill out the questionnaire to the respondent. Data processing was carried out through the editing and coding stages for all research variables, followed by data entry, processing, and cleaning. Further data analysis was carried out using univariate and bivariate analysis.

Univariate analysis is a data analysis technique for one variable independently. The variables to be analyzed univariately are age, education, parity, economic status, frequency of ANC, and compliance with consumption of Fe tablets in mothers. Bivariate analysis is used to determine factors related to the incidence of anemia. In this study, bivariate analysis was conducted on each independent variable against the dependent variable. All variables tested are categorical, so the analysis used is the Chi Square ( $\chi^2$ ) statistical test with  $\alpha = 0.05$ . If the test results show  $p \leq 0.05$  then the relationship between variables is meaningful (significant), if the test results show  $p > 0.05$  then there is no relationship between variables. If the Chi Square test requirements are not met, then other alternative tests can be used with the alternative Chi Square test for the 2 x 2 table being the Fisher Exact test [12]. In this study, after being analyzed using chi-square, it was found that the requirements for using Chi Square in the table above were not met, because there was 1 cell that had an expected count  $<5$  and  $>20\%$ , so the alternative test that could be used was the Fisher Exact test.

## RESULTS

The results of table 1 above, from 36 respondents, it was found that most pregnant women 69.4% were in healthy reproduction. At the level of maternal education, most were high 63.9%. The parity of mothers was mostly multiparous 77.8%. The level of economic status of mothers was mostly high 69.4%. Compliance with the consumption of Fe tablets by pregnant women was mostly non-compliant 69.4%. From 36 respondents, showed that the majority of pregnant women had anemia, namely 21 respondents (58.3%).

Table 1.  
Frequency Distribution of Pregnant Women's Characteristics Based on Age, Education, Parity, Economic Status, ANC Frequency, Compliance with Consumption of Fe Tablets, Anemia incident

Indicators	f	%
<i>Age</i>		
Unhealthy reproduction	11	30,6
Healthy reproduction	25	69,4
<i>Education</i>		
Low	13	36,1
High	23	63,9
<i>Parity</i>		
Primipara	8	22,2
Multipara	28	77,8
<i>Economic status</i>		
High	25	30,6
Low	11	69,4
<i>ANC frequency</i>		
Obeey	24	66,7
Not obeey	12	33,3
<i>Compliance with FE Tablet Consumption</i>		
Obeey	11	30,6
Not obeey	25	69,4
<i>Anemia incident</i>		
Anemia	21	58,3
Not Anemia	15	41,7
Total	36	100

The results of table 2 show that pregnant women with unhealthy reproduction, most of which are 72.7% of pregnant women, are not anemic, while those with healthy reproduction, most of which are 72% of pregnant women, are anemic.

The results of the bivariate analysis using the Fisher-Exact test obtained a p value of 0.02. Because the p value  $< \alpha$  (0.05), H<sub>0</sub> is rejected. This means that there is a relationship between maternal age and the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with unhealthy reproduction aged  $< 20$  years and  $> 35$  years have a 0.025 times risk of experiencing anemia compared to healthy reproduction aged 20-35 years (OR 0.025 95% CI 0.030-0.714). Pregnant women with low education are mostly 84.6% pregnant women with anemia, while pregnant women with high education are mostly 56.5% without anemia.

The results of the bivariate analysis using the Fisher-Exact test obtained a p value = 0.03. Because the p value  $< \alpha$  (0.05), H<sub>0</sub> is rejected. This means that there is a relationship between education and the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with low education have a 7.150 times risk of experiencing anemia compared to mothers with high education (OR 7.150 95% CI 1.284-39.8270).

Most multiparous pregnant women, namely 46.4%, did not have anemia, while all primiparous pregnant women, namely 100%, had anemia. The results of the bivariate analysis using the Fisher-Exact test and obtained a p value = 0.01 because the p value  $< \alpha$  (0.05), then H<sub>0</sub> was rejected. This means that there is a relationship between parity and the incidence of anemia in pregnant women in the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with multiparous parity have a 2.154 times risk of experiencing anemia compared to primiparous parity (OR 2.154 95% CI 1.447-3.206).

Pregnant women with low economic status were found that most of them, namely 27.3%, did not have anemia. While pregnant women with high economic status were found that most of them, namely 72.0%, had anemia.

The results of the bivariate analysis using the Fisher-Exact test and obtained a p value = 0.02. Because the p value  $< \alpha$  (0.05), then H<sub>0</sub> is rejected. This means that there is a relationship between economic status and the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with low economic status have a 6.857 times risk of experiencing anemia compared to women with high economic status (OR 6.857 95% CI 1.401-33.570).

Pregnant women who were not compliant in making ANC visits were mostly 75.0% without anemia, while pregnant women who were compliant in making ANC visits were mostly 75.0% with anemia.

The results of the bivariate analysis using the Fisher-Exact test and obtained a p value = 0.01 because the p value  $< \alpha$  (0.05), then  $H_0$  was rejected. This means that there is a relationship between parity and the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with non-compliant ANC frequencies have a 9,000 times risk of experiencing anemia compared to compliant mothers' ANC frequencies (OR 9,000 95% CI 1.817-44.591).

Pregnant women who were not compliant in consuming Fe tablets, most of which were 56%, did not have anemia, while pregnant

women who were compliant in consuming Fe tablets, most of which were 90.9%, had anemia.

The results of the bivariate analysis using the Fisher-Exact test and obtained a p value = 0.01 because the p value  $< \alpha$  (0.05), then  $H_0$  was rejected. This means that there is a relationship between compliance with Fe tablet consumption and the incidence of anemia in pregnant women at the Klungkung I Health Center Regional Technical Implementation Unit. Pregnant women with non-compliant Fe tablet consumption have a 12.727 times risk of experiencing anemia compared to mothers who are compliant in consuming Fe tablets (OR 12.727 95% CI 1.407-115.105).

Table 2.

Relationship Between Maternal Age, Education, Parity, Economic status, ANC Frequency and Consumption of Fe Tablets With the Incidence of Anemia in Pregnant Women

Indicators	Incidence of Anemia				Total		p	OR	95% CI
	Anemia		No		f	%			
	f	%	f	%					
Age									
Unhealthy reproduction	3	27,3	8	72,7	11	100	0,02	0,025	0,030-0,714
Healthy reproduction	18	72,0	7	28,0	25	100			
Education									
Low	11	84,6	2	15,4	13	100	0,003	7,150	1,284-39,827
High	10	43,5	13	56,5	23	100			
Parity									
Multipara	13	46,4	5	53,3	28	100	0,01	2,154	1,447 - 3,206
Primipara	8	100	0	0,00	8	100			
Economic status									
Low	3	27,3	8	72,7	11	100	0,02	6,857	1,401 - 33,570
High	8	72,0	7	28,0	25	100			
ANC Frequency									
Not obey	3	25,0	9	75,0	12	100	0,01	9,000	1,817 - 44,591
Obey	18	75,0	6	25,0	24	100			
Consumption of Fe Tablets									
Not obey	11	44,0	4	56,0	25	100	0,01	12,727	1,407 - 115,105
Obey	10	90,9	1	9,1	11	100			
Total	21	58,3	15	41,7	36	100			



## DISCUSSIONS

According to the study's findings, moms between the ages of 20 and 35 are less likely than mothers under the age of 20 or above the age of 35 to suffer from anemia. backed up by Andini (2020), who claimed that women who are pregnant and between the ages of 20 and 35 are in a safe, healthy reproductive age range with a decreased risk of anemia [12]. Of the respondents who were pregnant, the majority had a high level of education—23 respondents, or 63.9%. Priyanti et al., (2020) stated that mothers who have completed more schooling have been shown to comprehend and implement advice more effectively, both in terms of knowledge and advantages [13]. Compared to primiparous moms, whose results were 8 (22.8%), maternal parity received results of multiparous parity 28 (77.8%). moms with multigravida parity are more prone to problems than moms with low parity, according to Fatkhiyah et al. (2020) [14]. The risk of anomalies or problems, including anemia, gestational hypertension, diabetes mellitus, improper position, placenta previa, placental abruption, and others, is higher in pregnant women with grandemultipara [15]. 25 individuals (69.4%) in the study were pregnant women with a high economic position, while 11 individuals (30.6%) had a low economic status. Pregnant women who come from low-income families are more likely to get anemia because they are unable to achieve their demands for nutrition throughout pregnancy. Nevertheless, the theory also asserts that in cases where an individual's economic standing is low but their level of knowledge is high, anemia will not develop because the respondent is aware of the kinds of food that are recommended for pregnant women and makes an effort to meet their nutritional needs based on their ability to pay [16].

The frequency of prenatal care visits (ANC) is crucial for expectant mothers. This study indicated that the majority of pregnant women, or 24 individuals (66.7%),

complied with ANC requirements, while 12 individuals (33.3%) did not. This is consistent with a study conducted in 2020 by Gazali et al., which demonstrated that anemia was common among pregnant women who did not comply with scheduling prenatal care visits, but not in those who did [17]. Additionally, Nurhaidah and Rostinah (2021) bolster the idea that routine prenatal treatment will lower the risk of anemia development in pregnant women [18]. The results of this study indicate that 25 respondents (69.4%) were mostly non-compliant with regard to their use of Fe pills, whereas 11 respondents (30.6%) were complying. Mothers in this study were not following through on their Fe tablet usage, and a number of respondents reported feeling queasy after taking Fe tablets. Anemia in mothers is caused by their ignorance of the advantages of taking their Fe tablets as prescribed [19].

According to this study's incidence of anemia in pregnant women, 21 respondents (58.3%) had anemia. On the other hand, 15 persons (41.7%) did not suffer from anemia. Pregnant women's anemia can be caused by a variety of circumstances, including using iron supplements, not going to ANC appointments, and consuming nutrition during pregnancy. Education regarding lowering the risk of anemia during pregnancy is therefore essential [19]. The study's findings demonstrated that 72.0% of pregnant women with anemia were of a healthy reproductive age. The findings of this investigation are consistent with the findings of a study by Dewi and Mardiana (2021), which found a correlation between the occurrence of anemia in pregnant women and a healthy reproductive age [20]. Similar results were also obtained in a study by Amini et al. (2018), which stated that there was a relationship between elderly people and anemia in the Puskesmas Ampenan work area, with a p-value of 0.017 [21].

According to research findings, mothers of hamil with a rendah pendidikan suffer from

anemia at a rate of 84.6%, while mothers of hamil with a tinggi pendidikan, or roughly 56.5%, do not suffer from anemia. This is related to research by Dewi and Mardiana (2021), which states that there is a relationship between educational attainment and anemia in older adults [20]. KNP and Setyawati (2018) also have similar findings that indicate a statistically significant relationship between the level of parental education and anemia in older children [22].

The study's findings demonstrated that whereas 100% of pregnant women who were primiparous suffered anemia, the majority of multiparous pregnant women—53.6%—did not. The findings of this study also support the findings of a study by Hidayati and Andyarini (2018), which found that pregnant women's parity had an impact on the incidence of anemia in the Kintamani Health Center work area ( $p = 0.044$ ) [23]. The findings of Sjahriani and Faridah's (2019) study, which found that there is no statistically significant correlation between parity and the incidence of anemia in pregnant women ( $p = 0.472$ ), are not consistent with the findings of this study [24]. High parity raises the risk of stillbirth and pre- and postpartum hemorrhage, among other pregnancy and delivery difficulties. Regular laborers run the danger of developing vascularization of the uterine wall and blood vessel damage, which can lower blood flow to the placenta and the fetus's availability of oxygen and nutrients. Anemia in subsequent pregnancies is more likely in people with a high pregnancy history [25].

The study's findings also demonstrated that the majority of pregnant women with low socioeconomic position (84.6%) experienced anemia, but the majority of pregnant women with high socioeconomic status (56.5%) did not. According to research by Septiasari (2019), there is a significant correlation ( $p = 0.005$ ) between the incidence of anemia in pregnant women and their income status [16]. The findings of

this investigation, however, conflict with those of Sugiarsih's (2013) study, which found no evidence linking pregnant women's hemoglobin levels to their economic situation [26]. The study's findings contradict the theory because, despite their low socioeconomic status, the respondents had good knowledge, which prevented anemia from developing because they were aware of the kinds of foods that pregnant women should eat and made an effort to meet their needs based on their ability to pay.

Additional research findings show that while the majority of pregnant women—18 respondents, or 75%—are compliance in scheduling ANC checks, moms nevertheless suffer from anemia. In contrast, the majority of pregnant women—9 respondents, or 75%—are not compliant in scheduling ANC visits and do not suffer from anemia. This is consistent with research by Gazali et al. (2020), which reports that Antenatal Care variables and the incidence of anemia in pregnant women are significantly correlated [17]. Antenatal care services refer to the information and actions that expectant mothers take in an attempt to keep their pregnancy healthy and to prevent disorders that affect both them and their unborn child throughout pregnancy and childbirth, such as anemia. Additionally, this study revealed that the majority of pregnant women did not have anemia when ingesting Fe tablets—14 respondents, or 56 percent—while the majority of pregnant women who did comply—10 respondents, or 90.9%—did experience anemia. This is consistent with the findings of Sari and Djannah's (2020) study, which found a  $p$ -value of 0.002 correlation between the incidence of anemia in pregnant women and compliance with taking Fe pills [27]. The lack of a connection between iron consumption and hemoglobin levels can be the result of respondents consuming a lot of iron-containing foods (such as green leafy vegetables) despite not frequently consuming iron to prevent anemia [26].

## CONCLUSSION

The conclusion of this study is that pregnant women in the Klungkung I Health Center Technical Implementation Unit mostly have a healthy reproductive age of 20-35 years (69.4%), most are highly educated (63.9%), most are multiparous parity (77.8%), most have high economic status (30.6%), most are compliant in doing ANC (66.8%), most mothers are not compliant in consuming Fe tablets (69.4%). Most pregnant women have anemia problems, and there is a relationship between the incidence of anemia in pregnant women and age, education, parity, economic status, frequency of ANC, and compliance with consuming Fe tablets.

Prevention of anemia in pregnant women must be encouraged by related health facility officers in order to support the health and safety of mothers and babies during pregnancy and childbirth. By knowing the factors that influence the incidence of anemia in pregnant women, it is hoped that mothers will be more vigilant and routinely conduct pregnancy visits according to standards to find out the health of the mother and fetus and to detect any diseases or abnormalities that accompany their pregnancy.

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