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## Hemoglobin Level Overview Using the Point of Care Test (POCT) Method For Pregnant Women

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Wakhdaniya Annisa Putri<sup>1</sup>, Dhita Yuniar Kristianingrum<sup>2</sup>, Imam Fatoni<sup>3</sup>, Inayatul Aini<sup>4</sup>, Siti Shofiyah<sup>5</sup>  
<sup>1,2,3,4,5</sup> ITSkes Insan Cendekia Medika, Jombang, Indonesia  
Email Corepondence author<sup>(K)</sup>: [aannisaputri01@gmail.com](mailto:aannisaputri01@gmail.com)

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### ABSTRACT

Anemia is a condition where the number of red blood cells or hemoglobin concentration is insufficient to meet the physiological needs of the body. Lack of knowledge about anemia has an influence on the health behavior of expectant mothers in preventing pregnancy anemia. This study aims to identify the hemoglobin levels of expectant mothers at Puskesmas Jatiwates Tembelang Jombang measured using the Point of Care Test (POCT) method. This study used descriptive research. The population of this study were all expectant mothers who checked ANC at Jatiwates Tembelang Jombang Health Center. The sample in this study was a total of 20 expectant mothers. This study uses total sampling technique. The variable in this study is hemoglobin levels with the Point of Care Test (POCT) method in expectant mothers. The method used is the Point of Care Test (POCT). The results of the examination of hemoglobin levels in expectant mothers are that some respondents have normal hemoglobin levels (50%), almost some respondents have low hemoglobin levels (35%), and few respondents have high hemoglobin levels (15%). The conclusion of this study is that half of the respondents have normal hemoglobin levels, almost half of the respondents have low hemoglobin levels and few respondents have high hemoglobin levels.

Keywords: Hemoglobin; Point of Care Test (POCT); Pregnant Women

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## INTRODUCTION

Hemoglobin is a hermetic protein that binds oxygen, carbon dioxide, and protons. Hemoglobin serves a complete function, namely as a protein that transports oxygen from the lungs to the entire body's tissues and as a red color in erythrocytes. Hemoglobin fulfills a very important function, so it is not surprising that if there is a decrease in hemoglobin levels in the blood below normal limits, the body's organs cannot function properly<sup>1</sup>. Hemoglobin (Hb) levels are the easiest parameter to use in determining a person's anemia status. Hemoglobin levels are affected by consuming foods that lack nutrients, excessive activity, or even worms. A decrease in hemoglobin levels in the blood will result in a decrease in oxygen supply to the body's organs, especially vital organs such as the brain and heart. If the Hb level is low, it is certain that a person will experience anemia<sup>2</sup>. Anemia is a condition in which the number of red blood cells or hemoglobin concentration does not meet the physiological needs of the body. The most common anemia encountered during pregnancy is iron deficiency anemia, caused by insufficient iron intake in the diet, impaired absorption, and increased iron deficiency<sup>3</sup>.

According to the WHO, the overall prevalence of anemia in women is 35%, while the global prevalence of anemia in pregnant women is 51%. Consequently, the incidence of anemia in pregnant women in Indonesia tends to increase. Based on the results of the Basic Health Research (Riskersdas) in 2013, the prevalence of anemia in pregnant women was 37.1%, increasing to 48.9% in 2018. The results of the 2018 Riskersdas also indicated that 84.6% of pregnant women aged less than 25 years experienced anemia and 57.6% of pregnant women aged more than or equal to 35 years experienced anemia<sup>4</sup>. Meanwhile, the average prevalence of anemia in East Java Province reached 5.8%. Based on the Jombang Regency Health Profile in 2018, the total number of pregnant women was 21,288 people, of which 18,287 pregnant women underwent hemoglobin examination. From the survey data, it was found that there were 3,853 pregnant women with low hemoglobin. Based on the monthly study conducted on Tuesday, April 2, 2024, at the Jatiwaters Termberlang Jombang Health Center, a total of 10 pregnant women, the results showed that 4 pregnant women had hemoglobin levels below normal values and 6 pregnant women had normal hemoglobin levels. Anemia during pregnancy can have devastating effects on the mother and fetus, disrupting the supply of oxygen and nutrients from the mother to the fetus. Mild anemia causes premature birth and low birth weight, while severe anemia during pregnancy increases the risk of maternal and fetal death and morbidity. Anemia in pregnancy is classified as follows: Hb levels in pregnant women <11 g% in the first and third trimesters, while in the second trimester, hemoglobin levels <10.5 g%<sup>5</sup>.

Factors contributing to anemia in pregnant women are related to inadequate dietary intake, and approximately 95% of cases of anemia during pregnancy are caused by iron deficiency (iron deficiency

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anemia). Other risk factors that contribute to anemia in pregnancy include having multiple pregnancies, being pregnant with more than one baby, having a miscarriage (hypertension), not consuming enough iron, having heavy menstrual bleeding during pregnancy, and being pregnant during adolescence. The occurrence of anemia in pregnancy can also be influenced by the mother's lack of knowledge. Lack of knowledge about anemia significantly impacts pregnant women's health behaviors and can help prevent anemia. Pregnant women with inadequate knowledge about anemia can also consume insufficient iron-rich foods during pregnancy<sup>6</sup>.

Efforts to overcome anemia in pregnant women include providing vitamins and iron tablets during pregnancy. Each tablet contains 320 mg of Fer SO<sub>4</sub> (60 mg of iron) and 500 mg of folic acid, with a minimum of 90 tablets each. This also includes increasing the consumption of iron-rich foods from both plant and animal sources. Hemoglobin levels can be measured using several methods, one of which is the Point of Care Test (POCT) method. The POCT method is a simple examination method using a small number of samples, is cheap, fast, and effective, and is more affordable and affordable. The examination can be carried out independently without having to reduce health services for early detection of anemia<sup>7</sup>.

## METHOD

This study uses a descriptive design by describing hemoglobin levels using the Point of Care Test (POCT) method in pregnant women at the Jatiwaters Public Health Center, Temberlang District, Jombang Regency, which uses an ordinal data scale to indicate hemoglobin levels in three categories, namely low, normal, and high. The categories are low (first and third trimesters:  $\leq 11$  g/dL, second trimester:  $\leq 10.5$  g/dL), normal (first and third trimesters: 11-13 g/dL, second trimester: 10.5-13 g/dL), and high (first, second, and third trimesters:  $\geq 13$  g/dL). This study was conducted from May to June 2024 at the Jatiwates Community Health Center Laboratory, Tembelang District, Jombang Regency.

The research variable was hemoglobin levels in pregnant women at the Jatiwates Community Health Center, Tembelang District, Jombang. The study population consisted of 20 pregnant women at the Jatiwates Community Health Center, Tembelang District, Jombang Regency. The sample in this study was all pregnant women at the Jatiwates Community Health Center, Tembelang District, Jombang Regency. A total sampling of 20 individuals was used.

The data collection technique used was a questionnaire designed to measure the research variables. This was followed by hemoglobin levels being measured using the POCT (capillary blood sample) autocheck Hb instrument. The collected data was then processed and analyzed through editing

(rechecking the data), coding (assigning codes to represent respondents' personal identities), and tabulating (presenting the collected data in tabular form).

This study has received ethical clearance from the Health Research Ethics Committee (KEPK) at the Insan Cendekia Medika Institute of Science and Technology, Jombang, with ethics approval number 161/KEPK/ITSKES-ICME/VII/2024.

## RESULTS

Based on a study of hemoglobin levels using the Point of Care Test (POCT) method in pregnant women, results were obtained from both primary and secondary data. Primary data included age, gestational age, gestational spacing, ANC frequency, and adherence to Fertility tablet consumption. Secondary data consisted of hemoglobin level examinations in pregnant women conducted at the Jatiwaters Termberlang Health Center Laboratory, Jombang. General Data

### 1. Respondent Characteristics Based on Age

The results of the study, based on the age of pregnant women, are presented in Table 1 as follows:

Table 1. Distribution of Respondent Frequency Based on Age of Pregnant Women at the Jatiwaters Health Center

Age	Hemoglobin Level			Frequency	Percentage (%)
	R	N	T		
20-35	5	8	3	16	80
35-42	2	2	0	4	20
Total		20		20	100

Source: (Primary Data, 2024)

Based on Table 1, almost all pregnant women were aged 20-35 years (80%), and only a few pregnant women were aged 35-42 years (20%).

### 2. Respondent Characteristics Based on Pregnancy Age

The results of the study, based on the pregnancy age of pregnant women, are presented in Table 2 as follows:

Table 2. Distribution of Respondent Frequency Based on Pregnancy Age of Pregnant Women at the Jatiwaters Health Center

Trimester	Hemoglobin Level			Frequency	Percentage (%)
	R	N	T		
1	1	6	1	8	40
2	0	0	2	2	10
3	6	4	0	10	50
Total		20		20	100

Source: (Primary Data, 2024)

Based on Table 2, almost half of pregnant women were in their first trimester (40%), a few were in their second trimester (10%), and half were in their third trimester (50%).

### 3. Characteristics of Responders Based on ANC Frequency

The results of the study based on ANC frequency among pregnant women in Table 3 are as follows:

Table 3: Distribution of Responder Frequency Based on ANC Frequency for Pregnant Women at the Jatiwaters Community Health Center (Puskesmas) in Termberlang, Jombang

ANC visits	Hemoglobin Level			Frequency	Percentage (%)
	R	N	T		
Routin	6	10	3	19	95
Non-Routin	1	0	0	1	5
Total		20		20	100

Source: (Primary Data, 2024)

Based on Table 3, almost all pregnant women (95%) attended regular antenatal care (ANC) and only a small number (5%) did not attend regular antenatal care (ANC).

### 4. Respondent Characteristics Based on Pregnancy Interval

The results of the study, based on the pregnancy interval, are presented in Table 4 as follows:

Table 4. Distribution of Respondent Frequency Based on Pregnancy Interval of Pregnant Women at the Jatiwaters Health Center (Puskesmas), Termberlang, Jombang

Pregnancy Interval	Hemoglobin Level			Frequency	Percentage (%)
	R	N	T		
≤ 2 years	1	0	0	1	5
≥ 2 years	6	10	3	19	95
Total		20		20	100

Source: (Primary Data, 2024)

Based on Table 4, the results show that only a few pregnant women had a pregnancy interval of ≤ 2 years (5%), and almost all pregnant women had a pregnancy interval of ≥ 2 years (95%).

### 5. Characteristics of Respondents Based on the Frequency of Iron Tablet Consumption

The results of the study based on the frequency of iron tablet consumption by pregnant women are presented in Table 5 as follows:

Table 5. Distribution of the frequency of respondents based on the frequency of iron tablet consumption by pregnant women at the Jatiwaters Termberlang Jombang Health Center

Iron Tablet Consumption Compliance	Hemoglobin			Frekuensi	Presentase (%)
	R	N	T		
Routin	4	10	2	16	80
Non-Routin	3	0	1	4	20
Total		20		20	100

Source: (Primary Data, 2024)

Based on Table 5, the results show that almost all pregnant women with the regular consumption of iron tablets (80%), and a few pregnant women with the regular consumption of iron Tablets (10%).

6. The results of the hemoglobin level examination

The results of the hemoglobin level examination in pregnant women at the Jatiwaters Termberlang Jombang Health Center Laboratory using the Point of Care Test (POCT) method. The results of hemoglobin level examinations in pregnant women are explained in Table 6 as follows:

Table 6. Distribution of response frequency based on the results of hemoglobin level examinations in pregnant women at the Jatiwaters Termberlang Jombang Health Center

Hemoglobin Level	Frequency	Presentase (%)
Rendah Trimester I&II : $\leq 11$ g/dL Trimester III : 10,5 g/dL	7	35
Normal Trimester I&II : 11-13 g/dL Trimester III : 10,5-13 g/dL	10	50
Tinggi Trimester I,II dan III : $\geq 13$ g/dL	3	15
Jumlah	20	100

Source: (Primary Data, 2024)

Based on Table 6, half of the total respondents had normal hemoglobin levels (50%), almost half had low hemoglobin levels (35%), and a small number (3 respondents) had high hemoglobin levels (15%).

## DISCUSSION

The results of the study were conducted with 20 respondents who agreed to participate. The hemoglobin level examination used the Point of Care Test (POCT) tool. Based on the results of this study, it was found that most pregnant women aged 20-35 years (80%), and almost half of pregnant women aged 35-42 years (20%). According to the study, pregnant women aged under 20 years and over 35 years were twice as likely to suffer from anemia as pregnant women aged between 20-35 years during

pregnancy. However, in this study, pregnant women with low hemoglobin levels were found to be in the range of 20-35 years. This is likely due to the lack of nutrient intake during pregnancy, and some respondents were 35-42 years old (20%), and 2 respondents with low hemoglobin levels were  $\geq 35$  years old. This is because at this age, pregnant women experience a decrease in their endurance and the condition of their biological organs experiences a decrease which causes hemoglobin production to decrease so that anemia is prone to occur. Anemia in pregnant women can cause one of the factors that reduce the occurrence of low birth weight (LBW) is the age of pregnant women who are at high risk. The optimal reproductive age for a woman is between 20-35 years, below and above the optimal age will increase the risk of pregnancy and childbirth. The results of this study are in line with research conducted by Isnaini et al., (2021) who stated that there is no significant relationship between maternal age and the occurrence of anemia in pregnant women<sup>8</sup>.

In addition to age, hemoglobin levels are also influenced by the age of pregnancy. This study found that almost half of pregnant women were in the first trimester (40%), a few in the second trimester (10%), and half in the third trimester (50%). This is because pregnant women in the first trimester are twice as likely to experience anemia as those in the second trimester. Similarly, pregnant women in the third trimester are almost three times more likely to experience anemia than those in the second trimester. Anemia in the first trimester can be caused by loss of appetite, morning sickness, and the onset of hemodilution at 8 weeks of pregnancy. Meanwhile, in the third trimester, it can be caused by high nutrient deficiencies that affect fetal growth and various iron substances in the fetal blood, which will reduce the mother's iron reserves. Therefore, pregnant women in the third trimester are at greater risk of experiencing anemia (Ramadhannanti, 2018). The results of this study are in line with research by Sursianty (2017), which based on statistical analysis results with a chi-square test obtained a p value of 0.000, indicating a significant relationship between gestational age and the occurrence of anemia in pregnant women at the Poasia Health Center, Kerndari City, Southeast Sulawesi Province. Table 3 shows that almost all pregnant women with regular ANC visits (95%) and only a small number of pregnant women with irregular ANC visits (5%), namely, one pregnant woman who did not have regular ANC visits, had low hemoglobin levels. According to the study, the number of pregnant women who attended ANC visits.

An ANC visit can assess, identify, and identify problems that arise during pregnancy, so that health can be maintained throughout the pregnancy. ANC visits are crucial because when pregnant women attend ANC visits, they receive 10 service components simultaneously during one visit. ANC should be carried out as early as possible by pregnant women in preventing anemia in pregnant women, increasing early detection of pregnancy risks, and preventing pregnancy complications. The results of

this study are in line with the research conducted (Laturraker et al., 2023) which stated that there was a decrease in ANC visits with the results of research that had been carried out in the work area of the Tamalanrera Jaya Makassar Health Center, which obtained a value of  $p = 0.000$ , which means the value of  $p < \alpha$  (0.05).

Based on table 4, few pregnant women have a pregnancy interval of  $\leq 2$  years (5%), and almost all pregnant women have a pregnancy interval of  $\geq 2$  years (95%). Research shows that a good pregnancy interval for the health of both mother and child is  $\geq 2$  years. Pregnant women whose birth interval is  $< 2$  years need adequate rest in terms of physical health and uterine condition. There is a possibility that mothers still need to nurse and provide attention to their unborn children, so that this weak maternal condition will impact the health of the fetus and its birth weight (Monita et al., 2019). The results of this study are in line with Yurnita's (2018) study, which found a chi-square statistic with a p-value of 0.003  $< 0.05$ , indicating a correlation between pregnancy spacing and the incidence of anemia in third-trimester pregnant women at the Urm Burlharjo II Health Center.

Based on Table 5, almost all pregnant women consumed iron tablets regularly (80%), while only a small number consumed iron tablets regularly (10%). According to the study, the more regularly a woman consumed iron tablets, the lower the risk of anemia during pregnancy. In this study, the researchers also found that some respondents experienced anemia while routinely consuming Fer tablets. This is usually due to inappropriate ways of consuming Fer tablets, such as drinking them at the same time as drinking other iron supplements, or also due to respondents having poor economic status, resulting in inadequate nutritional intake<sup>9</sup>. Even if you consume iron tablets regularly, if your nutritional intake is insufficient, it will not be sufficient to increase Hb. Iron tablets are salts in tablets or capsules that, if consumed regularly, can increase the number of red blood cells. The primary substance needed for hemoglobin synthesis (blood formation) is hemoglobin (Hb), especially in pregnant women whose iron deficiency increases. Consumption of iron tablets is highly recommended for pregnant women because it can increase iron<sup>10</sup>. The results of this study are in line with research conducted by<sup>11</sup>, which found a correlation between the frequency of Fer tablet consumption and the incidence of anemia in pregnant women in the Surngai Jingah Health Center work area in Banjarmasin City in 2022, with a p-value of 0.000. Based on Table 6, half of pregnant women have normal hemoglobin levels (50%). This is likely due to their frequent consumption of vegetables and fruits rich in iron, such as green vegetables, eggs, and meat. Almost half also have low hemoglobin levels (35%). This is due to several factors such as gestational age, missed antenatal care (ANC), pregnancy spacing, and inadequate consumption of iron tablets. A small number have high hemoglobin levels (15%). This can occur due to preeclampsia, gestational diabetes, and dehydration.

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## CONCLUSION

Based on research conducted on pregnant women using the Point of Care Test (POCT) method, it can be concluded that half of the respondents have normal hemoglobin levels, nearly half of the respondents have low hemoglobin levels, and a few respondents have high hemoglobin levels.

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