


## Characteristics Of Pregnant Women With Anemia

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| Article Info   | ABSTRACT  |
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| <p><b>Keywords:</b><br/>Anemia,<br/>Pregnant Women</p>   | <p>Anemia is a condition of decreased hemoglobin levels , hematocrit and erythrocyte count below normal values . Anemia in pregnancy can have harmful effects on the mother and fetus. Iron deficiency anemia (IDA) is most common in pregnancy women . pregnant women are at high risk of IDA because the need for iron increases significantly during pregnancy . pregnant women are said to be anemic if their blood hemoglobin is less than 11%. This literature review aiming to determine the characteristics of pregnant women with anemia from various articles . This study uses a descriptive literature review approach . Article search via Google Scholar , Science Direct , and Pubmed according to keywords are then analyzed according to inclusion and exclusion criteria . The results obtained in this literature has 15 articles with a limit of 2020 - 2024. In this literature review study, the characteristics of maternal age , education , occupation , economic status, place of residence , gestational age , parity , nutritional status, dietary habits and compliance with taking iron tablets affect the incidence of anemia in pregnancy . The incidence anemia in pregnancy is more common in the 20-35 year age group , having low education , low income , living in rural areas areas , multiparous mothers , gestational age in the third trimester of pregnancy , experiencing CED ( Chronic Energy Deficiency ), rare consuming meat , green vegetables , tea habits of consuming tea and coffee after eating , and not complying with taking iron tablets.</p> |
| <p>This is an open access article under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY-NC</a> license</p>  | <p><b>Corresponding Author:</b><br/>Ufarah Indah Sari<br/>Program Studi Pendidikan Profesi Dokter Umum, Fakultas Kedokteran, Universitas Muslim Indonesia<br/><a href="mailto:ufarahindahs@gmail.com">ufarahindahs@gmail.com</a></p>  |

### INTRODUCTION

Anemia is a condition of decreased hemoglobin levels, hematocrit and erythrocyte count below normal values. Anemia in pregnancy can have harmful effects on the mother and fetus. If it occurs early in pregnancy, it can cause abortion, premature birth, fetal growth retardation and can affect placental vascularization by disrupting angiogenesis in early pregnancy. <sup>1</sup>Anemia is a global health problem. The prevalence of anemia in pregnancy varies, depending on socio-economic conditions, lifestyle, diet, and different attitudes and behaviors regarding health. Approximately 50% of anemia cases are caused by iron deficiency<sup>3</sup>. Other causes of anemia are deficiencies of other micronutrients (vitamins A, riboflavin (B2), B6, folic acid (B9), and B12), acute or chronic infections (such as malaria, hookworm infection, schistosomiasis, tuberculosis, and HIV), and inherited hemoglobin synthesis disorders (such as hemoglobinopathies). Pregnant women are said to be anemic if they have hemoglobin levels

<11.0 mg/dl in the first trimester of pregnancy or hemoglobin levels <10.5 mg/dl in the<sup>2</sup>second and third<sup>3</sup>trimesters of pregnancy .

According to WHO, in 2020, 36.5% of pregnant women in the world suffered from anemia. Although the number has decreased since 2000, it is still relatively high. Based on the Basic Health Research (Riskesdas) in 2018, there were 48.9% of pregnant women suffering from anemia in Indonesia. The number of pregnant women who experience anemia is highest at the age of 15-24 years at 84.6%, aged 25-34 years at 33.7%, aged 35-44 years at 33.6%, and aged 45-54 years at 24%.<sup>4</sup>In Indonesia, the prevalence of anemia is the 4th most common disease, which is around 20%. Around 40.1% are anemia in pregnant women with the dominant type of anemia being iron deficiency anemia.<sup>1</sup>

Iron deficiency anemia is anemia caused by a lack of iron in the body, so that the need for iron (Fe) for erythropoiesis is insufficient, which is characterized by a picture of hypochromic microcytic red blood cells, serum iron levels ( *Serum iron* = SI) and transferrin saturation decreases, total iron binding capacity ( *Total iron Binding Capacity* = TIBC) increases and iron reserves in the bone marrow and elsewhere are very low or nonexistent. In pregnancy, the increase in plasma volume is higher than red blood cells, resulting in hemodilution and decreased hematocrit. This condition makes pregnant women susceptible to anemia. In pregnancy, the need for iron increases by 1000 mg, of which 300 mg is for the fetus and placenta, 500 mg is for the expansion of the mother's hemoglobin mass and 200 mg is excreted normally through the intestines, urine and skin.<sup>2</sup>

Iron deficiency anemia is caused by unhealthy diet, lack of iron consumption, digestive problems that interfere with nutrient absorption, and short pregnancy intervals. The factors suspected of influencing anemia during pregnancy are maternal age, gestational age, nutritional status, degree of anemia, gestational diabetes, iron consumption, genetics, infection and inflammation.<sup>5</sup>Other factors that are closely related to the incidence of anemia in pregnant women include education level, parity and frequency of Antenatal Care (ANC).<sup>6</sup>In pregnancy, anemia can have a negative impact on maternal and infant morbidity and mortality. The impact of anemia on the fetus includes intra uterine growth retardation (IUGR), premature birth, babies with congenital defects, low birth weight (LBW) and increased risk of fetal death in the womb. The impact of anemia on pregnant women is shortness of breath, fatigue, palpitations, hypertension, sleep disorders, preeclampsia, abortion and increased risk of bleeding before and during labor and even maternal death.<sup>7</sup> Based on the background of the problem, the researcher decided to conduct research with *a literature review* to analyze research results that focus on the characteristics of pregnant women that influence the occurrence of anemia in pregnancy.

## METHOD

This research is a *Literature Review research* with a *Narrative Review design*. This method is used to identify, study, evaluate, and interpret all available research. By using this method, can be *reviewed* and systematic journal identification, which in each process follows the steps or established protocols. This study also uses the PICO method in look for literature.

Type data on research This in the form of data secondary, that is database from various reference, such as research journals, *journal reviews* , and related data with characteristics

Mother pregnant with anemia incidence . Reviewed article is published articles in 5 years time last (2020-2024). Search literature done through database electronic that is *Google Scholar, Science Direct and PubMed* . Search results and selection article by researcher viewed from title , abstract and full text in 15 relevant journals with criteria inclusion Then researcher do review journal .

## RESULTS AND DISCUSSION

*Literature This review* is synthesized using a narrative method by grouping similar extracted data according to the results measured to answer the objectives. Research journals that meet the inclusion criteria are then collected and a journal summary is made including the name of the researcher, year of publication of the journal, place of research, method and summary of research results. The summary of the research journal is entered into a table (The results of *the literature review* are presented in table 1). To further clarify the analysis, the abstract and *full text* of the journal are read and examined. The journal summary is then analyzed against the contents contained in the research objectives and research results/findings.

**Table 1.** Research Results Related to Characteristics of Pregnant Women with Anemia

| No | Writer  | Research Place  | Number of Samples | Research methods       | Research result  |
|----|---|---|-------------------|------------------------|--|
| 1. | I Nyoman Ari Bayu Murti, et al. (2024)        | Sanjiwani Regional Hospital, Gianyar, Bali              | 100               | <i>Cross sectional</i> | The highest prevalence of anemia in pregnant women occurs in the age range of 20-35 years which occurs in the third trimester of pregnancy. The most common anemia is the mild anemia category with Hb conditions of 9 - 10.9 g / dL. <sup>8</sup>   |
| 2. | Putu Ayu Krisna Cahyaning Putri, et al (2020) | Sanglah General Hospital/Unud Medical Faculty, Denpasar | 25                | <i>Cross sectional</i> | Pregnant women with iron deficiency anemia are most often found in the third trimester , with the highest degree of anemia being mild anemia (8-9.9gr/dl). Pregnant women most often experience IDA at the age of 20-35 years. The highest final education level is high school and anemia most often occurs in multigravida pregnancies. <sup>5</sup> |
| 3. | January Simatupang , et al. (2020)            | South Manggarai Health Center, DKI Jakarta Province     | 56                | Cohort retrospective   | Pregnant women with low BMI, multiparity , and third trimester of pregnancy increase the risk of anemia in pregnancy. Giving the first iron supplement tablet in the first trimester of pregnancy  |

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|----|--|--|----|------------------------|--|
|    |  |  |    |                        | reduces the risk of anemia. Maternal age does not have a risk of anemia. Pregnant women with low education are at risk of anemia although not statistically significant. <sup>9</sup>  |
| 4. | This is Nyoman Sri Yuliastini, et al. (2022) | Tejakula II Community Health Center , Bali | 68 | Cohort retrospective   | The age range at risk (35 years) in pregnant women mostly experienced mild anemia while in the age range that was not at risk most experienced moderate anemia. There were no pregnant women who had a bachelor's degree and the average education level was junior high school. Nulliparous women experienced more moderate anemia and primiparous women experienced more mild anemia. Pregnant women who experienced KEK mostly experienced moderate anemia compared to mild anemia. <sup>10</sup> |
| 5. | Eunike Alicia Valentina, et al. (2021)       | Citra Medika Hospital Sidoarjo             | 50 | <i>Cross sectional</i> | The majority of pregnant women suffer from moderate anemia with an average Hb level of 9.2 g/dl. The average Hb level of multiparous pregnant women decreases as the number of parities increases. The type of anemia most commonly suffered by respondents is microcytic anemia. hypochromia followed by anemia. <sup>11</sup>  |
| 6. | Nur Masrurroh, et al. (2020)                 | Jagir Community Health Center, Surabaya    | 30 | <i>Cross sectional</i> | There is a relationship between age and Hb levels in pregnant women in the third trimester . More than half of multigravida respondents who have Hb levels <11g% and less than half of respondents who are pregnant for the first time have Hb levels <11g%, this shows that there is a relationship between parity and Hb levels in   |

|    |  |  |     |                         |   |
|----|--|--|-----|-------------------------|---|
|    |  |  |     |                         | pregnant women in the third trimester . There is no relationship between education and Hb levels in pregnant women in the third trimester . <sup>12</sup>   |
| 7. | Ni Made Ayu Yulia Raswati Teja, et al (2021) | Denpasar Health Center South I                       | 83  | <i>Cross sectiona /</i> | There is a significant relationship between knowledge and anemia in pregnant women. Mothers who have less knowledge as many as 50 percent experience anemia. Pregnant women who experience parity at risk as many as 66.6% experience anemia, and mothers who are not at risk parity as many as 5.8% experience anemia with <i>p value</i> = 0.002 which means there is a relationship between parity and anemia in pregnant women. <sup>13</sup> |
| 8. | Nur Hikmah Musfida , et al. (2023)           | Sebatung Health Center , South Kalimantan            | 46  | <i>Cross sectiona /</i> | There is a relationship between nutritional status and the incidence of anemia in pregnant women. The highest percentage is pregnant women with normal nutritional status but not anemia at 85.7%, then pregnant women with normal nutritional status but anemia at 72.2%, KEK pregnant women with anemia at 27.8%, and the least is KEK pregnant women but not anemia at 14.3%. <sup>14</sup>  |
| 9. | Arum Diah Pusporini , et al. (2021)          | Singgani Health Center and Tipo Health Center , Palu | 138 | <i>Case control</i>     | Pregnant women with chronic energy deficiency (CED) have a 24-fold increased risk of anemia. Nutritional status is one of the risk factors for anemia in pregnant women at Singgani Health Center and Tipo Health Center . The risk of pregnant women with chronic energy deficiency (CED) experiencing anemia is higher at Singgani Health Center than at Tipo Health Center . <sup>15</sup>   |

|     |                                 |   |        |                          |   |
|-----|---------------------------------|---|--------|--------------------------|---|
| 10. | Delfi Ramadhini , et al. (2021) | Batunadua Community Health Center , Padang Sidempuan City | 70     | <i>Cross-sectional /</i> | There is a relationship between age and the incidence of anemia in pregnant women, the majority of respondents with age are at risk of experiencing anemia. There is a relationship between parity and the incidence of anemia in pregnant women, primiparous pregnant women experience anemia more than multiparous. The majority of respondents experience anemia and are not compliant in consuming iron tablets. <sup>16</sup>                      |
| 11. | Jing Tan, et al. (2020)         | China   | 12,403 | <i>Cross-sectional /</i> | The prevalence of iron deficiency anemia is higher in the third trimester of pregnancy. The prevalence of anemia increases with each trimester , and reaches a peak in the eighth month. Similarly, pregnant women who experience anemia are higher in the age group >35 years. Women with multiparity are more likely to experience anemia than nulliparous women. <sup>17</sup>   |
| 12. | Semalign Samuel, et al. (2020)  | Kembata Health Center Tembaro, Southern Ethiopia          | 423    | <i>Cross-sectional</i>   | Pregnant women with informal education, living in rural areas, having low food diversity scores, from the lowest wealth index, not consuming iron-rich foods in the last 24 hours have a higher risk of anemia. The chance of anemia increases by 3.2 in daily workers compared to housewives. Pregnant women who have given birth at least once are 4x more likely to suffer from anemia than pregnant women with their first pregnancy. <sup>18</sup> |
| 13. | Romi Bansal, et al. (2020)      | Antenatal Clinic, Department of Obstetrics                | 500    | <i>Cross-sectional</i>   | The prevalence of anemia in pregnant women was higher in subjects aged 26-30 years, rural residents, secondary education  |

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|-----|--|---|-----|------------------------|--|
|     |  | and<br>Gynaecology,<br>AIMSR,<br>Bathinda,<br>India |     |                        | level, working pregnant women, low income , having a habit of drinking tea and coffee immediately after eating and not having a habit of eating meat, animal products and green leafy vegetables. The anemia rate was also found to be higher in multigravida, second trimester, with a pregnancy interval of >2 and no history of abortion. 85.9% of pregnant women were found to suffer from anemia who did not consume iron and folic acid tablets. <sup>19</sup> |
| 14. | Nurhusien<br>Nuru Yesuf,<br>et al.<br>(2021) | Felegehiwot<br>Referral<br>Hospital,<br>Ethiopia    | 286 | <i>Cross-sectional</i> | Anemia in pregnant women is higher in women living in rural areas, multiparous pregnant women and mothers suffering from hookworm infection. The possibility of anemia in pregnant women is 8 times higher in pregnant women who rarely eat additional food during pregnancy. Lack of green leafy vegetable intake is also a significant factor . <sup>20</sup>  |
| 15. | Maha<br>Awadh<br>Alreshidi, et<br>al (2021)  | Hail, Saudi<br>Arabia                               | 390 | <i>Cross-sectional</i> | Pregnant women who experience anemia are higher in mothers who rarely eat meat and have a habit of drinking tea immediately after eating, higher parity, have a previous history of anemia, and low family income. <sup>21</sup>   |

## Discussion

### Characteristics Age In Pregnant Women With Anemia

Based on results research by I Nyoman Ari Bayu Murti, et al show that prevalence of anemia in mothers highest pregnant occurs in the range age 20 to 35 years , findings This in line with research conducted by Putu Ayu Krisna CP, et al. and Ni Nyoman Sri, et al . This is No in line with research by Delfi Ramadhini , et al show majority Mother pregnant women who experience anemia have age at risk at the moment pregnancy , namely age <20 years and >35 years , this This in line with research conducted by Nur Masrurah, et al . Likewise , research by Jing Tan, et al. show pregnant women who experience anemia are higher at the

age of >35 years. In a study conducted by Januar Simatupang , et al ., characteristics age Mother fail show significance significant p value , discordance between results study with theory Can due to Because age Mother No One the only one that influences the incidence of anemia in mothers pregnant .

Age mother 20 to 35 years old is age reproduction that can functioning with good . Group This including group age reproduction healthy . Ministry of Health data also says good age For pregnancy is 20 to 35 years . This is what causes number anemia incidence is high occurs at that age .8 In conditions that require Lots substance iron , then pregnancy that occurs in women very young or very old will also prone to to occurrence of anemia. Age very young is age under 20 years old and those who are classified as too old is >35 years temporary age considered safe for pregnancy is age 20 to 35 years because of Already Ready pregnant in a way physical and mental.10 Age <20 years can causes anemia because at the age of the development biological in matter This tool reproduction not optimal. Psychic Not yet mature at age <20 years , this That cause woman pregnant easy experience resulting mental shock lack of attention to fulfillment need substances nutrition during her pregnancy .12 A mother who is pregnant at the age of 35 years , has entering the early period phase degenerative, so that function body not optimal and experiencing various problem health . Pregnant women in too old old will prone to against anemia because decline Power stand body so that easy caught various infection during pregnancy .

Based on a number of research that has been reviewed , age Mother influential to anemia incidence , group age Mother pregnant <20 years , 20-35 years and >35 years is age pregnancy that has risk of anemia.

### **Characteristics Parity in Pregnant Women with Anemia**

Based on results research by Putu Ayu Krisna CP, et al shows the most anemia occurs in multigravida pregnancies compared to primigravida pregnancy . This is in line with research by Nur Masrurah, et al. and Romi Bansal, et al . The results of the research conducted by Januar Simatupang , et al. that multiparity has a risk of  $RR$  1.3 (95%  $CI$ ) for anemia. This is in line with the research of Nurhusien Nuru Yesuf, et al. which showed that anemia in multiparous pregnant women was 2.43 times higher than in primigravida mothers . Likewise , research by Eunike Alicia, et al. show mark average maternal Hb levels multiparous pregnancies are increasingly decrease along increase amount parity . This is also in line with research by Jing Tan, et al and Maha Awadh Alreshidi , et al that Women with multiparity are more likely to experience anemia than nulliparous women. Research by Semalign Samuel et al. showed that pregnant women who gave birth at least once were four times more likely to experience anemia than pregnant women with their first pregnancy.

Research by Ni Made Ayu Yulia, et al. showed that pregnant women with high-risk parity experienced anemia as much as 66.6 percent, and mothers with non- risk parity experienced anemia as much as 5.8 percent with a  $p$  value = 0.002, which means that there is a relationship between parity and anemia in pregnant women. In the research of Delfi Ramadhini , et al. show The majority of respondents experienced anemia and primiparous parity of 42.9%, while the minority of respondents experienced anemia and multiparous parity of 12.9%. The  $chi$ -square test obtained  $p = 0.006$  ( $< 0.05$ ), meaning that there is a relationship between parity and the incidence of anemia in pregnant women. This No in line



with research by Ni Nyoman Sri, et al. which states that Mother nulliparous more Lots experiencing moderate anemia and primiparous mothers are more Lots have mild anemia and most of them Mother pregnant be at parity nullipara . From the data above researcher assume that majority Mother pregnant is at parity having been pregnant twice or more and more adapt with her pregnancy , and knowledge as well as experience possessed around pregnancy . This means that although there is connection parity with the incidence of anemia but Can So Still There is other factors involved involved in the incidence of anemia in mothers pregnant the .

Parity factor affects anemia due to pregnancy need addition substance iron For increase amount cell blood red mother and form cell blood red fetus . According to study Yuliatuti , et al. parity 2-3 is the safest parity reviewed from corner maternal mortality . Parity  $\leq 1$  and parity  $> 2$  have number highest maternal mortality . Increasingly tall parity the more tall maternal parity , then in a way statistics there is connection parity with occurrence of anemia.<sup>6</sup> Parity is one of factor important in anemia event substance iron in mother pregnant . Women who often experience pregnancy and childbirth increasingly anemic because Lots lost substance iron , thing This due to during pregnancy woman use backup iron that is in her body.<sup>13</sup> Pregnant women parity tall three times more at risk suffer from anemia compared to those of equal parity low . It is estimated matter this is also caused Because every pregnancy increase risk bleeding before , during , and after childbirth . The more often a woman giving birth , increasingly often he also exposed risk those . Some change like hyalinization vessels blood and its decrease elasticity uterine wall can occurs in multiparous mothers . In pregnancy multiparous and grandemultiparous mothers can happen uterine overdistension and weakness myometrium , and if condition This exacerbated by anemia which causes the decline oxygen transferred to place implantation placenta and myometrium , chances the occurrence postpartum bleeding will the more big . Things the enlarge maternal anemia risk parity high in subsequent pregnancies .<sup>11</sup>

### **Characteristics Age Gestation in Pregnant Women with Anemia**

Based on results research by I Nyoman Ari Bayu Murti, et al shows anemia most often occurs in the third trimester . This is in line with research by Putu Ayu Krisna CP, et al. , January Simatupang , et al . and Jing Tan, et al .

In the third trimester period pregnancy , mother pregnant women are very vulnerable to lack substance iron and zinc , especially during the third trimester pregnancy . Absorption or lack of intake poor micronutrients , needs iron and zinc increased blood volume experience expansion and its bad condition This occurs during pregnancy. <sup>22</sup>This is due to because in the third trimester it occurs phase the fastest growing . Pregnant women will experience change in a way physiological For support development fetus during pregnancy . The impact is improvement significant on blood plasma volume resulting in increase heavy fetus at age 34 weeks pregnant . The amount of plasma that is not balanced with cell blood red can also cause decline amount erythrocytes and hematocrit.<sup>8</sup>

### **Characteristics of Nutritional Status in Pregnant Women with Anemia**

Based on results research by January Simatupang , et al. mention that BMI is low own risk of anemia, weight gain during less pregnant own risk of anemia. Meanwhile, research by Ni Nyoman Sri Yuliastini, et al reviewed nutritional status based on LILA, pregnant women

who experience KEK (Chronic Energy Deficiency) mostly experience moderate anemia compared to mild anemia. Research by Nur Hikmah Musfida, et al obtained results that there is a relationship between nutritional status and the incidence of anemia in pregnant women at the Sebatung Health Center. This is also reinforced by research by Arum Diah Pusporini, et al that based on the results of bivariate tests, it is known that nutritional status is a risk factor for anemia in pregnant women at the Singgani Health Center and Tipo Health Center. Pregnant women with chronic energy deficiency conditions at the Singgani Health Center have a 24-fold risk of experiencing anemia compared to pregnant women who do not experience KEK. Meanwhile, pregnant women who experience KEK at the Tipo Health Center have a 12.75-fold risk of experiencing anemia during their pregnancy.

Nutritional needs increase with increasing gestational age, fetal growth and development because during pregnancy nutrients are needed for fetal growth, placenta, amniotic fluid, uterine growth, breast tissue growth, and blood volume growth along with changes in maternal tissue and metabolism. There is a relationship between nutritional status and the incidence of anemia, where pregnant women with good nutritional status tend to be at risk of not having anemia as much as 6,500 times compared to poor nutritional status. In pregnancy, the decrease in hemoglobin levels found during pregnancy is due to increased nutrient requirements and changes in the blood. If the mother's nutritional status is lacking, the intake of nutrient requirements is inadequate, resulting in anemia.<sup>14</sup>

Nutritional status Mother pregnant Can known with measure LILA size , if < 23.5 cm then Mother pregnant including KEK.10 Deficiency energy chronic (CED) is a condition body lack substance nutrition macros ( carbohydrates , protein and fat) in term long time . Deficiency macronutrients relate with deficiency micronutrients , especially vitamin A, vitamin D, folic acid folate , substance iron , zinc, calcium , and iodine . Conditions Mother pregnant with KEK can causing anemia in her pregnancy . Nutritional status is a factor that plays a role direct to need nutrition Mother pregnant and her fetus so that lack of intake nutrition for mothers pregnant with KEK can causes anemia in pregnancy.<sup>15</sup>

### **Characteristics Compliance Consume Blood Supplement Tablets With Anemia Occurrence in Pregnant Women**

Based on research by Delfi Ramadhini , et al show majority Respondent have anemia and not obedient consume additional tablets blood . This is reinforced by research January Simatupang , et al . , who stated that supplemental tablet administration blood first in the first trimester of pregnancy can lower the occurrence of anemia. So it can concluded that There is connection compliance Increased tablet consumption blood with the incidence of anemia in mothers pregnant . This is reinforced by research by Romi Bansal, et al. show 85.9% of pregnant women were found to suffer from anemia who did not consume iron and folic acid tablets.

Tablet substance iron (Fe) is important For Mother pregnant Because own a number of function that is add intake nutrition for the fetus , preventing deficiency anemia substance iron , prevent bleeding during labor , lowering risk maternal death Because bleeding at the time labor . Therapy for deficiency anemia iron is with preparation oral iron . Oral therapy is with giving preparation iron : *ferro sulfate* , *ferrous gluconate* , or *Na- ferobicitrate* and still Lots again . Giving preparation 60 mg/ day can raise Hb levels of 1gr%/ month . Starting with

give one tablet a day as soon as possible Possible after feeling nauseous lost . Each tablet contains  $FeSO_4$  320 mg ( substance iron 60 mg) and acid folate 500  $\mu$ g , minimum 90 tablets each . Iron tablet supplementation is one of useful way in to overcome anemia. In Indonesia, supplementation iron long given routinely to the mother pregnant women at health centers and integrated health posts , using tablets containing 60 mg/ day can raise Hb levels by 1 gr% per month.<sup>23</sup> Irregularity Mother pregnant consuming Fe tablets can cause lack nutrition for mothers pregnant who has enough impact big towards the growth process fetus and child born . Pregnant women need consuming Fe tablets during pregnancy , because need substance iron Mother increase during pregnancy.<sup>16</sup>

### Characteristics of Education With Anemia Occurrence in Pregnant Women

Based on research by Putu Ayu Krisna CP, et al. show level education Mother most pregnant found at level education end of high school with degree of anemia degree light . This is in line with research by Romi Bansal, et al. show The prevalence of anemia is high in pregnant women with secondary education, namely 48.7%. Research by Ni Nyoman Sri, et al. shows the average mother pregnant with anemia at the level Junior high school education . Respondents in the study the No anyone has level diploma and undergraduate education so education tall consists of from high school level and education not enough based on Elementary and Middle School levels . Research by Semalign Samuel, et al. show respondents with informal education were 6.3 times more likely to experience anemia than those with formal education. In a study by Januar Simatupang , et al. show characteristics education fail show significance p value (p 0.12 ) which meaningful . Although considered No significant in a way statistics , education level low show possibility increased anemia in pregnancy .

Level of education somebody can support or influence level knowledge that is the more tall education so the more tall knowledge somebody Because higher education make it easier Mother accept information new so that No indifferent to information health whereas the more low education so knowledge is also very limited so that indifferent to existing <sup>24</sup>health programs . Research by Ni Made Ayu Yulia Raswati , et al. show significant relationship between knowledge with anemia in the mother pregnant . Height the incidence of anemia in mothers pregnant due to lack of understanding Mother pregnant about impact from lack of hemoglobin and low Power buy Mother pregnant For fulfil need foods and drinks containing substance iron during pregnancy . Education has reported reduce risk of anemia in a number of research . Further education tall associated with frequency breast-feed more exclusive high, do visit antenatal care , and more own concern towards health.<sup>24</sup>

In research by Nur Masruroh , et al. show results that No There is connection between education and Hb levels in mothers pregnant . Incompatibility between results study with theory Can due to Because education Mother No One the only one causes of anemia in mothers pregnant . Need emphasized that an educated person low No means absolute obtained in formal education , will but also can obtained in non-formal education . In this case this , can So respondents who have level education height also has lack of knowledge Good about How prevent anemia during pregnancy and lack of knowledge about fulfillment nutrition moment pregnant so that impact on the results obtained.<sup>10</sup>

## **Characteristics Employment and Economic Status With Anemia Occurrence in Pregnant Women**

Based on research by Semalign Samuel, et al show mother and husband's work are associated with an increased risk of anemia, the chance of anemia increases by 3.2 in daily workers compared to housewives. Pregnant women from the lowest wealth index have a five times higher risk of experiencing anemia, in contrast to pregnant women from the highest wealth index. This is in line with research by Romi Bansal, et al., which shows that pregnant women who work are more likely to experience anemia, namely 55.5% compared to housewives, and pregnant women with low incomes, namely monthly incomes <10,000 85.6% experience anemia compared to those with higher incomes. Likewise, research by Maha Awadh Alreshidi, et al. also shows that pregnant women with low family incomes (<10,000 SR) are twice as likely to experience anemia compared to pregnant women with higher incomes.

Time constraints may be the cause of anemia in them. They may not have enough time to rest and visit antenatal clinics. They tend to forget iron intake quite often. In addition, most of the women in the study were considered underemployed, namely working but having a job that is not permanent and low-paid.<sup>19</sup> Work somebody influenced by the level education and place where he lives . Often those involved in various work daily life and activities business small is those who are educated low and is the least group lucky in a way economy , which in turn influence practice they to healthy and nutritious food enough . Food rich in nutrients iron like meat Beef , chicken and fish are very expensive so those who earn low and labor daily No can buy it . Besides , they to miss time Eat Because they are very busy throughout day . Financial constraints and factors riches can cause inability in get health services .<sup>18</sup>

## **Characteristics Residence With Anemia Occurrence in Pregnant Women**

Based on research by Romi Bansal, et al., it shows that rural residents are 68% more likely to experience anemia than pregnant women living in urban areas. This is in line with research by Semalign Samuel, et al. and Nurhusien Nuru Yesuf, et al.

The height prevalence of anemia in mothers pregnant in the area rural possibility big due to lack of information about adequacy nutrition during pregnancy , factors economy , and not can accessible center health services .<sup>18</sup> Pregnant women living in the area rural areas also have risk more big caught exposure infection transmitted worms through contact with contaminated land dirt man consequence No can access and use toilet that is not right . In addition , the lack of information about pattern eat and various pattern Eat or practice giving bad eating can increase occurrence of anemia.<sup>20</sup>

## **Characteristics of Eating Patterns With Anemia Occurrence in Pregnant Women**

Pregnant women's diet is one of the factors associated with an increased likelihood of anemia. Semalign Samuel et al.'s study showed that respondents with lower dietary diversity scores were affected compared to those with higher scores. Based on various food groups, the highest consumption of cereals was (100%) followed by consumption of dark green leafy vegetables (69.7%), legumes, nuts, and seeds (66.9%), but consumption of the most iron-rich food groups such as meat and fish and organ meats were (31.4%) and (5.7%) respectively.

In the study of Romi Bansal, et al., anemia was more common in groups that had the

habit of drinking tea and coffee immediately after eating and did not have the habit of eating meat and animal products and green leafy vegetables. This is in line with the study of Maha Awadh Alreshidi, et al., which showed that pregnant women who rarely eat meat and the habit of drinking tea immediately after eating are independently associated with anemia. Pregnant women who have the habit of eating meat less than once a week have a 2.1 times higher risk of developing anemia compared to pregnant women who eat meat once or more a week. The study of Nurhusien Nuru Yesuf, et al., also showed that a lack of intake of green leafy vegetables is also a significant factor in the occurrence of anemia.

Red meat is an important dietary source of heme iron. The common source of iron in developing countries is non-heme iron obtained from plant sources. However, various factors in the diet limit its bioavailability. In contrast, absorption of non-heme iron is enhanced by the presence of other dietary components such as ascorbic acid, organic acids, and animal foods in the diet. <sup>20</sup>Phenolic compounds found in tea, coffee, and other beverages are major inhibitors of non-heme iron absorption.<sup>21</sup>

## CONCLUSION

Based on the results of the identification and literature review above, it can be concluded that the characteristics of maternal age, education, occupation, economic status, place of residence, gestational age, parity, nutritional status, dietary habits and compliance with consuming iron tablets affect the incidence of anemia in pregnancy. The incidence of anemia in pregnancy is more common in the 20-35 year age group , has low education, low income, lives in rural areas, multiparous mothers, gestational age in the third trimester of pregnancy, experiences KEK (Chronic Energy Deficiency) , rarely consumes meat, green vegetables, the habit of consuming tea and coffee after eating, and does not obedient consume additional tablets blood. Furthermore, it is expected that this research can be used as a source of information to focus on providing information, education and services, especially on anemia in pregnant women. Suggestions are expected that future researchers can conduct further research on the characteristics and other factors that have not been studied regarding anemia in pregnant women.

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