

Literature Review Of The Relationship Between Anemia In Pregnant Women And The Incidence Of Low Birth Weight

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ABSTRACT

Anemia occurs when there are not enough red blood cells to meet the body's physiological needs. Anemia in pregnant women can affect the likelihood of low birth weight babies (LBW). This article aims to find out the relationship between anemia in pregnant women and the incidence of low birth weight. The search method was carried out through online databases, such as Goggle Scholars and Pubmed which were in accordance with the inclusion criteria in 5 national journals and 5 international journals. The results of ten analyzes from five national journals and five international journals from 2019 to 2024 show that there is a link between anemia in pregnant women and the incidence of low birth weight babies (LBW). However, one journal stated that there was no association between anemia in pregnant women and the incidence of low birth weight babies (LBW).

Keywords: pregnant woman, anemia, low birth weight

INTRODUCTION

Anemia is a condition in which the number of red blood cells or hemoglobin levels in the body are below normal levels. Hemoglobin plays a role in transporting oxygen throughout the body. If the number of red blood cells is too low, their shape is abnormal, or the hemoglobin level is insufficient, the blood's capacity to transport oxygen to body tissues will decrease. According to the WHO, anemia in pregnant women is defined as low hemoglobin (Hb) levels. According to the WHO, anemia in pregnancy is defined as a hemoglobin (Hb) level <11 g/dL and the Centers for Disease Control and Prevention defines anemia as a condition with an Hb level <11 g/dL in the first and third trimesters, Hb <10.5 g/dL in the second trimester, and <10 g/dL in the postpartum period.(WHO, 2025).

The World Health Organization describes the prevalence of anemia in pregnant women as ranging between 35% and 37% with increasing gestational age. According to a 2021 WHO report, the global prevalence of anemia in pregnant women is around 41.8%. The prevalence in Asia is 48.2%, Africa is 57.1%, the United States is 24.1%, and Europe is 25.1%. (WHO, 2021) The results of the 2023 Indonesian Health Survey (SKI) revealed that 27.7% of pregnant women in Indonesia have anemia. (Ministry of Health, 2023) Over the past five years, from 2017 to 2022, Basic Health Research (Riskesdas) data shows an increase in the percentage of anemia in pregnant women. The 2017 Riskesdas result of 37.15% and the 2022 result of 48.9% indicate an 11.8% increase in anemia among pregnant women. According to the 2021 Indonesian Health Profile data, the age group 15–24 years experienced anemia most frequently, at 84.6%; age group 25–34 years, 33.7%; age group 35–44 years, 33.6%; and age group 45–54 years, 24%. (Ministry of Health, 2022).

The 1996 book on Child Health defines a low birth weight (LBW) baby as one born weighing less than 2,500 grams. Low birth weight is usually caused by fetal growth retardation, birth occurring before 37 weeks of gestation, or both. This results in higher rates of neonatal mortality and morbidity, as well as growth and developmental disorders, compared to babies born with normal weight, both during the neonatal period and throughout infancy and childhood. (IDAI, 2022).

Babies born with low birth weight have a higher risk of wasting because their organs and functions have not developed optimally like babies born normally, including the digestive system, respiratory system, and immune system, so they have difficulty breastfeeding, absorbing nutrients, and are prone to infection. (UNICEF, 2024) Premature babies and those with low birth weight are at risk of hypothermia, a body temperature below 36.5°C (when measured in the armpit). Hypothermia is very dangerous because it can cause illness and even death. (IDAI, 2022).

Anemia affects both the mother and the fetus she is carrying. In pregnant women, Iron deficiency anemia is also associated with adverse effects on reproductive outcomes, such as delayed growth, premature babies, babies with low birth weight and reduced iron reserves in babies, which can cause growth and development problems (WHO, 2021). In addition, long-term problems can affect physical and cognitive development, learning ability and overall potential in adulthood. (UNICEF, 2024)

Risk factors that can cause anemia in pregnancy include nutritional intake, which has a significant impact on a pregnant woman's risk of anemia. Anemia occurs due to several factors, such as

nutritional deficiencies due to an inadequate diet or impaired nutrient absorption, infections (such as malaria, parasitic infections, tuberculosis, and HIV), inflammation, chronic diseases, gynecological and obstetrical disorders, and genetic red blood cell disorders. The most common cause of anemia is iron deficiency, although deficiencies in folate, vitamin B12, and vitamin A are also significant contributing factors.(WHO, 2025)

During pregnancy, pregnant women need plenty of hemoglobin-forming iron to balance the increase in blood volume and meet the needs of the fetus and placenta. This occurs because the amount of blood in the body increases by fifty percent compared to normal levels during pregnancy. Nutritional deficiencies, including iron deficiency, from infancy and throughout the child's growth period, can lead to stunting.(Ministry of Health, 2023).

According to the researcher's assumptions, Armiyanti et al, 2024 showed There is a relationship between anemia and nutritional status and low birth weight babies. Furthermore, a baby's nutritional status also influences low birth weight in babies.caused by nutritional deficiencies, iron deficiency, heavy bleeding during previous deliveries, and chronic diseases (Armiyanti Amalia et al., 2024).

Anemia can cause a variety of common symptoms, such as fatigue, weakness, dizziness or headaches, drowsiness, and shortness of breath, especially during activity. Children and pregnant women are particularly vulnerable, as more severe anemia can increase the risk of maternal and infant mortality. Furthermore, iron deficiency anemia is known to impact cognitive and physical development in children and reduce productivity in adults.(WHO, 2025).

Maintaining the health of the mother and fetus is very important during pregnancy so that the next generation does not have stunting, there are several things that need to be done including: consuming Iron Supplement Tablets (FE). Consuming nutritious foods, natural foods with iron content can usually be obtained such as: meat, oatmeal, brown rice, types of nuts, and dark green vegetables, and various additional nutritional intakes that are usually recommended by doctors or other health workers. Avoid smoking and consuming alcohol. Conducting pregnancy checks or Antenatal Care (ANC) regularly, at least 6 times during pregnancy, including consultations with doctors and ultrasound examinations. The need for full support from the husband and family, this can improve the health of the mother and fetus during pregnancy until delivery.(Ministry of Health, 2023)According to the National Medium-Term Development Plan (RPJMN), every pregnant

woman must undergo a hemoglobin test as part of a complete nutritional assessment to determine whether they have anemia.(UNICEF, 2023).

Low birth weight babies are at higher risk of being underweight because their organs and body functions, including the digestive, respiratory, and immune systems, may not be as fully developed as those of full-term babies. This can lead to challenges with breastfeeding, nutrient absorption, and increased susceptibility to infection.(UNICEF, 2024).

METHOD

This article was compiled using a literature review method, involving several articles related to the relationship between anemia in pregnant women and the incidence of low birth weight.conducted based on keywords such as pregnant women, anemia and low birth weight, using online databases such as Google Scholar and PubMed. The article search was limited not only by topic but also by year of publication. Inclusion criteria for this study included publication years between 2020 and 2021.4, in English and Indonesian, and the research subjects include pregnant women and babies.The researchers searched and selected articles that met the inclusion criteria in five national and five international journals. The researchers then conducted a journal review.

RESULTS AND DISCUSSION

Article compilation is done using a database with keywordssuch as pregnant women, anemia, and low birth weight. Ten articles met the criteria. The list of articles is presented in tabular form to facilitate discussion.

Table 1. Distribution of Articles

No	Title	Author Name, Journal Name, and Year of Publication	Study design	Sample Research Location	and Findings Conclusion
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1.	The effect of maternal anemia on low birth weight among newborns in Northwest Ethiopia.	Performing Tadege Engidaw, Tahir Eyayu & Tegenaw Tiruneh (2022).	The research method was descriptive cross-sectional and data were collected from previously completed questionnaires.	The number of samples taken was 300 newborns or >37 weeks from pregnant women with anemia. In Nepalgunj medical college and teaching hospital, kohalpur, banke, nepal.	Of 300 full-term newborns born to anemic mothers, the prevalence of low birth weight was 106 (35.33%) (29.92-40.74, 95% CI). Among the newborns, 64 (60.38%) were boys. This study showed that 58 (54.71%) of the LBW infants were admitted to the NICU. It can be concluded that mothers with anemia are more likely to give birth to babies with low birth weight than mothers who are not anemic.
2.	Iron status, anemia, and birth outcomes among pregnant women in urban Bloemfontein, South Africa: the	Janet Adede Carboo, Jennifer Ngounda, Jeannine Baumgartner, Liska Robb, Marizeth Jordaan and Corinna May Walsh	Cross-sectional research methods and questionnaires were used to collect information.	The number of samples taken was 427 pregnant women with anemia and iron status. In urban Bloemfontein, South Africa.	The results of the analysis showed that babies born to participants in the third hemoglobin (Hb) quartile (Hb>11.3–12.2 g/dL) had a gestation period 1 week shorter than those in the fourth Hb quartile (Hb>12.2 g/dL) (p=0.009).

	NuEMI study.	Journal of BMC Pregnancy Childbirth (2024).			With the conclusion that there is no significant relationship between anemia and iron status with LBW and prematurity were observed.
3.	Determinants of Low Birth Weight Among Women Who Gave Birth at Public Health Facilities in North Shewa Zone: Unmatched Case-Control Study.	Berhanu Senbeta Deriba and Kemal Jemal. The Journal of Health Care Organization, Provision, and Financing Volume 58(2021).	The research method used institution al-based case-control and questionnaires were used to collect information.	The sample used was 555 research participants (185 cases and 370 controls). In the North Shewa zone.	The results of anemia analysis (AOR = 2.34; 95% CI = [1.21, 4.53]). It can be concluded that it is significantly related to LBW.
4.	U-Shaped Association between Maternal Hemoglobin	Rebecca M. Carpenter et al. Journal of The American	The research method uses a multi-site,	Number of samples 1,665 mother-daughter pairs between July 2019 and April 2020.	The results of the U-shaped relationship analysis where the highest risk of LBW was seen at very low Hgb

in and Society of prospectiv In rural Tangail levels (, 7.0 g/dL, OR =	Low Birth Tropical e, District of 2.00, 95% CI = 0.43–	Weight in Medicine and continuou Bangladesh 7.01, P = 0.31) and high	Rural Hygiene 106 s, and . (, 13.0 g/dL, OR = 2.17,	Banglades (2) (2022). active 95% CI = 1.01–4.38, P =	h. surveillan 0.036).
					Can be concluded
					did not find a significant
					increase in the risk of
					low birth weight babies
					in pregnant women with
					mild to moderate
					anemia.

5. The Amer This study The number of The results of maternal	relationshi Sindiani, used a samples taken from anemia analysis were	p between Ekram tailored all mothers who were higher among mothers of	maternal Awadallah, case- eligible for this study LBW newborns (62.5%,	health and Eman control was 2260. n=45) compared to	neonatal Alshdaifat, design. In Amman, Jordan. mothers of newborns	low birth Shatha with normal birth weight	weight in Melhem, (13.5%, n=20)	Amman, Khalid (p<0.001).	
Jordan: a Kheirallah. 3	case- JOURNAL	control of	study. MEDICINE					It can be concluded that	
								socioeconomic status,	
								maternal health,	
								COVID-19, and its	

	and LIFE. VOL: 16 (2023).			impact are significant risk factors for LBW.
6.	The Effect of Anemia in Pregnant Women on Nutritiona l Status and Low Birth Weight in Babies.	Devi Armiyanti Amalia, Olivia Nancy. JKFT Journal: Muhammadi yah University of Tangerang Vol. 9 No. 1 Year 2024.	The Cross-Sectional research method is the collection of data simultane ously at one time (Point time approach) using a Checklist Sheet.	The number of samples taken was 120 pregnant women respondents. At Cikupa Community Health Center. The results of the analysis of the incidence of anemia on nutritional status and low birth weight using the Chi-square test obtained a significant value (p-value <0.05), that there was an influence of the incidence of anemia on nutritional status and low birth weight. It can be concluded that the incidence of anemia affects nutritional status and LBW.
7.	The Impact of Pregnancy Anemia on the Incidence of Low Birth Weight Babies at	Sri Suparti, Ani Nur Fauziah. Indonesian Midwifery Journal. Vol 11 No 1. January 2020.	Analytical survey research method with a retrospective approach.	All mothers who gave birth to LBW babies in the Musuk I Boyolali Community Health Center area totaled 23 people. At the Musuk I Health Center, Musuk District, Boyolali. The results of the chi-square test at a significance level of 0.050 obtained an Asymp. Sig. (2-sided) value of 0.037 < the significance level of 0.050. The relationship is moderate with a

the Musuk I Community Health Center, Musuk District, Boyolali in 2018.		correlation coefficient of 0.50. It can be concluded that anemia in pregnant women has an impact on the occurrence of babies with low birth weight at the Musuk I Community Health Center in 2018.
8. The Relationship Between Anemia in Pregnant Women and the Incidence of Low Birth Weight (LBW) at Bangkinang Regional Hospital in 2018.	Gusman Virgo, Tia Halimah. Nursing Journal Volume Number 3 2, 2019.	The quantitative analytical research method used a cross-sectional research design. The sampling technique used was systematic random sampling. Data analysis There were 222 pregnant women with anemia in medical records. At Bangkinang Regional Hospital. From the results of the chi-square test, the p value was obtained = $0.000 < 0.05$. In conclusion, there is a relationship between the incidence of anemia in pregnant women and the incidence of LBW at Bangkinang Regional Hospital in 2018.

			included univariate and bivariate analysis.		
9.	The Relationsh ip Between Anemia and Preeclamp sia in Pregnant Women and the Incidence of Low Birth Weight (LBW) Babies at Tangerang District Hospital.	Ririn Utami, Rini Sartika, Ria Setia Sari. Journal of Health Sciences. Vol. 7 No. 3, 2024	The research method used is an analytical observatio nal survey with a cross- sectional approach.	Using a total sampling of 52 respondents. At Tangerang Regency Hospital.	The majority of respondents had mild anemia (55.8%) and mild preeclampsia (55.8%). There was a significant association between anemia and low birth weight ($p<0.05$), as well as a significant association between preeclampsia and low birth weight ($p<0.05$). It can be concluded that anemia and preeclampsia in pregnant women have a significant relationship with the occurrence of LBW.
10.	Anemia and Chronic Energy Deficienc	Yuli Astutia, Luluk Khusnul Dwihestieb, Nuli	An analytical observatio nal research	Using a sample of 102 babies. At the Kandangan Community Health	The results of the study showed that the relationship between anemia and the incidence of LBW had a p-value of

y (CED) in Pregnant Women Are Associate d with the Incidence of Low Birth Weight (LBW) in the Work Area of the Kandanga n Communit y Health Center, Temanggu ng Regency.	Nuryanti Zulala. Journal of Nursing and Midwifery Vol.15 No.1 Year 2024.	method with a retrospective approach. The method uses simple sampling using case control. 1 person. Data analysis using the chi square formula (X2).	Center, Temanggung Regency.	0.0006 < 0.5 and an OR value of 0.324, while the relationship between chronic energy deficiency and LBW had p-value of 0.002 < 0.05 and OR value of 0.246. It can be concluded that there is a relationship between anemia and chronic energy deficiency with the incidence of LBW. Pregnant women with anemia are three times more likely to give birth to a low birth weight baby than women without anemia. Meanwhile, pregnant women with chronic obstructive pulmonary disease (CED) are twice as likely to give birth.
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Anemia that occurs in pregnant women is often caused by several factors including chronic bleeding, malnutrition, problems with nutrient absorption in the intestines from hemoglobin-forming nutrients such as folate and iron (Fe). Anemia has an impact on pregnant women and the fetus they are carrying, including increasing the risk of morbidity and mortality in the mother,

increasing the morbidity and mortality rate of the fetus, and increasing the possibility of giving birth to a baby with low birth weight.

Researchers Engidaw et al (2022) stated that 300 full-term newborns or >37 weeks of anemia in pregnant women in TM III and newborns were 34 (16.11%, 95% CI: 11.42, 21.78) and 64 (30.33%, 95% CI: 24.20, 37.01), respectively. The purpose of this study was to assess the impact of maternal anemia during the final trimester on LBW among newborns by showing results ($p < 0.05$) which means that there is a relationship between anemic mothers who are more likely to give birth to babies with low birth weight (LBW) which is more common in mothers who experience anemia compared to mothers who do not experience it in Nepalgunj medical college and teaching hospital, kohalpur, banke, nepal (Engidaw et al., 2022)

The research findings of Janet et al (2024) stated that of all the respondents, Of 427 pregnant women, anemia and iron deficiency were common in 42% and 31% of pregnant women, respectively, and only 19% of pregnant women met the estimated average daily requirement. This study aimed to identify the relationship between iron status and birth outcomes in pregnant women by administering a questionnaire used to collect information on birth outcomes (birth weight and gestational age at birth), HIV exposure, sociodemographics, iron supplement intake, and maternal dietary iron intake using a validated quantified food frequency questionnaire which showed results ($p < 0.009$) which means that there is no significant relationship between anemia and iron status with LBW and prematurity in urban Bloemfontein, South Africa (Carboo et al., 2024)

Other findings made by the research Deriba et al (2021) stated that of the total respondents, there were 555 research participants (185 cases and 370 controls) with a response rate of 97.37%. The aim of this study was to identify the determinants of LBW among women who gave birth by giving a questionnaire given through interviews used to collect data which showed results ($p < 0.05$) which meant that it was significantly related to LBW in the North Shewa zone. (Deriba & Jemal, 2021)

In addition, Sindiani et al (2023) stated that 2,260 mothers who gave birth to a full-term singleton baby with a birth weight of <2500 gr and without any congenital abnormalities or deformities who visited the Abu-Nusair Comprehensive Health Center (ANCC) in 2020, where Seventy-two cases were randomly selected from a total of 166 cases and 148 controls were selected from 2094 controls based on age and social class matching (parental education level, occupation). This study aims to analyze the relationship between maternal health during pregnancy with low birth weight

and the impact of COVID-19 on the socioeconomic conditions of pregnant women and its influence on LBW with a case-control design for data collection through medical records and face-to-face interviews which showed that factors such as monthly income of 400 JD or less, living with an extended family, exposure to passive smoking, maternal weight gain of 6–10 kg, maternal anemia, maternal hypertension, delivery by cesarean section, and a history of previous LBW newborns were positively associated with an increased risk of LBW in Amman, Jordan (Sindiani et al., 2023)

However, other research by Rebecca et al (2023) revealed that of all 1,665 mother-child pairs participated between July 2019 and April 2020, 48.3% of women had anemia and the mean Hgb level was 10.6 (61.24) g/dL, identifying a U-shaped relationship where the highest risk of LBW was seen at very low (7.0 g/dL, OR = 2.00, 95% CI = 0.43–7.01, P = 0.31) and high (13.0 g/dL, OR = 2.17, 95% CI = 1.01–4.38, P = 0.036) Hgb levels. This study aims to understand the ongoing contribution of maternal hemoglobin (Hgb) levels to the incidence of LBW using a multisite, prospective, continuous, and active surveillance system that tracks pregnancies and births in specific geographic communities (clusters) which means that there was no significant increase in the risk of LBW in pregnant women with mild-moderate anemia in Tangail district of rural Bangladesh (Carpenter et al., 2022)

Researcher Armiyanti et al (2024) stated that all pregnant women who had anemia and had given birth at the Cikupa Health Center were 68 pregnant women with anemia (75%), primary partum (45%), low birth weight 65%. This study analyzed the effect of anemia on nutritional status and low birth weight (LBW) using a checklist. Observational data collection was conducted through a checklist that included information related to infant nutritional status and infant weight. The results showed a significant effect (p-value <0.05) indicating that anemia affects nutritional status and low birth weight, as well as the effect of infant nutritional status on infant birth weight at the Cikupa Community Health Center. (Armiyanti Amalia et al., 2024)

The results of the research conducted Suparti et al (2020) show that At the Musuk I Boyolali Community Health Center, there were 23 mothers who gave birth to LBW babies with 17 mothers (73.91%) experiencing pregnancy anemia and 6 mothers (26.09%) not experiencing anemia. Of the 17 babies born with LBW (73.91%), 6 (26.09%) were born with LBW. The purpose of this study was to determine the relationship between anemia in pregnant women and the incidence of

LBW babies using a master table, using secondary data sourced from medical records of childbirth and pregnancy. The results of this study showed that at a significance level of p-value 0.050, the Asymp. Sig. (2-sided) value = 0.037 < 0.050 indicated a relationship between anemia in pregnant women and the incidence of LBW babies in the Musuk I Boyolali Community Health Center area. (Suparti & Fauziah, 2020)

Anindiyasari et al (2022) stated that the 106 respondents in this study consisted of 53 case respondents and 53 control respondents. It was found that anemia in pregnant women occurred in 64 people (4.1%) of 1,547 pregnant women, while the incidence of low birth weight (LBW) was recorded in 53 cases (3.5%) of 1,509 babies born. The purpose of this study was to analyze the relationship between anemia in pregnant women and the incidence of low birth weight, using a case-control study design. The results showed a value ($p < 0.05$) which means there is a significant relationship between anemia in pregnant women and the incidence of low birth weight at Abdul Wahab Sjahranie Regional Hospital, Samarinda. (Rahadinda & Kurniati Dwi Utami, 2022)

Strengthened by research Utami et al (2024) described that of all 52 pregnant women, the majority of respondents had mild anemia, 29 mothers (55.8%), and respondents with severe anemia, 10 mothers (19.2%). Of the 52 respondents, the majority of respondents experienced LBW (39 respondents) and respondents who experienced LBW (5 respondents) were 5 respondents (9.6%). The purpose of this study was to examine the relationship between anemia and preeclampsia in pregnant women with the incidence of low birth weight (LBW) babies using an analytical observational survey with a cross-sectional approach. The results showed ($p < 0.05$) stating that there was a significant relationship between anemia and the incidence of LBW. (Utami et al., 2024)

Another study conducted by Yuli et al (2024) stated that it involved 102 samples of 51 live-born babies with LBW status and 51 babies with normal birth weight. Pregnant women with anemia were 52 respondents (51%) and pregnant women who were not anemic were 50 respondents (49%). The incidence of LBW was 51 respondents (50%). The purpose of this study was to determine the relationship between anemia and KEK in pregnant women with a number of low birth weight babies. The sampling technique using the case control method showed that the relationship between anemia and the incidence of LBW had a p-value of 0.006 < 0.05 and an OR value of 0.324, while the relationship. Chronic Energy Deficiency with the incidence of LBW had a p-value of 0.002 < 0.05 and an OR value of 0.264. It can be concluded that there is a relationship

between anemia and chronic energy deficiency with the incidence of LBW at the Kandangan Community Health Center, Temanggung Regency.(Yuli Astutia, Luluk Khusnul Dwihestieb*, 2024)

CONCLUSION

Anemia in pregnant women can affect the likelihood of low birth weight (LBW) babies due to reduced fetal oxygen delivery during pregnancy. Iron deficiency anemia in mothers can affect the growth and development of the fetus and baby both during pregnancy and after delivery. According to studies conducted in various locations, such as Indonesia, Nepal, South Africa, West Rajasthan, and Jordan, pregnant women with anemia are more likely to give birth to low birth weight babies.

SUGGESTION

The literature review is expected to provide healthcare professionals with relevant information for pregnant women, thereby reducing the incidence of anemia and encouraging them to seek prenatal care. Furthermore, pregnant women can minimize the risk of anemia by paying attention to nutritional intake and attending antenatal care (ANC) during pregnancy.

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