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Factors Related to Anemia in Pregnant Women at the Kotaraja Health Center

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A B S T R A C T

Anemia poses a growing health concern within the community, particularly among pregnant women who require special attention due to increased nutritional needs for fetal development. The aim of this research is to identify the factors associated with anemia among pregnant women at the Kotaraja Health Center. This type of research is analytical observation with a cross-sectional approach. The study sample consisted of 156 individuals selected from a population of 202. The study utilized simple random sampling as The sampling technique. The results indicated a significant association between age and anemia in pregnant women P-value (0.035), nutritional status P-value (0.004), the ANC frequency P-value (0.009), and infection diseases P-value (0.035). However, the parity variable showed no significant association with anemia in pregnant women, as indicated by a p-value (0.097). In conclusion, age, nutritional status, frequency of ANC visits, and infection diseases all have a significant association with the incidence of anemia in pregnant women.

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INTRODUCTION

Anemia has emerged as a significant health concern globally, affecting over two billion individuals. Pregnant women are particularly at risk of developing anemia (Dodzo et al., 2022). It is essential to prioritize the nutritional requirements of pregnant women during this period to support fetal growth and the overall well-being of the mother (Koerniawati, 2022).

The World Health Organization(WHO) Data from 2019 indicate that 29.9% of women of childbearing age globally were affected by anemia, equating to roughly half a billion women, whereas the anemia rate among pregnant women in this group was 36.5%. In Indonesia, the rate of anemia among pregnant women grew from 37.1% in 2013 to 48.9% in 2018 (Riskesdas, 2013, 2018). Based on the Maternal and Child Health Report, anemia pregnancy at the Kotaraja Health Center in 2022 was 22% and increased in 2023 to 38%(Dinas Kesehatan Kota Jayapura, 2023).

Extensive research has been conducted on anemia during pregnancy to understand its impact on both the mother and the fetus. Studies have revealed that severe anemia during pregnancy can have a considerable adverse effect on the mother and the baby, leading to poor pregnancy outcomes. (Bukhari *et al*., 2022). The occurrence of anemia during pregnancy in developing countries has significant implications, including fetal growth restriction, increased risk of antepartum and intrapartum/postpartum hemorrhage, Obstetric complications, Early childbirth, low birth weight, miscarriage, stillbirth, and maternal mortality (Eweis *et al*., 2021).

Based on the description above, this study aims to identify factors associated with anemia in pregnant women at Kotaraja Health Center.

LITERATURE REVIEW

Anemia in Pregnancy

According to WHO dalam Sharma *et al*., (2020) Anemia occurs when the body cannot meet its physiological demands due to an insufficient number of erythrocytes or red blood cells. A pregnant woman is said to be anemic when the Hb concentration is less than 11 g% in the 1st and 3rd trimesters, and in the 2nd trimester is said to be anemic when the hemoglobin level is below 10.5 grams %(Pratiwi & Fatimah, 2019).

Age

According to Kementerian Kesehatan Republik Indonesia (2021), To support optimal health during pregnancy and childbirth, the recommended age range is generally between 20 and 35 years. Women who are over 35 years old often experience pregnancy problems caused by reduced Body iron supply As a result of aging, That could affect the fetus's developmental and growth processes. In contrast, Women who are pregnant and less than 20 years old lead to nutritional competition between the fetus and the mother due to the mother's body still being in the growth phase (Zahidatul Rizkah & Trias Mahmudiono, 2017). Age and nutritional status were related to anemia during pregnancy in Mojokerto.

H1: A significant association was found between the age of pregnant women and anemia in pregnant women at the Kotaraja Health Center.

Parity

Parity refers to The count of babies born to a mother, both born alive and dead after 20 weeks of gestation. Frequent childbirth without proper attention to appropriate dietary intake throughout successive pregnancies is one factor contributing to anemia pregnancy. This is because the mother gives the fetus nutrition throughout pregnancy so that it can grow (Yuli Astutik & Ertiana, 2018). Research by Elfiyunai *et al*., (2019) found a significant association between parity and anemia pregnancy at Anatapura Palu Hospital, with a P-value of 0.003.

H2: A significant association was found between parity of pregnant women and anemia in pregnant women at the Kotaraja Health Center.

Nutritional Status

The nutritional status of pregnant women reflects their physical condition, which is influenced by the intake, absorption, and use of various macro and micronutrients. (Paramita, 2019). According to the Ministry of Health, the nutritional status of pregnant women is considered normal if the upper arm circumference (LiLA) is ≥ 23.5 cm, while it is deemed inadequate if the LiLA is < 23.5 cm. (Nurliawati dan Hersoni, 2024). Research by Karmila *et al*., (2023) found a significant association between nutritional status and anemia pregnancy with a P-value of 0.002. The nutritional intake of pregnant women will affect their nutritional status. Mothers with Inadequate nutritional status will experience anemia, which will interfere with the blood supply that is responsible for delivering oxygen and other nutrients which results in disruption in fetal growth and development.

H3: A significant association was found between the nutritional status of pregnant women and the incidence of anemia among pregnant women at the Kotaraja Health Center.

ANC Frequency

ANC services are prenatal monitoring, especially on fetal growth and development during pregnancy. The reluctance of pregnant women to carry out prenatal monitoring results in mothers experiencing nutritional deficiency anemia which is usually accompanied by malnutrition and parasitic infestation. Monitoring in ANC services can be seen through visits by Pregnant mothers to attend pregnancy check-ups. Six service visits are recommended for pregnant women, including two in the first trimester (K1), one in the second trimester (K2), and three in the third trimester (K4). ANC service activities for pregnant women include the implementation of pregnancy counseling which includes information about nutrition during pregnancy the provision of free blood tablets and information related to blood supplement tablets that Might decrease the incidence of anemia during gestation (Kemenkes RI 2020). Research by

Pasmawati & Hatma (2019) found a significant association between ANC frequency and Anemia in pregnancy in Indonesia with a P-value of 0.001.

H4: A significant association was found between the frequency of ANC visits for pregnant women and anemia in pregnant women at the Kotaraja Health Center.

Infection Diseases

Infection diseases are diseases caused by the entry of pathogens or microorganisms into the body that can multiply and cause pain (WHO, 2024). One of the contributing factors to anemia in pregnancy is infection diseases, because infection diseases and nutrition are related to each other, a person who suffers from infection diseases can experience malnutrition due to disruption of mechanisms and tissue metabolism in the body and loss of appetite. Similarly, people who experience malnutrition have a weak immune system to diseases, so they are susceptible to infection diseases (Syarif, 2021). Research by Ssentongo *et al*., (2020) in African countries indicates a significant association between infection diseases and anemia in pregnancy with a P-value (0,001).

H5: A significant association was found between infection diseases and anemia in pregnant women at the Kotaraja Health Center

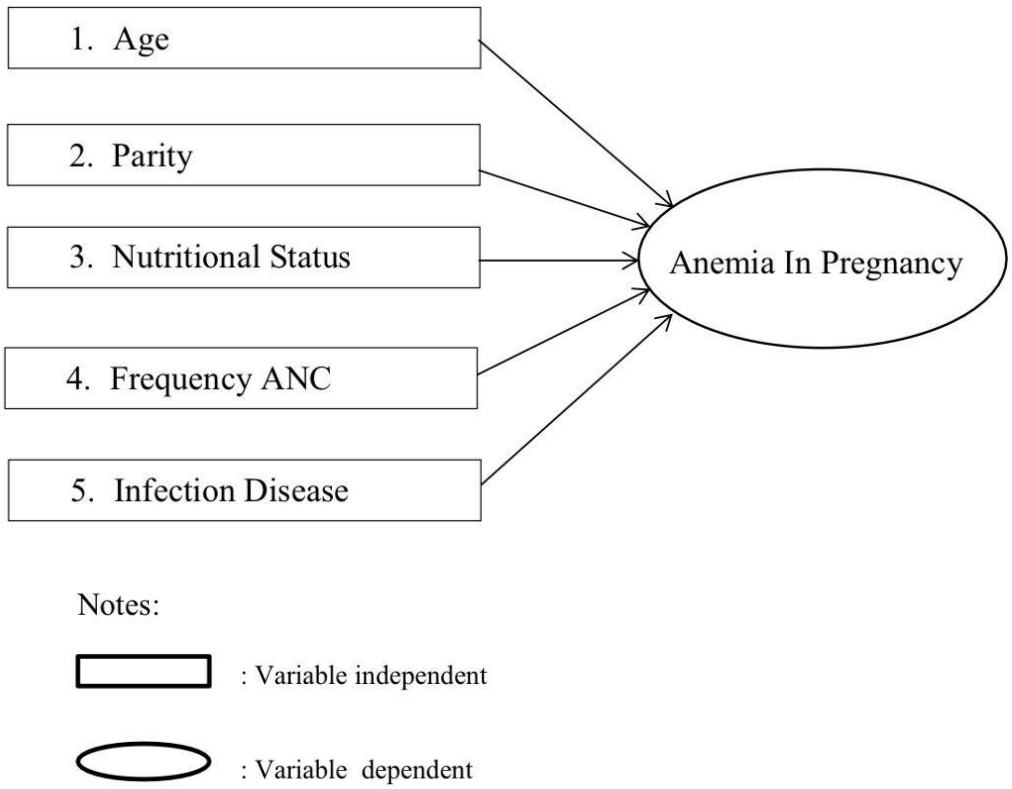

Figure 1. Conceptual Framework

METHODOLOGY

The methodology of this research involves an analytical approach and a cross-sectional study, where measurements of variables are taken at a single time point. (Hasmi, 2016). This research was conducted at the Kotaraja Health Center in the Abepura District from June to July 2024. The population in this study is all medical record data of pregnant women complete with the first visit to the health center in October 2023 - March 2024 as many as 202 people. The sample was determined using the Lemeshow formula so 156 samples were obtained.

In this study, The method of sampling utilized was simple random sampling. The study's samples were obtained from the medical records that were collected and then randomly selected through an Excel application using the Randbeetwen formula. The study utilized observation sheets, SPSS-22 software, and Excel as instruments. The data analysis utilized the Chi-square test.

RESULTS

Table 1 The Association Age with Anemia in Pregnant woman

Usia	Anemia				Total		*RP (CI 95%)*	*P-value*
	Yes		No					
	n	%	n	%	N	%		
At Risk	18	75,0	6	25,0	24	100,0	1,523 (1,141-2,033)	0,035
No Risk	65	49,2	67	50,8	132	100,0		

Source: Primary Data, 2024

Table 1 indicates that anemia in pregnancy at a risky age < 20 years and > 35 years was 75,0%, Meanwhile, Pregnant women at the age of 20 years-35 years who experienced anemia was 49,2%. The bivariate analysis results indicated that there was no association between age and anemia in pregnancy with *a P-value* (0,035). The findings of this study indicate value of *RP* =1,523 (*CI* 95%: 1,141-2,033) indicating pregnant women ages <20 years and >35 years are at risk of developing anemia by 1-2 increased risk of developing anemia in pregnancy than pregnant women with the age of 20-30 years.

Table 2 The association parity with Anemia in Pregnant woman

Parity	Anemia				Total		*RP (CI 95%)*	*P-value*
	Yes		No					
	N	%	N	%	N	%		

At Risk	9	81,8	2	18,2	11	100,0	1,603 (1,163-2,210)	0,097
No Risk	74	51,0	71	49,0	145	100,0		

Source: Primary Data, 2024

Table 2 indicates that anemia in pregnancy with risk parity > 3 is 81,5% while pregnant women with parity are not at risk ≤ 3 at 51,0%. The bivariate analysis results indicated no association between parity and anemia pregnancy with *P-value* (0,097). The findings of this study indicate value *RP* =1,603 (*CI* 95%: 1,163–2,210) indicating that pregnant women with parity >3 are at risk of anemia by 1-2 increased risk of developing anemia in pregnancy than pregnant women with parity ≤ 3. However, it was not found to be significant in the incidence of anemia in pregnant women at the Kotaraja Health Center..

Tabel 3 The association Nutritional Status with Anemia in Pregnant women

Nutritional Status	Anemia				Total		*RP (CI 95%)*	*P-value*
	Yes		No					
	N	%	N	%	N	%		
Poor	26	76,5	8	23,5	34	100,0	1,637 (1,255–2,135)	0,004
Good	57	46,7	65	53,3	122	100,0		

Source: Primary Data, 2024

Table 3 indicates the anemia in pregnant women with poor nutritional status with anemia is 76,5%, Meanwhile, pregnant women with good nutritional status experience anemia as much as 46,7%. The bivariate analysis results indicated an association between nutritional status and anemia in pregnancy with *a P-value*(0,004). The findings of this study indicate value *RP* =1,637 (*CI* 95%: 1,255–2,135) indicating that pregnant women with poor nutritional status experience anemia by 1-2 increased risk of developing anemia in pregnancy than pregnant women with good nutritional status.

Table 4 The Association ANC Frequency With Anemia In Pregnant Women

ANC Frequency	Anemia				Total		*RP (CI 95%)*	*P-value*
	Yes		No					
	N	%	N	%	N	%		

Incomplete	63	61,2	40	38,8	103	100,0	1,621 (1,110-2,367)	0,009
Complete	20	37,7	33	62,3	53	100,0		

Source: Primary Data, 2024

Table 4 indicates the anemia in pregnancy with an incomplete ANC frequency is 61,2% while in pregnant women with a complete ANC Frequency of 37,2%. The bivariate analysis results indicated that there was an association between ANC frequency and anemia in pregnancy with *a P-value* (0,009). The findings of this study indicate value *RP* =1,621 (*CI* 95%: 1,110-2,367) indicating that pregnant women with incomplete ANC Frequency are at risk of anemia by 1-2 increased risk of developing anemia in pregnancy than pregnant women with complete ANC Frequency.

Table 5 The Association of Infection Disease With Anemia In Pregnant Women

Infection Disease	Anemia				Total		*RP (CI 95%)*	*P-value*
	Yes		No					
	N	%	N	%	N	%		
Suffering	18	75,0	6	25,0	24	100,0	1,523 (1,141-2,033)	0,035
Not suffering	65	49,2	67	50,8	132	100,0		

Source: Primary Data, 2024

Table 5 indicates that pregnant women who suffer from infectious diseases experience anemia 75,0%, Meanwhile, pregnant women who do not suffer from infection diseases as many as 49,2%. The bivariate analysis results indicated that there was an association between infection diseases and anemia in pregnancy with *a P-value* (0,035). The findings of this study indicate value *RP*=1,523 (*CI* 95%: 1,141-2,033) indicating that pregnant women with infection diseases are 1-2 increased risk of developing anemia in pregnant than those without infection diseases.

DISCUSSION

The association Age with Anemia in Pregnant women

Based on the results of the study, The bivariate analysis results indicated that there was no significant association between Age and anemia in pregnancy with *a P-value* (0,035). The findings of this study indicate *RP* =1,523 (*CI* 95%: 1,141-2,033) suggesting that pregnant women younger than 20 years and older than 35 years are at a 1-2 increased risk of developing anemia than those aged 20-30 years.

The results of this study align with those of Irawati et al., (2021) in Mojokerto, showing that there is a significant association between age and anemia in pregnancy with a P-value (0.040). The risk of anemia is higher for pregnant women in the at-risk age group than for those who are not categorized as high-risk. Latief et al., (2023) in Palu also reported an association between age and anemia in pregnancy with a P-value (0.005). This is further reinforced by a study by Gudeta et al., (2019) in Ethiopia showing that pregnant women between the ages < 20 and > 35 have a 2.53 Increased likelihood of experiencing anemia

To support optimal health during pregnancy and childbirth, the recommended age range is generally between 20 and 35 years. Women who are over 35 years old often experience pregnancy problems caused by reduced Body iron supply As a result of aging, That could affect the fetus's developmental and growth processes. In contrast, Women who are pregnant and less than 20 years old lead to nutritional competition between the fetus and the mother due to the mother's body still being in the growth phase

According to Kemenkes (2021), To support optimal health during pregnancy and childbirth, the recommended age range is generally between 20 and 35 years. This is because, in Women who are over 35 years old, the mother's body is still in the growth period and must share nutrients with the fetus and is also at risk of experiencing disorders in pregnancy such as chlamydia due to body functions that are not ready for pregnancy. At the age of over 35, it is more prone to experiencing disorders in pregnancy because at that age the body experiences a decrease in organ function that occurs in Peripheral circulation that affects changes in blood pressure (Nugraheni*et al*., 2021).

The Association Parity with Anemia in Pregnant Women

Based on the results of the study, The bivariate analysis results indicated no significant relationship between parity and anemia in pregnancy with a *P-value*(0,097). The findings of this study indicate an RP value of 1.603 (CI 95%: 1.163–2.210), suggesting that pregnant women with a parity greater than 3 have a 1-2 increased risk of developing anemia than those with a parity of 3 or fewer.

The result of this study aligns with those of Indrasari et al., (2022) at the Karta Raharja Health Center & Marga Kencana Health Center, Tulang Bawang Barat Regency, which observed no significant association between parity and anemia in pregnancy with a P-value (0.017.). Likewise, Nuwabaine et al. (2024) in Rwanda and Amini et al. (2018) at the Ampenan Health Center found no significant association between parity and anemia in pregnancy.

Women often have low iron stores because they lose blood every month during menstruation. Women's iron stores will decrease again during pregnancy, this is due to the high iron needs of the fetus and an increase in blood volume which will reduce hemoglobin levels in the pregnant woman's body so that anemia occurs. A mother who gives birth frequently and neglects her nutritional needs will experience anemia in the next pregnancy (Yully Asmariana dan Nursyam Perwitasari, 2018).

The findings of this study contrast with the previous theory, that parity > 3 is related to anemia in pregnant women. This is because parity is not always

related to the incidence of anemia. After all, other variables cause anemia in pregnant women.

The Association of Nutritional Status with Anemia in Pregnant Women

Based on the results of the study, The bivariate analysis results indicated that nutritional status was related to anemia in pregnancy with a *P-value* (0,004). The study's findings show a value *RP* =1,637 (*CI 95%*: 1,255–2,135) suggesting that pregnant women with poor nutritional status are at 1-2 times increased risk of developing anemia than those with adequate nutritional status.

The results of this study align with those of Irawati et al., (2021) in Mojokerto which revealed a significant association between undernourished status and anemia in pregnancy with a P-value (0.020). This is further corroborated by a study conducted study by Sulastri et al., (2023), showing that there is a significant association between malnutrition status and anemia in pregnancy with a P-value (0.004).

Pregnant women with poor nutritional status based on LiLA measurements < 23.5 cm are associated with the condition of pregnant women lacking protein intake, Protein can increase iron absorption. If the protein intake of pregnant women is low, iron absorption will also be low, so the risk of pregnant women suffering from anemia is even higher. When the body does not have sufficient nutrient reserves for pregnancy, it will impact the amount of nutrients available to the fetus. (Hayati dan Martha, 2020; Karmila *et al*., 2023; Simbolon *et al*., 2022).

The findings of this study are in line with the previous theory, that nutritional status is less related to anemia among pregnant women because the results of the research obtained, that anemia in pregnancy is higher in the group of pregnant women with poor nutritional status, which means that pregnant women do not know the type of food that is high in iron, nutrients that help iron absorption, and nutrients that inhibit iron absorption.

The Association ANC Frequency with Anemia in Pregnant Women

Based on the results of the study, The bivariate analysis results indicated that incomplete ANC frequency was related to anemia in pregnancy with a P-value (0,009). The study's findings show a value *RP* =1,621 (*CI* 95%: 1,110-2,367) indicating that pregnant women with incomplete ANC Frequency are at a 1-2 increased risk of developing anemia in pregnancy than those without complete ANC Frequency.

The results of this study align with those of Nurmasari & Sumarmi (2019) at the Maron Health Center in Probolinggo Regency, which demonstrated a significant association between ANC visits and anemia in pregnancy with a P-value (0.001). This contrasts with the study by Amanupunnyo et al. (2018) at the Kairatu Health Center, which found no significant association between ANC frequency and anemia in pregnancy, with a P-value (0.054). Another study from Dessalegn et al. (2021) in Ethiopia showed a significant association between the frequency of ANC and anemia in pregnancy with a P-value (0.011).

According to Sudaryo & Sam (2022), ANC services are very helpful in identifying and managing pregnancy risks and increasing knowledge. Problems in pregnancy can be avoided if mothers regularly check themselves and get complete services in ANC services.

The Association Infection Diseases with Anemia in Pregnant Women

Based on the results of the study, The bivariate analysis results indicated that infection diseases were related to anemia in pregnancy with a P-value (0.035). The study's findings show a value RP=1,523 (CI 95%: 1,141-2,033), indicating that pregnant women with infection diseases have a 1-2 increased risk of developing anemia in pregnancy than those without infection diseases.

the findings of Stephen et al. (2018) in Norway, indicated no significant association between infection diseases and anemia in pregnancy, with a P-value (0.719). Another domestic study from Yuli Arisyah Siregar et al., (2023) at the Batangtoru Health Center found a significant association between infection diseases and anemia in pregnancy with a P-value (0.001). This finding is further supported by another study from Siregar et al., (2023) at the North Bogor Health Center which also identified a significant association between infection diseases and anemia in pregnant, reporting a P-value of 0.037.

Infection diseases are a factor that can lead to anemia in pregnant. this is because infection diseases and nutrition are not related to each other, a person who suffers from infection diseases can experience malnutrition due to disruption of mechanisms and tissue metabolism in the body and loss of appetite. Similarly, people who experience malnutrition have a reduced immune system, which makes them more prone to infectious diseases. (Syarif, 2021).

CONCLUSIONS

Based on the results of the study it can be concluded age, nutritional status, frequency of ANC visits, and infectious diseases all have a significant association with anemia in pregnant women at the Kotaraja Health Center.

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ADVANCED RESEARCH

It is hoped that future researchers, to further research on anemia in pregnant women and add other factors that cause anemia in mothers.

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