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**ORIGINAL RESEARCH**

# THE RELATIONSHIP BETWEEN ANEMIA INCIDENCE IN PREGNANT MOTHERS AND LOW BIRTH WEIGHT BABY DELIVERY

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**ABSTRACT**

Anemia is a condition in which the number of red blood cells (erythrocytes) is less than it should be even though red blood cells contain hemoglobin which is responsible for distributing nutrients and oxygen throughout the body Anemia in pregnancy can cause miscarriage, premature birth, low birth weight, bleeding before and after childbirth can even cause death of mother and child. The purpose of this study was to determine the relationship between the incidence of anemia in pregnant women and LBW births at UPT Puskesmas Kaliorang in 2023. This research is a type of analytic observational research with a retrospective approach. The population in this study were pregnant women at UPT Puskesmas Kaliorang. The number in this study was 15 people, the sampling technique used was total sampling. The instruments in this study were observation sheets, medical records, laboratory results sheets. Data analysis using chi-square. The results of statistical tests using the Chi-square test on the variable anemia with LBW incidence showed that the p-value = 0.001 and the Odds Ratio value (OR = 27.500). There is a relationship between the incidence of anemia in pregnant women and LBW births with a risk level of 27 times greater. Anemia can be prevented by consuming a balanced nutritious diet with sufficient intake of iron to meet the body's needs. Iron can be obtained by consuming meat (especially red meat) such as beef.

**Keywords**

**Anemia, LBW, Iron**

## INTRODUCTION

Anemia during pregnancy is one of the national issues as it reflects the socio-economic well-being of the community and its significant influence on human resource quality. Anemia in pregnant mothers is referred to as a "potential danger to mother and child." Anemia during pregnancy is a crucial health problem in efforts to enhance public health concerning maternal and child health (Fathiyati et al., 2020). Anemia is a condition where the number of red blood cells (erythrocytes) is lower than normal, despite these cells containing hemoglobin, which is responsible for distributing nutrients and oxygen throughout the body (Astriana, 2017). According to the World Health Organization (2020), the global

infant mortality rate is 28.2 per 1000 live births. Developing countries contribute to 98% of this infant mortality rate (Fathiyati et al., 2020). Anemia is a worldwide health issue in women of childbearing age. In Indonesia, the prevalence of anemia is 37.1%, with 36.4% occurring in urban areas and 37.8% in rural areas among pregnant women (Haryanti, 2019). Anemia during pregnancy is caused by nutritional deficiencies, lack of folate, vitamin B12, and vitamin A, particularly iron deficiency (WHO, 2020).

Mild anemia during pregnancy doesn't directly negatively impact pregnancy and delivery, unless the iron reserves in the mother's body decrease further, leading to moderate or severe anemia. Moderate anemia results in fatigue, energy depletion, exhaustion, and poor performance. Severe anemia is associated with adverse pregnancy outcomes, such as palpitations, tachycardia, shortness of breath, increased cardiac output leading to decompensation and fatal heart failure, increased incidence of preterm birth, preeclampsia, and sepsis (Milman, 2018). Anemia during pregnancy can result in miscarriage, preterm birth, low birth weight, bleeding before and after childbirth, and even maternal and infant mortality (Listyana, 2018). The increased iron requirements in pregnant women, necessary to support pregnancy, coupled with inadequate iron intake, can disrupt uteroplacental oxygenation, potentially hindering fetal growth and development. Anemia in pregnant mothers increases the risk of low birth weight (LBW) babies by 6 times compared to non-anemic pregnant women (Surati et al., 2018). Furthermore, anemia in pregnant mothers also increases the risk of miscarriage, stillbirth, and prematurity (WHO, 2018).

This is consistent with research by Virgo and Halimah (2019), which shows that pregnant women with anemia are at risk of giving birth to LBW babies, as indicated by a significant p-value of 0.000, implying a connection between maternal anemia and LBW occurrence. Another study by Novianti and Aisyah (2018) states that a higher proportion of pregnant women with anemia (80%) give birth to LBW babies compared to non-anemic mothers. A bivariate analysis using the chi-square test yielded a p-value of 0.011, signifying a connection between maternal anemia and the occurrence of Low Birth Weight (LBW) at SMC Hospital in Tasikmalaya District. Research conducted by Haryanti et al. also depicts a significant relationship between the variables of maternal anemia (p=0.001), chronic energy deficiency (KEK) (p=0.004), exposure to cigarette smoke (p=0.027), and the occurrence of LBW babies in the working area of Juwana Community Health Center, Pati Regency (Haryanti, 2019).

Low birth weight (LBW) indirectly contributes to neonatal mortality. LBW accounts for 60% to 80% of all neonatal deaths. The global prevalence of LBW is 15.5%. About 20 million babies are born with LBW each year, with 98.5% of them in developing countries. Experiences from both high-income and low- to middle-income countries clearly show that appropriate care for LBW babies, including feeding, temperature maintenance, hygienic cord care, skin care, and early detection and treatment of infections and complications, including respiratory distress syndrome, can substantially reduce mortality (WHO, 2018). The global prevalence of LBW is 15.5%, with approximately 20 million LBW babies born each year, 19.3 million of them in developing countries (WHO, 2018). In Africa, the prevalence is around 12%, and in South Asia, it is 28%. Globally, 21 million LBW babies are born, with South Asia having the highest rate of LBW. South Asia contributes nearly half of these 21 million LBW babies (Gopalan, 2018). According to

Riskesdas (2018), the prevalence of LBW in Indonesia is 6.2%, while it is 4.9% in East Kalimantan.

LBW can be caused by three factors: maternal factors, fetal factors, and environmental factors. Maternal factors include chronic energy deficiency, anemia, maternal age, parity, medical history, socio-economic status, maternal education, and maternal nutritional status based on body mass index (BMI). Fetal factors encompass multiple pregnancies, placenta previa, and congenital abnormalities. Environmental factors involve living conditions and radiation exposure (Sukarni, 2014). Babies born with low birth weight (LBW) are a significant risk factor for infant mortality, especially during the perinatal period. LBW has a significant impact on a child's future growth and development. One of the effects is slower growth and a tendency to have lower intellectual performance compared to babies born with normal weight.

## METHOD

The research design used in this study is a retrospective correlational study with a cross-sectional approach. The research was conducted at the BLUD Kaliorang Community Health Center. This study was carried out in February 2023. The population in this study consisted of 25 pregnant women who visited the Kaliorang Community Health Center. The sampling technique used total sampling, resulting in a sample size of 25 respondents. The data collection technique in this study involved primary data obtained through direct observation of respondents using OBSERVATION SHEETS. The determination of hypothesis testing highly depends on the quality of the data used in the testing. The hypothesis testing of the study will not be meaningful if the data is not reliable. Furthermore, data processing begins with editing, coding, processing, and cleaning. Bivariate analysis aims to determine the relationship between the dependent variable (LBW occurrence) and the independent variable (Anemia) to understand the relationship between these two variables. This study aims to find the relationship between the independent variable and the dependent variable using the chi-square test, with a confidence level of 95%.

## RESULTS

**Table 1. Characteristics of respondents based on age, education, occupation, and parity at the Kaliorang Community Health Center in 2023.**

| Variable | Cathegory | Frequency | Percent (%) |
|---|---|---|---|
| Age | <20 years | 7 | 28,0 |
| | 20-35 years | 7 | 28,0 |
| | 35 years | 11 | 44,0 |
| Occupation | Housewife | 10 | 40,0 |
| | Entrepreneur | 7 | 28,0 |
| | Civil Servant/Honorary | 8 | 32,0 |
| | | 13 | 52,0 |
| Education | Elementary School | 10 | 40,0 |
| | Junior High School | 2 | 8,0 |
| | High School/University | 7 | 28,0 |
| Parity | Primipara | 18 | 72,0 |
| | Multipara | | |
| **Total** | | **25** | **100** |

*Source: Primary Data*

Based on Table 1, The majority of mothers' ages were above 35 years, totaling 11 individuals (44.0%). Based on education, the highest number of respondents were elementary school graduates, with a total of 10 individuals (40%). In terms of occupation, the highest proportion was housewives, comprising 13 individuals (52.0%). Regarding parity, the majority of respondents were multiparous, accounting for 18 individuals (72.0%)

**Table 2. The Incidence of Anemia and LBW at the Kaliorang Community Health Center in 2023.**

| Variable | Cathegory | Frequency | Percent (%) |
|---|---|---|---|
| Incidence of Anemia | Anemia | 13 | 52,0 |
| | No | 12 | 48,0 |
| Incidence of Low Birth Weight | LBW | 13 | 52,0 |
| | No | 12 | 48,0 |
| **Total** | | **25** | **100** |

*Source: Primary Data*

Based on Table 2, it is shown that the majority of respondents experienced anemia, totaling 13 individuals (52.0%), and there were also more respondents with Low Birth Weight (BBLR) births, which is also 13 individuals (52.0%).

**Table 3. The Relationship between the Incidence of Anemia and Low Birth Weight Births (BBLR) at the Kaliorang Community Health Center in 2023.**

| Incidence of Anemia | Low Birth Weight Births | | | | Total | | P Value | OR |
|---|---|---|---|---|---|---|---|---|
| | LBW | | Not LBW | | | | | |
| | N | % | N | % | N | % | | |
| Anemia | 11 | 44,0 | 2 | 8,0 | 13 | 52,0 | 0,001 | 27,500 |
| Not Anemia | 2 | 8,0 | 10 | 40,0 | 12 | 49,0 | | |
| **Total** | **13** | **52,0** | **12** | **48,0** | **25** | **100** | | |

*Source: Independent T-Test Statistical Test*

Based on Table 3 indicate that out of 25 respondents, the majority experienced anemia, totaling 13 individuals (52.0%), and among them, 11 respondents (44.0%) had Low Birth Weight (BBLR) births. The statistical test results using the Chi-square test show that the p-value is 0.001 (<0.05), which means there is a relationship between the incidence of anemia in pregnant mothers and the occurrence of BBLR births. The Odds Ratio (OR=27.500) has a significance, indicating that mothers with anemia have a 27 times higher risk compared to those without anemia.

## DISCUSSION

The research results based on Table 4.1 show that the majority of mothers were above 35 years old, totaling 11 individuals (44.0%). Based on education, the highest number of respondents were elementary school graduates, with a total of 10 individuals (40%). In terms of occupation, the highest proportion was housewives, comprising 13 individuals (52.0%). Regarding parity, the majority of respondents were multiparous, accounting for 18 individuals (72.0%). Consistent with the study by Nurhidayah, Tenriwati & Fitriani Yusuf (2019), out of 30 respondents, mothers at high risk (35 years old) totaled 24 respondents (80.0%), while those at low risk (20-35 years old) were 6 respondents (20.0%). The occurrence of BBLR was most influenced by high-risk ages (<20 and >35 years). Women under 20 years old experience insufficient reproductive system changes during pregnancy, along with the impact of family support and knowledge. On the other hand, women over 35 years old experience deteriorating maternal health, disrupted reproductive functions, bleeding, difficulties in childbirth, and the risk of BBLR due to delayed marriage and childbearing. Parallel to Padmi's research (2017), it was found that a higher proportion of pregnant women with anemia belonged to the non-risk group, namely those aged 20-35 years old, comprising 63 pregnant women (73.3%), compared to the risk group (35 years old), which included 23 pregnant women (26.7%).

Anemia during pregnancy significantly correlates with the mother's age (Chowdhury HA, 2018). Both younger and older maternal ages affect the increased requirement for necessary nutrients. The insufficient fulfillment of nutritional elements during pregnancy, particularly in those under 20 years old and over 35 years old, elevates the risk of anemia (Suryati,

2017). Pregnancy at the age of 35 presents a risk of anemia. This is due to the biological immaturity and instability of emotions in women under 20 years old, affecting nutritional intake during pregnancy. At this age, the body is not fully prepared for pregnancy due to ongoing growth. Consequently, nutritional requirements for both maternal growth and pregnancy decrease, leading to susceptibility to anemia. Similarly, maternal age over 35 is associated with a decline in immune system functions, and changes in biological conditions can reduce hemoglobin production, resulting in anemia. In line with parity, the study by Ika Popi Sundani (2020) indicates that multiparity significantly increases the risk of delivering BBLR babies. High parity can cause disruptions in uterine blood vessels, potentially obstructing the supply of nutrients during pregnancy.

Based on Table 2, it is evident that the majority of respondents experienced anemia, totaling 13 individuals (52.0%). Anemia refers to the decreased count of red blood cells or hemoglobin levels in the blood. Anemia is caused primarily by iron deficiency during pregnancy (Mansjoer, 2017). Anemia during pregnancy is a national problem, reflecting the socioeconomic welfare of society and its significant impact on human resource quality. Pregnancy-related anemia poses potential risks to both mothers and infants, warranting serious attention from all stakeholders in healthcare (Manuaba, 2013). Anemia in pregnant mothers results in a 2.5 times higher likelihood of preterm delivery compared to non-anemic mothers. Anemia can lead to reduced oxygen supply to tissues and alterations in placental vascularization, thereby increasing the risk of preterm birth and low birth weight due to low hemoglobin levels from the early trimesters of pregnancy (Sagung Adi Sresti Mahayana, 2015). Anemia not only affects mothers but can also have cognitive consequences for infants born to mothers with iron deficiency or anemia. Insufficient maternal iron can lead to decreased iron reserves in newborns, predisposing them to iron deficiency anemia in early life.

Maternal anemia significantly affects developing fetuses, leading to reduced red blood cells (erythrocytes) in circulation or decreased hemoglobin mass, hindering their oxygen-carrying capacity to tissues. Normal maternal hemoglobin levels are around 11 g/dL, which depends on maternal nutrition. A level below 11 g/dL increases the risk of iron deficiency anemia, potentially leading to low birth weight (Tarwoto, 2016 cited in Sari, J., and Indriani, P., 2020). The main cause of maternal anemia is iron deficiency, necessary for hemoglobin production. Anemia results from inadequate iron absorption, impairing red blood cell formation and causing an imbalance between iron intake and expenditure. Anemia during pregnancy disrupts nutrition and uteroplacental oxygenation, impacting fetal growth and increasing the risk of immaturity, prematurity, birth defects, and low birth weight (Trihardiani cited in Sulistiani, 2014).

The research results indicate that a greater number of respondents had BBLR births, totaling 13 individuals (52.0%). BBLR refers to babies born with a weight below 2500 grams (Manuaba, 2015). Causes of BBLR include maternal chronic energy deficiency (KEK), anemia, inadequate maternal nutritional supply, pregnancy complications, the number of deliveries, and birth intervals. Babies with BBLR require intensive care as they are susceptible to hypothermia and their organs are not fully developed, posing a risk of mortality (Putri, 2015). According to Soetjiningsih (2018), BBLR is also influenced by other factors during pregnancy, such as severe illnesses,

pregnancy complications, malnutrition, and maternal stress. Maternal nutrition affects fetal growth. Throughout pregnancy, the maternal body rapidly meets the fetus's growing needs to ensure a successful and complete pregnancy. Based on the study's findings and theoretical support, it can be concluded that mothers aged 20-35 years have fewer occurrences of BBLR compared to mothers aged 35 years. In the case of mothers aged 20-35 years, chronic energy deficiency (KEK) is a potential cause. On the other hand, for mothers aged 35 years, the risk may stem from health conditions during pregnancy. Factors like maternal age, parity, nutritional status, and anemia are all influential. On average, babies with BBLR weigh less than 2500 grams.

The statistical test results using the Chi-square test indicate a p-value of 0.001 (<0.05), suggesting a significant relationship between anemia in pregnant mothers and BBLR births. The Odds Ratio (OR=27.500) signifies that anemic mothers have a 27 times higher risk compared to non-anemic mothers. In line with Novianti's research (2016), it is asserted that a relationship exists between maternal anemia and BBLR with a p-value of 0.026. Physiologically, maternal hemodilution or blood dilution occurs during pregnancy due to the increased need for blood supply to the fetus. Anemia occurs when the maternal hemoglobin level falls below 11 g/dL. Andria (2017) conducted research titled "Relationship Between Maternal Anemia and the Incidence of BBLR at RSUD Rokan Hulu." The study showed that maternal anemia was associated with a tendency to deliver babies with low birth weight (BBLR) with a probability of 23% if the mother's hemoglobin level was <11.0 gr%. Maternal anemia increases the risk of complications during pregnancy and childbirth, leading to prematurity and adverse health effects.

Babies born with BBLR are generally less capable of adapting to the new environment, potentially hindering their growth and development, and increasing their vulnerability. According to research, maternal anemia is primarily caused by the inadequate fulfillment of the body's iron needs. During pregnancy, the need for iron increases due to hemodilution in the third trimester of pregnancy, peaking at 28 weeks. Anemia contributes to compromised physical stamina due to insufficient oxygen supply to cells. Anemia during pregnancy increases the frequency of complications during pregnancy and childbirth, leading to the risk of BBLR. Anemia can be managed with additional iron supplementation. Dietary choices, including red meat like beef, and dark green vegetables like spinach and kale, as well as legumes, are good sources of iron.

## CONCLUSIONS

The results of the statistical test using the Chi-square test indicate that the p-value is 0.001 (<0.05), signifying that there is a significant relationship between the occurrence of anemia in pregnant mothers and the birth of low birth weight babies (BBLR). Additionally, the Odds Ratio (OR=27.500) holds the meaning that mothers with anemia have a risk level more than 27 times higher compared to mothers without anemia. Recommendation: It is expected that the findings of this study can enhance respondents' understanding regarding anemia in pregnant mothers, thus enabling them to prevent the occurrence of BBLR.

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