International Research Journal of Pharmacy and Medical Sciences
ISSN (Online): 2581-3277

Determinant Analysis of Gestational Anemia in Indonesia

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Abstract: ***Background:*** *Anemia gestational is a condition of red blood cell count or hemoglobin concentration lower than 11 g/dl in the first and third trimesters and lower than 10,5 g/dl in the second trimester of pregnancy. This situation has a negative impact on maternal and fetal health. WHO estimates, about 40% women worldwide are anemic. The trend of anemia gestational in Indonesia was increased over years, from 41% in 2013, 43,7% in 2018 to 44,2% in 2019.* ***Objectives****: the aim of this study was to identify the relationship between anemia gestational based on maternal age, gestational age, education level, employment status, place of residence, parity, ANC visits, iron supplementation, and chronic energy conditions.* ***Methods****: A cross-sectional study was conducted over 538 women from total sampling technique. Logistic regression model was employed to determine the relationship between independent variables on dependent variable.* ***Result:*** *Factors associated with anemia gestational in Indonesia were: maternal age, gestational age, ANC visits, and KEK (p≤0,05). This study also showed that education level, employment status, place of residence, parity and iron supplementation were not related to anemia gestational among pregnant women in Indonesia.* ***Conclusion:*** *The most dominant factor affecting anemia gestational was gestational age, that the third trimester of gestational age was 3 times more likely to be anemic (OR=2,581, 95% CI: 1,530−4.355, p−value <0,005).*

Keywords: *Determinants of gestational anemia; pregnant women in Indonesia*

I. BACKGROUND

The problem of nutrition is still a polemic in Indonesia, both excess nutrition and malnutrition problems, including micronutrient deficiencies. Not only during infancy, malnutrition in pregnant women also still a concern for various world health sectors in terms of improving maternal and reproductive health. During pregnancy, the need for macro and micronutrients increases significantly, one of which is iron (Fe). Iron deficiency can affect the decrease in hemoglobin (Hb) levels in the blood (Ministry of Health, 2020b; Mousa et al., 2019; Pasmawati & Hatma, 2019).

Gestational anemia or anemia that occurs during pregnancy is reported to have a negative impact on maternal and child health conditions, and can even increase the risk of maternal and perinatal death indirectly. The consequences that can occur in pregnant women with anemia are miscarriage, bleeding which can result in maternal death, low birth weight babies (less than 9 months of age), low birth weight babies (less than 2500 grams), and stillbirths if the mother have severe anemia. Some common symptoms in pregnant women who experience anemia include lethargy, fatigue, fatigue, weakness and fatigue, pale eyelids, pale tongue and lips, dizzy eyes and dizziness (Ministry of Health, 2018a; Stephen, 2018).

Gestational anemia is commonly found in women in the second trimester of pregnancy (15-28 weeks). Research by Nainggolan et al. Also found that women aged 16−25 years are more susceptible to gestational anemia. Marriage at a young age has a negative impact on reproductive and mental health. Anemia that occurs in pregnant women at a young age is associated with a lack of knowledge of mothers about nutrition during pregnancy. In addition, the second and third trimesters of pregnancy are 3.09 and 3.68 times more at risk of developing anemia than the first trimester (Lebso, 2017; Nainggolan & Siagian, 2019).. In addition, the second and third trimesters of pregnancy are 3.09 and 3.68 times more at risk of developing anemia than the first trimester (Lebso, 2017; Nainggolan & Siagian, 2019).

Nearly 40% of pregnant women in the world have anemia. This figure shows that anemia in pregnant women is still a major problem in the global public health sector (World Health Organization, 2021). The prevalence of anemia in pregnant women (age 15−49 years) tends to increase from year to year. As many as 48.2% of Asian women in the world experience gestational anemia. In Indonesia, the incidence of anemia in pregnant women is increasing from year to year. In 2018, it was recorded that 43.7% of pregnant women experienced anemia compared to 5 (five) years ago, which was 41%, and continued to increase in 2019 by 44.2% (WHO, 2021).

Based on the 2018 Riskesdas data, nationally it can be seen that there has been a significant increase in the incidence of anemia in pregnant women when compared to 2013, from 37.1% to 48.9%. The young age group of 15−24 years had the most dominant percentage of 84.6%, followed by the 25−34 years age group of 33.7%, then the 35−44 years age group of 33.6% and the 45−54 age group by 24%. From the results of Riskesdas it was also known that the proportion of pregnant women who received large blood-supplementing tablets was 73.2%, but only 38.1% received sufficient blood-supplementing tablets (≥90 items), the rest received <90 items. The percentage of chronic energy deficiency (CED) in pregnant women in Indonesia is 17.3% and has decreased relatively when compared to 2013. However, there are differences between provinces, where from the results of the 2018 National Riskesdas report, as many as 36.8% of pregnant women in East Nusa Tenggara experienced CED, in contrast to pregnant women in North Kalimantan, only 1.7% experienced CED (Ministry of Health, 2018b).

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Proportion of pregnancy inspection in Indonesia according to the results of the Indonesian Basic Health Research report in 2018 has experienced an increase compared to 2013, namely 96.1%, with the proportion of midwife examiners 85%, obstetricians 14% and general practitioners 1%. Even so, the ANC K4 coverage target in Indonesia still does not meet the Strategic Plan target. In 2017, ANC coverage in Indonesia was only 74.1%, while the Strategic Plan target reached 76%. Apart from that, it can be seen that there are still differences in coverage between provinces, where the lowest is in Papua at 43.8% when compared to Yogyakarta Which Already reach 90.2% (Kementerian Kesehatan, 2018b).

The data above shows an increase in the proportion of pregnant women who are anemic in Indonesia even though as many as 73.2% of pregnant women are known to have received iron tablets. Globally, the goal of the SDGs is to reduce maternal and preventable deaths in infants and toddlers, including efforts to prevent anemia in mothers during pregnancy. Indonesia has emphasized in the Law of the Republic of Indonesia Number 36 of 2009 concerning Health that efforts to improve nutrition must be carried out in all communities with priority on nutritionally vulnerable groups, namely infants, toddlers, teenage girls, pregnant and lactating women (Law of the Republic of Indonesia,2009; United Nations, 2017).

WHO has recommended pregnant women to routinely make ANC visits at least 4 times during pregnancy in order to further discipline pregnant women in taking iron supplements during pregnancy and continue after delivery in order to get adequate iron reserves in the body (Haile et al., 2017; World Health Organization, 2021).

This is a response to the still high rate of gestational anemia. Various efforts have been made by the Indonesian government to prevent anemia in pregnant women, including improving nutrition through the provision of nutritional supplements during pregnancy, one of which is the administration of blood-boosting tablets (TTD). This program has been regulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 88 of 2014 through various promotive and preventive efforts involving various sectors (Ministry of Health, 2018b; Regulation of the Minister of Health, 2014a, 2014b; Law of the Republic of Indonesia, 2009).

Because of That, researcher want to identify the problems that can cause an increase in the number of anemia in pregnant women complete by analyzing the determinants of the increase in the incidence of anemia in pregnant women through fundamentals determinants, underlying determinants, intermediate determinants, and immediate determinants.

II. Research Methods

This study uses a cross-sectional analytic research design with an observational approach because the data used in this study is secondary data that is already available and the variables are collected at the same time.

This research was conducted in Indonesia using secondary data which is the 2018 Indonesia Riskesdas data. The data that has been collected will be managed by the authors as of June 2022.

The population in this study were all pregnant women aged 10−54 years who were respondents to the 2018 Riskesdas, namely 538 respondents.

The sampling method in this study used the total sampling method which was obtained based on the 2018 Riskesdas data with the number of pregnant women respondents who had Hb values of 538 pregnant women from 34 Indonesian provinces.

The data that has been obtained from the 2018 Basic Health Research is then inputted into Microsoft Excel and then checked for suitability of the data with the data source. Each variable is given a code to be input into the SPSS version 26 software.

In this study, statistical analysis was performed using IBM SPSS software version 26 with a series of statistical analyzes including descriptive statistical tests, namely to determine the distribution and frequency of each variable. Furthermore, statistical tests were carried out using the logistic regression test with a significant value of $p<0.05$.

III. Results

This research was conducted on pregnant women aged 10−54 years who were respondents to the 2018 Riskesdas. Data were obtained through the Indonesian Data Management Laboratory in June 2022 with a total sample of 538 respondents. There were 9 independent variables in this study consisting of immediate determinants (CED), intermediate determinants (ANC), underlying determinants (BST, parity, maternal age, gestational age), fundamental determinants (education level, employment status and place of residence). The dependent variable includes gestational anemia status. The data obtained in this study were then analyzed statistically by logistic regression.

The results of univariate analysis are as follows:

TABLE 1. Frequency distribution of the determinants of gestational anemia in Indonesia (n= 538)

Variable	*f*	%
Mother's age		
< 20 years	36	6,7
20−35 years	418	77,7
≥ 35 years	84	15,6
Total	**538**	**100**
Gestational age		
Trimester I (0−12 weeks)	127	23,6
Trimester II (>12−24 weeks)	203	37,7
Trimester III (>24 weeks)	208	38,7
Total	**538**	**100**
ANC		
Not according to standard (< 4 times)	31	21,2
As per standard (≥ 4 times)	115	78,8
Total	**146**	**100**
Parity		
Primigravida	210	39,0
Multigravida	328	61,0
Total	**538**	**100**
BST		
Less (≤ 90 grains)	328	80,6
Enough (> 90 grains)	79	19,4
Total	**407**	**100**
Mother's education		

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Low	313	58,2
High	225	41,8
Total	**538**	**100**
Employment status		
Unemployed	375	66,4
Employed	181	33,6
Total	**538**	**100**
Residence		
Rural	276	51,3
Urban	262	48,7
Total	**538**	**100**
Variable	***F***	**%**
KEK		
UAC < 23,5 cm	90	83
UAC ≥ 23,5 cm	440	17
Total	**530**	**100**
Anemia		
Anemic Hb < 11 g/dl	159	29,6
Not anemic Hb ≥ 11 g/dl	379	70,4
Total	**538**	**100**

Table 1 shows that out of a total of 538 pregnant women who were respondents, 29.6% of pregnant women experienced anemia. Meanwhile, the proportion of pregnant women who did not experience anemia was 70.4%. The proportion of determinants of anemia in pregnant women in Indonesia shows that 83.0% of pregnant women do not experience chronic energy conditions, and 17% of pregnant women experience CED. Mothers aged 20−35 years had the most dominant proportion, namely 77.7%, compared to pregnant women aged less than 20 years, 6.7% and more than 35 years, 15.6%. As many as 38.7% of pregnant women were in the third trimester, 37.7% in the second trimester and 23.6% in the first trimester. The proportion of multigravida pregnant women was higher (61.0%) than primigravidas (39.0%).

The difference in the number of ANC visits showed that 78.8% were according to standards and 21.2% who had ANC less than 4 times during their pregnancy. In addition, as many as 80.6% of pregnant women consumed less than 90 iron tablets during their pregnancy, when compared to 19.4% of pregnant women who consumed sufficient iron tablets.

In terms of the determinants of the mother's education level and area of residence, there was not much difference between mothers with a low education level, namely 58.2%, and mothers with higher education, namely 41.8%, and mothers living in rural areas, 51.3%, and mothers who living in urban areas by 48.7%. Riskesdas data shows that mothers who do not work are more dominant, namely 66.4% compared to mothers with working status, 33.6%.

The results of bivariate logistic regression analysis are as follows :

TABLE 2. Results of bivariate logistic regression analysis

Variable	Gestational anemia status		Total (N %)	OR (95% CI)	*p−value*
	Anemic n (%)	Not anemic n (%)			
Mother's age (years)					
< 20 years	17 (47,2)	19 (52,8)	36 (100)	1	
20−35 years	114 (27,3)	304 (72,7)	418 (100)	0,42 (0,210−0,835)	**0,013**
≥ 35 years	28 (33,3)	56 (66,7)	84 (100)	0,56 (0,252−1,239)	0,152
Gestational Age					
Trimester I	26 (20,5)	101 (79,5)	127 (100)	1	
Trimester II	52 (25,6)	151 (74,4)	203 (100)	1,34 (0,784−1,483)	0,285
Trimester III	81 (38,9)	127 (61,1)	208 (100)	2,48 (1,483−4.139)	**0,001**
Education status					
High	61 (27,1	164 (72,9	225 (100)	1	
Low	98 (31,3)	215 (68,7)	313 (100)	1,23 (0,839−1,790)	0,293
Employment Status					
Employed	44 (24,3)	137 (75,7)	181 (100)	1	
Unemployed	115 (32,2)	242 (67,8)	357 (100)	1,48 (0,986−2,220)	0,058
Residence					
Urban	73 (27,9)	189 (72,1)	262 (100)	1	
Rural	86 (31,2)	190 (68,8)	276 (100)	1,17 (0,808−1,699)	0,402
Blood Supplement Tablets (BST)					
Less (≤ 90 grains)	94 (28,7)	234 (71,3)	328 (100)	1	
Enough (> 90 grains)	24 (30,4)	55 (69,6)	79 (100)	1,09 (0,636−1,856)	0,762
Parity					
Primigravida	62 (29,5)	148 (70,5)	210 (100)	1	
Multigravida	97 (29,6)	231 (70,4)	328 (100)	1,00 (0,686−1,465)	0,990

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ANC					
As per standards (≥ 4 times)	30 (26,1)	85 (73,9)	115 (100)	1	
Not according to standard (< 4 times)	15 (48,4)	16 (51,6)	31 (100)	2,66 (1,172−6.020)	**0,019**
Chronic Energy Deficiency (CED)	122 (27,7)	318 (72,3)	440 (100)	1	
Not CED (Upper arm circumference ≥ 23.5 cm)					**0,021**
CED (Upper arm circumference < 23.5cm)	36 (40)	54 (60)	90 (100)	1,74 (1,085−2,782)	

Table 2 shows that the group of pregnant women who had the most anemia status was in the age group over 35 years, namely 33.3%, followed by the age group 20−35 years by 27.3% and in the age group less than 20 years, namely by 10.7%.

Based on Table 2, pregnant women aged less than 20 years and pregnant women aged 20−35 years have a significant relationship with the occurrence of gestational anemia in Indonesia with a p value <0.005. Pregnant women aged 20−35 years are not at risk of experiencing anemia during pregnancy 0.4 times compared to pregnant women aged less than 20 years or in other words, pregnant women aged less than 20 years are more at risk 2 times than mothers aged 20−35 years.

Table 2. shows the gestational age with gestational anemia found that anemia was most commonly found in pregnant women in the final trimester of pregnancy with a percentage of 38.9% of the 208 total pregnant women in the third trimester of pregnancy and followed by the second trimester of pregnancy as many as 52 mothers pregnant (25.6%) of 203 pregnant women, 26 pregnant women (20.5%) of 127 pregnant women in the first trimester of pregnancy.

Pregnant women with a gestational age of more than 24 weeks are known to have 3 times the chance to experience gestational anemia compared to those with a gestational age of less than 12 weeks. Meanwhile, when compared with pregnant women in the 1st trimester of pregnancy, it is known that the 2nd trimester of pregnancy has a 1.3 times chance of experiencing anemia, but has no relationship with a significant value of p = 0.285. From the results of statistical analysis, it was shown that there was a relationship between the gestational age of the 1st and 3rd trimesters on the anemia status of pregnant women (p <0.005).

The education level of pregnant women is classified into high and low in Table 2. known to have no statistical relationship with the incidence of gestational anemia p=0.293. As many as 98 (31.3%) pregnant women who are anemic belong to the low education level group, where 27.1% come from the higher education level. This figure shows a low value when compared to the group of pregnant women who are not anemic, namely as many as 215 pregnant women come from low levels of education and 164 pregnant women come from high levels of education.

Table 2 shows that the relationship between work status and gestational anemia is not significant (p = 0.058). However, the data shows that mothers who do not work have a greater percentage of those with anemia of 32.2% compared to mothers who work 24.3%. Mothers who do not work tend to be at risk of 1.5 times experiencing anemia compared to working mothers.

Living environment in Table 2. shows no relationship with anemia status in pregnant women (p=0.402). Pregnant women who live in rural areas have a 31.2% number of pregnant women who experience gestational anemia compared to pregnant women who live in urban areas, where the risk for women who live in rural areas is 1.2 times compared to mothers who live in urban areas.

Pregnant women who are multigravidas experience more gestational anemia by 29.6% than mothers who are primigravidas by 29.5%. Pregnant women with a history of multigravida are known to have one times the risk of experiencing anemia compared to primigravidas. From the results of the logistic regression analysis shown in Table 2. it was found that there was no relationship between parity and gestational anemia in Indonesia (p=0.99).

Table 2 shows that pregnant women who had at least 4 ANC visits were not anemic (73.9%) compared to pregnant women who had less than 4 ANC visits (51.6%). Pregnant women who have less than 4 times the number of ANC visits are at risk of experiencing anemia 3 times compared to the sufficient number of ANC visits. The results of data analysis in this study found that there was a relationship between ANC visits and gestational anemia in Indonesia (p=0.019).

Table 2 shows that there is a relationship between CED and gestational anemia in Indonesia with a significant value of 0.021 (p <0.05) where the percentage of pregnant women with LiLA less than 23.5 cm is more dominant with anemia 40.0% compared to pregnant women whose LiLA is within normal limits. normally at 27.7%.

Table 2 shows that 28.7% of pregnant women who consumed blood-supplementing tablets during their pregnancy experienced gestational anemia, while 69.6% of pregnant women who consumed sufficient blood-supplementing tablets did not experience gestational anemia. However, there is no relationship between the consumption of iron tablets and gestational anemia in Indonesia with a value of p = 0.762,

Multivariable logistic regression is a statistical analysis model that tests one dependent variable against multiple independent variables (Hidalgo & Goodman, 2013).

Table 3 presents the results of logistic regression analysis to see the relationship between maternal age, gestational age, and CED on gestational anemia in Indonesia.

Based on Table 3, it shows that mothers aged less than 20 years are more at risk of experiencing anemia 2 times compared to pregnant women aged 20−35 years. Third trimester gestational age is more at risk of experiencing gestational anemia 3 times compared to first trimester gestational age. CED in pregnant women during pregnancy is known to be 1.7 times at risk of experiencing gestational anemia compared to mothers who do not experience CED. Employment status has no relationship to gestational anemia in Indonesia.

The most dominant determinant of the risk of experiencing gestational anemia was gestational age, where gestational age of more than 24 weeks was 3 times the risk of experiencing gestational anemia compared to the first trimester of gestation (OR= 2.58, 95% CI: 1.53−4.36, p <0.005).

TABLE 3. Multivariable regression model of the determinants of gestational anemia in Indonesia

Variable	OR	CI 95%	*p−value*
Mother's Age			
Age < 20 years	1		
Age 20−35 years	**0,48**	0,234−0,994	**0,048**
Age ≥ 35 years	0,7	0,304−1,626	0,411
Gestational Age			
Trimester I	1		
Trimester II	1,38	0,8−2,386	0,246
Trimester III	**2,57**	1,522−4.350	**<0,005**
Variable	**OR**	**CI 95%**	***p−value***
Employment Status			
Employed	1		
Unemployed	1,44	0,946−2,194	0,089
Chronic Energy Deficiency (CED)			
Not CED	1		
CED	**1,68**	1,025−2,760	**0,04**

IV. Discussion

Relationship between Maternal Age and Gestational Anemia in Indonesia

In this study it was found that there was a relationship between the age group of mothers less than 20 years and those aged 20−35 years, (p = 0.048), it was found that the age group 20−35 years was a protective factor for pregnant women in the age group less than 20 years (OR = 0.48). However, the group aged less than 20 years had no relationship with the group aged more than 35 years (p= 0.411; OR=0.7).

In line with the study conducted by Ozturk et al. that the highest incidence of gestational anemia was found in patients in the age group less than 19 years. The ideal age for a mother to get pregnant is between 20-35 years. The reproductive age of women in the age range of 20−35 years is in good health and there is a low risk of pregnancy complications. In addition, the psychological and biological conditions of the mothers in this age group were better than those in the less than 20 years and those over 35 years. Age 20−24 years is 4 times at risk of experiencing gestational anemia compared to mothers aged over 35 years (AOR= 4.01, 95% CI: 1.08−9). Mothers who are less than 20 years old have a risk of experiencing gestational anemia, this is related to the pelvis and uterus that are not yet fully developed, so that it can affect the safety and health of the fetus in the womb. Whereas in mothers who are more than 35 years old there is a decrease in body fitness and is also associated with reduced iron reserves in the body due to a history of more than 1 parity (Liyew, 2021; Öztürk et al., 2017; Teshome et al., 2020; Triharini et al., 2018; Wijayanti & Qonitun, 2021).

Relationship between gestational age and gestational anemia in Indonesia

In this study, it was found that there was a relationship between gestational age and gestational anemia. Anemia that occurs in each trimester of pregnancy has various effects on the incidence of low-birth-weight babies (LBW). Gestational anemia results in inadequate oxygen delivery to the fetus. Sabrina et al. found that the prevalence of gestational anemia was highest in the third trimester of pregnancy (68.3%) compared to the second trimester (27.2%) and first trimester (4.5%). According to Sabina et al. this is caused by hemodilution as well as poor nutrition and prenatal care (Murtiningih, 2019; Sabina Azhar et al., 2021).

Third trimester gestational age is 3 times at risk (95% CI 1.52−4.35; p= <0.05) to experience gestational anemia. The results were the same as in Dewi and Mardiana's study which found that the third trimester of pregnancy was 3 times more likely to experience anemia than the second trimester. Research conducted by Wemakor at a hospital in Ghana in 2019 stated that the third trimester of pregnancy is 4 times more at risk of experiencing gestational anemia than the first trimester (AOR = 3.57, 95% CI: 1.91−6.67).

Research by Tola et al. states that mothers with third trimester gestational age and have a history of routinely consuming iron supplements are at risk of experiencing gestational anemia 3 times compared to mothers with first trimester gestational age (Dewi & Mardiana, 2021; Tola et al., 2022; Wemakor, 2019).

In the third trimester of pregnancy, the tendency for gestational anemia increases along with the increase in oxygen consumption by the mother and fetus, which causes major hematological changes. WHO also reports that the peak of anemia during pregnancy is in the third trimester of pregnancy, so it is important for pregnant women to have good iron reserves and nutritional intake (Tola et al., 2022; World Health Organization, 2021).

Relationship between Education Level and Gestational Anemia in Indonesia

Pregnant women who have a low level of education are at risk for gestational anemia in Indonesia, but this does not have a significant relationship (p=0.293, OR=1.23 95%CI: 0.84−2.22). Research conducted in Ghana also showed that there was no significant relationship between education level and gestational anemia (p = 0.403), however, the prevalence of anemia in pregnant women was highest in the non-education group, 60.4% compared to mothers with higher education level, only 44.8. %, who had anemia and 55.3% did not have anemia (Wemakor, 2019)

The level of education is known to influence a person in making decisions, because education is a process of developing one's knowledge, point of view, ability and mindset. Pregnant women who have a higher level of education will more easily receive education about health during pregnancy, thus influencing the mother's behavior in maintaining fetal and maternal health during pregnancy. Kutsiyah et al. concluded that the higher the education level of pregnant women, the easier it is for pregnant women to absorb information about nutrition and pregnancy health (Kustiyah et al., 2021; Noviyanti et al., 2019).

Relationship between Employment Status and Gestational Anemia in Indonesia

This study shows that there is no relationship between maternal employment status and gestational anemia in Indonesia (p value = 0.058) in line with the results of research by Sabina et al. who found no relationship between employment status and anemia in pregnant women in Bangladesh (Sabina Azhar et al., 2021).

This study shows that mothers who do not work are 1.4 times at risk of experiencing anemia compared to working mothers. Research Ayensu et al. states that a person's employment status affects the amount of family income, where families with less income increase the risk of underweight (Ayensu et al., 2020).

Relationship between Residence and Gestational Anemia in Indonesia

This study showed that there was no relationship between residence and gestational anemia in Indonesia (p = 0.40). In Indonesia, pregnant women who live in rural areas are at risk of 1.2 times experiencing anemia compared to those living in urban areas. This is related to the mother's access to pregnancy checks. In Ethiopia, pregnant women living in rural areas are 2.9 times at risk of experiencing gestational anemia compared to those living in urban areas. The results of this study are in line with the research of Tola et al. which stated that mothers living in rural areas were 3.5 times more at risk of experiencing anemia (AOR= 3.51, 95% CI 1.92−6.42) than those living in urban areas. Teshome et al. assumes that this situation is influenced by access to health service facilities in rural areas (Teshome et al., 2020).

In Indonesia, the proportion of household knowledge regarding ease of access to health service facilities in rural areas is classified as very difficult compared to urban areas. According to the results of Indonesia's basic health research in 2018, access to hospitals in rural areas is classified as very difficult (43%), while in urban areas it is relatively easy (53.9%). Access to the Puskesmas /Pustu/Pusling is classified as very difficult (36.8%) while in urban areas it is relatively easy (46.1%). Access to Clinic/Physical Practice/Dentist Practice/Independent Midwife Practice in rural areas is easy (34.9%) but still lower than in urban areas (39.1%) (Health Research and Development Agency, 2018; Teshome et al., 2020; Tola et al., 2022).

The relationship between BST and gestational anemia in Indonesia

Blood supplement tablets are tablets given to pregnant women as much as one tablet per day during their pregnancy or at least 90 tablets. Each BST contains 60 mg of iron and 0.400 mg of folic acid (Ministry of Health, 2014a). The results of this study showed that there was no relationship between the consumption of iron tablets and gestational anemia (p = 0.762). Research conducted by Dewi and Mardiana also concluded that adherence to consumption of Fe tablets was not significantly related (p = 0.811) to the incidence of anemia in pregnant women. In line with the results of research conducted in Indonesia in 2020 that found no relationship between iron supplementation and gestational anemia in Indonesia (p>0.05) (Dewi & Mardiana, 2021; Lipoeto et al., 2020).

The negative relationship between iron supplement consumption and gestational anemia is assumed to occur due to the phenomenon that some iron supplement products circulating in the community do not meet the standards set by WHO, especially their elemental iron and folic acid content, so that the effectiveness of iron supplements does not work well in preventing gestational anemia. (Ministry of Health, 2014a).

The results of Triharini's research in Surabaya illustrate that perceived barriers (such as boredom, nausea, and fear of increasing high blood pressure can reduce the compliance of pregnant women in consuming iron. Iron supplements during pregnancy are not the only way and benchmark In reducing the risk of gestational anemia, the daily nutritional intake factor for pregnant women, consumption of drinks that can inhibit iron absorption such as tea and coffee is also very influential in reducing the risk of anemia during pregnancy. Even though pregnant women regularly consume iron supplements, nutritional integrity is not good. Iron supplementation cannot optimally reduce the risk of gestational anemia (Triharini et al., 2018).

The routine of pregnant women who drink coffee and tea with meals is known to be 3.6 times at risk of causing gestational anemia compared to mothers who do not consume tea or coffee (AOR = 3.6, 95% CI: 1.72−7.42) (Teshome et al ., 2020). It is likely that pregnant women who drink coffee or tea every day after eating will experience anemia 3.24 times higher than those who do not consume coffee and tea. Consumption of coffee and tea is known to affect the absorption of iron in the body because of their potential as inhibitors. This influence carries the risk of increasing the occurrence of gestational anemia along with the increased

physiological need for iron during pregnancy (Tola et al., 2022). Kusrini et al.'s study. concluded that in addition to consuming iron regularly, pregnant women should also pay attention to daily protein intake, because adequate consumption of macronutrients and micronutrients is one of the strategies to prevent gestational anemia in addition to iron supplementation. (Kusrini et al., 2021).

Relationship of Parity with Gestational Anemia in Indonesia

This study shows that parity has no relationship with gestational anemia in Indonesia, but mothers who have a history of parity are more than 1 (one) time at risk of developing anemia compared to primigravida mothers (p= 0.990 OR= 1.002 95% CI (0.686−1.465). The results of a study in Ethiopia showed that there was no relationship between parity and gestational anemia (p= 0.982 AOR= 1.01 95% CI= 0.49−2.06) (Kare & Gujo, 2021). getting a pregnancy check-up also showed that a history of parity was not associated with gestational anemia in Ghana (p= 0.709) (Wemakor, 2019).

Relationship between ANC and Gestational Anemia in Indonesia

The results of this study concluded that there was a relationship between ANC and gestational anemia, where pregnant women who had less than 4 ANC visits during pregnancy were more likely to be at risk of experiencing gestational anemia 3 times compared to pregnant women who had standard ANC visits.

This is in line with the research by Darmawati et al. who concluded that the highest incidence of gestational anemia was in the group of pregnant women who did not receive ANC services (Darmawati et al., 2018). In line with the results of the study by Sabrina Azhat et al. that pregnant women who do non-standard ANC numbers increase the prevalence of gestational anemia (Sabina Azhar et al., 2021). Stephen concluded that the prevalence of gestational anemia in pregnant women who received at least 4 prenatal checks (ANC) during their pregnancy was lower (17%) than pregnant women who had only 1 ANC (35.3%) (Stephen, 2018).

Pregnancy examination (ANC) is a program specifically for pregnant women during their pregnancy with the aim of improving health and obtaining health services such as measuring weight, height, blood pressure, measuring LiLA, measuring the height of the apex of the uterus, determining fetal presentation and heart rate. fetus, administering immunizations, administering blood supplement tablets, laboratory tests, mental health counseling and assessment, so that the health of the mother's pregnancy is maintained, the safety of the mother and fetus during the delivery process, and the mother can give birth to a healthy baby (Ministry of Health, 2021).

Relationship between CED and Gestational Anemia in Indonesia

As many as 88.9% of pregnant women in this study experienced CED and 40% of them experienced anemia. This study found that there was a relationship between chronic energy conditions (CED) and gestational anemia (p = 0.04), where pregnant women who experienced CED were 1.7 times more at risk of developing anemia than those who were not.

Research Lipoeto et al. states that pregnant women who experience CED have a risk of 3.81 times experiencing anemia compared to those who do not have CED (Lipoeto et al., 2020). Kusrini et al. in his research on the anemia profile of pregnant women in Indonesia in 2018 found that almost 1 to 5 pregnant women in Indonesia not only experience nutritional deficiency anemia, but also have other malnutrition conditions such as CED and stunting (Kusrini et al., 2021).

KEK in pregnant women can occur due to a lack of awareness of the mother about nutritional intake, both the quality and quantity of diet during pregnancy (Lipoeto et al., 2020). Lack of macronutrients during pregnancy can cause CED and is followed by micronutrient deficiencies that will increase the risk of anemia during pregnancy. (Kusrini et al., 2021).

The Most Dominant Factor

The most dominant factor in this study was the third trimester of gestation with an OR of 2.57, which means that pregnant women in the third trimester are 3 times more likely to be at risk of experiencing gestational anemia compared to pregnant women in the first trimester. Gestational age is a determinant. which cannot be modified, but the results of this study indicate that pregnant women at a gestational age of more than 24 weeks are very at risk of experiencing gestational anemia. Therefore, this can be used as a basis for education for pregnant women in the third trimester of pregnancy in terms of consideration of nutritional intake and adherence to ANC and consumption of iron supplementation according to doctor's recommendations.

The most dominant modifiable determinant is CED conditions with an OR value of 1.7. This value indicates that pregnant women with CED conditions have a 2 times tendency to experience anemia compared to mothers who do not experience CED. The condition of chronic energy deficiency experienced by pregnant women is associated with the risk of low-birth-weight babies (LBW). Research conducted in Ghana shows that almost 40% of pregnant women experience CED due to poor nutritional status. Pregnant women who have an upper arm circumference (LiLA) of more than 23 can reduce the risk of anemia by 0.4 times. This study also found that CED conditions were mostly found in the second trimester (64.3%) and third trimester (32.2%) (Ghosh et al., 2019).

From the results of this study, two dominant and mutually sustainable determinants were seen, namely gestational age of more than 24 weeks and CED conditions. The author assumes that more specific and integrated health services should be carried out from the beginning of pregnancy, including close monitoring of the nutritional intake of pregnant women, so that with the improvement of the nutritional status of pregnant women, the risk of developing gestational anemia in the third trimester of pregnancy will decrease.

V. SUMMARY

1. There is a relationship between maternal age and gestational anemia in Indonesia, with a mother aged 20−35 being an age that is not at risk of experiencing gestational anemia compared to ages <20 years and ≥ 35 years.
2. There is a relationship between gestational age and gestational anemia in Indonesia, with the tendency for the third trimester to be 3 times more at risk than the first trimester.
3. There is a relationship between ANC and gestational anemia in Indonesia, where pregnant women who have non-standard ANC are more likely to be at risk of experiencing gestational anemia 3 times compared to pregnant women whose ANC visits are according to standards.
4. There is a relationship between CED and gestational anemia in Indonesia where pregnant women who experience CED are 1.7 times more at risk of developing anemia than those who do not.
5. There is no relationship between education level and gestational anemia in Indonesia
6. There is no relationship between work status and gestational anemia in Indonesia
7. There is no relationship between residence and gestational anemia in Indonesia
8. There is no relationship between BST and gestational anemia in Indonesia
9. There is no relationship between parity and gestational anemia in Indonesia
10. The most dominant factor in determining gestational anemia is gestational age

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