ANALYSIS OF RISK FACTORS FOR LBW INCIDENTS AT BUA PONRANG PUBLIC HEALTH CENTER, LUWU REGENCY

Nurul Rahmadiani Ukfah[1], Azniah[2], Freddy Chandra Montolalu[3]

[123]*Magister Kesehatan Masyarakat, Universitas Mega Buana Palopo*
Corresponding author: nurulrahmadianiukfah@gmail.com

ABSTRACT

LBW (low birth weight), according to the WHO, is a baby born weighing less than 2500 grams. Several factors can cause LBW, such as maternal age, education, and ANC compliance. This study aimed to analyze risk factors for low birth weight (LBW) at Bua Ponrang Public Health Center, Luwu Regency. LBW remains a significant public health concern linked to short- and long-term neonatal complications. The Research used a case-control design with a total sample of 300 mothers who gave birth from January to May 2025. Data were obtained from secondary sources, and analysis was conducted using multiple linear regression. The independent variables included residence, education level, maternal age, number of pregnancies, birth interval, economic status, and compliance with antenatal care (ANC). Results showed that four variables significantly influenced LBW incidence: residence (p=0.000), maternal age (p=0.000), economic status (p=0.000), and ANC compliance (p=0.000). Variables such as education level, number of pregnancies, and birth interval were not statistically significant. The adjusted R^2 was 0.457, indicating that the model explained 45.7% of the variation in LBW cases. These findings highlight the importance of early maternal age screening, improved ANC compliance, and targeted interventions for low-income pregnant women in reducing LBW prevalence. It is hoped that future researchers will examine risk factors not examined in this study with a more diverse population.

Keywords: low birth weight, antenatal care, maternal age, economic status, risk factors

1. Introduction

Indonesia is the fourth most populous country in the world. This aligns with the 4.18 percent increase in employment from 2023 to 2024. In terms of producing high-quality offspring, one important factor that requires greater attention is having healthy, high-quality genes (Rahman et al., 2023). Nutrition must be designed from an early age, particularly during the First 1000 Days of Life (HPK). Nutrition is one of the most important factors influencing the development of embryos and fetuses, as well as the health condition of mothers. The most common nutritional problem in Indonesia occurs during pregnancy. Pregnant women who experience long-term malnutrition may suffer from chronic energy deficiency (CED) (Hartini et al., 2023).

According to the World Health Organization (2021), the number of Muslim women worldwide was estimated at 278 million. According to statistics from South Sulawesi Province, the number of pregnant women in Indonesia in 2021 was 15,690,381, while in Luwu it was 5,678.

The incidence of CED and low birth weight (LBW) in South Sulawesi Province has declined in several periods. In 2021, 19,940 pregnant women experienced CED, and 6,364 infants were born with LBW. In Luwu Regency, the number of pregnant women in 2021 was 709, with cases of CED and 52 infants born with LBW.

Based on initial observations at Bua Ponrang Health Center, 407 pregnant women were recorded in 2022, with 59 cases of CED. In 2023, the number of pregnant women increased to 626, with 50 cases of CED. In 2024, there were 651 pregnant women, with 62 cases of CED.

Research conducted by Ekariono et al. (2025) revealed that the problem of LBW is not solely caused by maternal health factors, but rather by multiple contributing factors, particularly within the context of public health approaches to pregnant women. Several Research variables included place of residence (rural or urban), education level, smoking habits, maternal age, pregnancy spacing, parity, and nutritional diet.

Low birth weight (LBW) has become a significant global public health issue and is associated with various short- and long-term consequences. It is estimated that 15%–20% of the world's population suffers from LBW, accounting for more than 20 million births each year. According to Riskesdas statistics, the prevalence of LBW in Indonesia is around 6.2 percent (Wari et al., 2025). In Luwu Regency, the number of LBW cases was 249 in 2020, 241 in 2021, and 242 in 2022.

Several factors contribute to LBW, including maternal, infant, and environmental factors. Maternal factors include age, pregnancy history, illness, social conditions, and poor nutritional status during pregnancy. Infant-related factors include hydramnios, multiple pregnancies, and chromosomal abnormalities. Environmental factors include temperature, radiation, and toxic substances (Syarif, 2025). Among these, the most significant contributors to LBW are chronic energy deficiency (CED) and anemia (Susiyanti et al., 2025).

When a woman's nutritional needs increase, she must ensure her child receives adequate nutrition. Pregnant women suffering from CED experience greater discomfort, especially during the third trimester, compared to normal pregnant women. As a result, pregnant women with CED have a higher risk of delivering LBW infants (D. Putri & Maulani, 2023).

The relationship between CED and LBW is also supported by findings from Masan et al. (2022), which showed a significant correlation between CED and LBW during pregnancy. Since malnutrition reflects the maternal nutritional status prior to conception, it affects fetal growth and development throughout pregnancy. Therefore, a mother will give birth to a healthy infant if her nutritional and health status are maintained at an optimal level.

Maternal age also affects LBW. The 20–35-year age group is considered the safest and most mature for pregnancy and childbirth. Mothers under the age of 20 may face risks due to an immature reproductive system, potentially affecting fetal development and leading to complications during labor, thus increasing the Risk of LBW. Conversely, women over 35 years old are more vulnerable to reproductive decline, reduced elasticity during delivery, and physiological changes, which can also negatively affect both mother and fetus (Juntika et al., 2025).

The association between maternal age and LBW incidence is further supported by Apriani et al. (2021), who found a significant relationship between gestational age and LBW at Cilacap General Hospital (p-value = 0.000), with an OR of 20.213 (CI: 6.332–64.522). This indicates that preterm pregnancies are 20.213 times more likely to result in LBW compared to pregnancies with lower risk parity.

Based on these phenomena, the researcher is interested in conducting a study entitled "Analysis of Risk Factors for the Incidence of Low Birth Weight (LBW) at Bua Ponrang Public Health Center, Luwu Regency."

2. Methodology

This study employed a quantitative, case-control design to analyze risk factors for low birth weight (LBW). The Research was conducted at Bua Ponrang Public Health Center, Luwu Regency, from January to July 2025, with a population of 300 respondents. The sample consisted of 300 participants (a total sampling design).

Data were collected from medical records (secondary data) and processed through the stages of editing, scoring, tabulation, and cleaning. Data analysis included univariate analysis for frequency distribution and multivariate analysis using multiple linear regression to determine the extent of the influence of LBW risk factors. Before multivariate analysis, the data were tested for classical assumptions.

3. Results

A. Respondent Characteristics

Table 1 Respondent Characteristics

No	Variable	n	%
1	Birth Weight Status - Normal	150	50.0
	Birth Weight Status - Low Birth Weight (LBW)	150	50.0
2	Residence - Urban	157	52.3
	Residence - Rural	143	47.7
3	Education Level - Basic	151	50.3
	Education Level - Higher	149	49.7

4	Maternal Age - At Risk (<22 years or >35 years)	142	47.3
	Maternal Age - Not at Risk (22–34 years)	158	52.7
5	Parity - Primipara	159	53.0
	Parity - Multipara	141	47.0
6	Birth Spacing <33 months	168	56.0
	Birth Spacing >33 months	132	44.0
7	Economic Status - Equal to Regional Minimum Wage	158	52.7
	Economic Status - Below Regional Minimum Wage	147	49.0
8	ANC Compliance - Routine	153	51.0
	ANC Compliance - Not Routine	147	49.0

Based on the frequency distribution table, the study showed that birth weight status consisted of 150 samples (50%) with normal birth weight and 150 samples (50%) with low birth weight. According to residence status, 157 samples (52.3%) were from urban areas, while 143 (47.7%) were from rural areas. Regarding education level, 151 samples (50.3%) had a basic education level, while 149 samples (49.7%) had a higher education level. Based on maternal age, 142 samples (47.3%) were categorized as at Risk (<22 years or >35 years), while 158 samples (52.7%) were categorized as not at Risk (22–34 years).

Regarding parity, 159 samples (53%) were primiparous, and 141 samples (47%) were multiparous. Based on birth spacing, 168 samples (56%) had an interval of less than 33 months, while 132 samples (44%) had an interval of more than 33 months. Based on economic status, 158 samples (52.7%) had income equal to the regional minimum wage (UMR), while 147 samples (49%) had income below the minimum wage. Meanwhile, regarding antenatal care (ANC) compliance, 153 samples (51%) attended ANC routinely, whereas 147 samples (49%) did not.

B. Classical Assumption Test

The purpose of the classical assumption test is to ensure that the obtained regression equation is consistent. However, the classical assumption tests are conducted before the linear regression test, using tests for normality, multicollinearity, and heteroscedasticity. This study used only three classical assumption tests because the data were not a time series.

1) Data Normality Test

Table 2 Kolmogorov-Smirnov Normality Test Results

N		300
Normal parameters[a,b]	Mean	.0000000
	Std. deviation	.36466266
Most extreme differences	Absolute	.057
	Positive	.057
	Negative	-.050
Test statistic		.057
Asymp. Sig (2-tailed)		.020[c]
Exact sig. (2-tailed)		.275

Based on Table 2, it can be concluded that the Asymp. Sig. (2-tailed) value is 0.020, <α = 0.05, indicating the data are not normally distributed. Therefore, the researcher conducted an exact test to ensure that the analyzed data is normally distributed, with an exact significance. (2-tailed) value of 0.275 > 0.05. The Kolmogorov-Smirnov test indicates that the data are normally distributed and meet the normality requirements for the regression model.

2) Multicollinearity Test

Table 3 Multicollinearity Test Results

Model	Collinearity statistic	
	Tolerance	VIF
Residence status	.947	1.055
Education level	.253	3.946
Maternal Age	.256	3.904
Parity	.993	1.007
Birth Spacing	.991	1.009
Economic Status	.922	1.080
ANC Compliance	.915	1.082

Based on the test results, there is no evidence of multicollinearity in the regression model for all variables tested.

3) Heteroscedasticity Test

Table 4 Heteroscedasticity Test Results

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	beta		
Residence status	-.012	.028	-.025	-.423	.672
Education level	-.064	.053	-.139	-1.201	.231
Maternal Age	.066	.053	.143	1.239	.216
Parity	.011	.027	.023	.395	.693
Birth Spacing	.015	.027	.033	.556	.579
Economic Status	.017	.028	.036	.593	.553
ANC Compliance	.008	.026	.018	.290	.772

In Table 4, based on the test results for all variables, it can be concluded that, according to the Glejser test, there is no heteroscedasticity in the regression model.

C. Hypothesis Testing (Multiple Linear Regression)

Table 5 Multiple Regression Test Results

Variable	Coefficient (B)	Sig. Value	Interpretation
Constant	1.700	–	If all variables are constant, the incidence of LBW is 1.700.
Place of Residence	-0.219	0.000	Negative; an increase decreases LBW, a decrease increases LBW.
Education Level	-0.132	0.121	Negative; higher education reduces LBW incidence.
Maternal Age	0.350	0.000	Positive; higher age in the risky range increases LBW incidence.
Parity	-0.069	0.107	Negative; more pregnancies reduce LBW incidence.
Birth Spacing	0.116	0.008	Positive; risky birth spacing increases LBW incidence.
Economic Status	-0.162	0.000	Negative; higher economic status reduces LBW incidence.
ANC Compliance	-0.160	0.000	Negative; better compliance reduces LBW incidence.

Table 6 F Test Results

Model	Sum Of Squares	Df	Mean Square	F	Sig.
Regression	35.239	7	5.034	36.971	.000[b]
Residual	39.761	292	.136		
Total	75.000	299			

Based on the table above, the regression results in SPSS 26 are shown by the calculated F (36.971), which is greater than the F table (2.12) at the 0.000 significance level (< 0.05), indicating that the regression model is appropriate (goodness of fit). Thus, it can be concluded that the variables of residential status, education level, maternal age, pregnancy spacing, number of pregnancies, economic level, and ANC compliance all influence LBW simultaneously.

Table 7 T Test Results

Variable	**T-value**	**t-table**	**Sig. Value**	**Conclusion**
Place of Residence	4.990	1.968	0.000 < 0.005	Significant (H1 accepted)
Education Level	-1.555	1.968	0.121 > 0.005	Not Significant (H2 rejected)
Parity (Number of Pregnancies)	-1.617	1.968	0.107 > 0.005	Not Significant (H4 rejected)
Maternal Age	-4.154	1.968	0.000 < 0.005	Significant (H3 accepted)
Birth Spacing	-2.684	1.968	0.00001 < 0.005	Significant (H1 accepted)
Economic Status	3.641	1.968	0.003 < 0.005	Significant (H1 accepted)
ANC Compliance	3.584	1.968	0.000 < 0.005	Significant (H1 accepted)

Table 8 Test of Determination Coefficient (R^2)

Model	R	R Square	Adjusted R Square	Std. error of the estimate
1	.685[a]	.470	.457	.36901

Based on Table 8, the coefficient of determination (R2) is 0.457. It can be concluded that 45.7% is influenced by residential status, education level, maternal age, pregnancy spacing, number of pregnancies, economic level, and ANC compliance. At the same time, the remaining 54.3% is explained by other factors or variables outside the model.

5. Discussion

a. Influence of Residential Status on the Incidence of Low Birth Weight (LBW)

The results showed that residential status had a significant effect on LBW incidence, with a t-value of 4.990 > 1.968 and a significance value of 0.00 < 0.005, indicating that H1 was accepted. Mothers living in rural areas tend to have a higher risk of delivering LBW infants compared to those living in urban areas. This may be due to limited access to health facilities, transportation, medical personnel, and health information. The World Health Organization (2019) emphasizes that living conditions are critical social determinants of maternal and child health. Poor infrastructure, sanitation, and limited healthcare access increase pregnancy complications, including LBW. Studies by Dewi et al. (2021), Wulandari & Laksono (2020), and Silva et al. (2022) support these findings.

b. The Influence of Education Level on the Incidence of LBW

The results showed that the education level variable had a t-value of -1.555 < 1.968 and a significance of 0.121 > 0.005, meaning H2 was rejected. Education level was not statistically significant in influencing LBW incidence. However, theory suggests education remains an important factor affecting mothers' knowledge of nutrition, health, and pregnancy behavior (Notoatmodjo, 2020). Studies (Titaley et al., 2020; Nugraheni et al., 2021) note that low education levels correlate with a limited understanding of the importance of ANC, but the lack of statistical significance here may reflect homogeneous respondents or alternative sources of health information, such as health workers or digital media.

c. The Influence of Maternal Age on the Incidence of LBW

The results showed that maternal age had a t-value of -4.154 < 1.968 with a significance value of 0.00 < 0.005, meaning H3 was accepted. Maternal age significantly influences LBW incidence. Mothers under 20 and over 35 are at high Risk due to biological immaturity, hormonal imbalances, poor nutritional status, and higher rates of chronic conditions like hypertension and diabetes (Kemenkes RI, 2021). Studies (Yanti et al., 2022; Putri et al., 2021; Lee et al., 2019) confirm that mothers <20 or >35 years have double the Risk of preterm birth and LBW compared to those aged 20–34 years.

d. The Influence of Number of Pregnancies on the Incidence of LBW

The results showed a t-value of -1.617 < 1.968 and a p-value of 0.107 > 0.005, indicating that H4 was rejected. The number of pregnancies (primipara vs multipara) was not significant for LBW. Obstetric theory suggests that the first pregnancy may carry a greater risk, but multiparity risks depend on maternal age, birth spacing, and obstetric history (Cunningham et al., 2022). Research (Wahyuni & Prasetya, 2019; Amalia & Febrianti, 2022) similarly reports no consistent link between parity and LBW.

e. The Influence of Birth Spacing on the Incidence of LBW

The results showed a t-value of -2.684 < 1.968, with a significance value of 0.001 < 0.005, indicating that H1 was accepted. Short birth spacing (<33 months) was associated with a significantly higher incidence of LBW. Close intervals do not allow mothers' bodies to recover nutritionally or physiologically, impacting fetal growth. WHO (2019) recommends a minimum of 24 months between pregnancies. Findings are supported by Conde-Agudelo et al. (2019), Huang et al. (2022), and Sari et al. (2019).

f. The Influence of Economic Status on the Incidence of LBW

The results showed a t-value of 3.641 > 1.968, with a significance of 0.003 < 0.005, indicating that H1 was accepted. Economic status significantly influenced LBW. Mothers below the minimum wage threshold had higher LBW risk due to poor nutrition, limited ANC access, and substandard housing. This aligns with WHO's (2019) social gradient in health. Supporting studies include Fitriyani et al. (2021), Huang et al. (2022), and Kusumawati & Lestari (2020).

g. The Influence of ANC Compliance on the Incidence of LBW

The results showed a t-value of 3.584 > 1.968, with a significance of 0.00 < 0.005, indicating that H1 was accepted. ANC compliance significantly reduced LBW incidence. Routine ANC helps detect risks, provide supplements, and deliver health education. WHO (2021) and UNICEF (2019) recommend at least 8 ANC visits. Studies (Kartini et al., 2020; Astutik & Kurniasari, 2020) confirm that high-quality ANC reduces the Risk of anemia, preeclampsia, and other complications.

h. Public Health Implications of LBW Risk Factors

These findings carry significant public health implications. Factors such as residence, maternal age, birth spacing, economic status, and ANC compliance significantly influence LBW incidence. Interventions should focus on improving access to and quality of ANC services, reproductive health education, maternal nutrition, and socioeconomic support. Community-based strategies and digital health tools can enhance ANC compliance. Evidence (Huang et al., 2022; Kemenkes RI, 2021; Hernandez et al., 2025; WHO, 2021) highlights the role of integrated, family-centered, and environmentally conscious approaches in reducing LBW incidence and improving neonatal survival

6. Conclusion

This study concludes that residential status, maternal age, birth spacing, economic status, and ANC compliance significantly influence the incidence of low birth weight (LBW). In contrast, maternal education and parity do not show a significant effect. Overall, the regression model explains 45.7% of the variation in LBW incidence, with the remaining variation influenced by other factors not examined in this study.

References

Amalia, R., & Febrianti, N. (2022). Hubungan Paritas Dengan Kejadian Bayi Berat Lahir Rendah Di Wilayah Kerja Puskesmas X. *Jurnal Kesehatan Reproduksi, 13(2), 102–110*.

Andriani, L., Silaen, P. Y., Humayrah, W., Qurniyawati, E., Murdani, A. P., Yuliani, C., & Sihombing, I. U. A. (2025). Pengelolaan Dan Pemanfaatan Data Kesehatan: Perspektif Epidemiologi. *Sada Kurnia Pustaka*.

Andriani, N., & Masluroh, S. (2023). Hubungan Anemia Dan Kekurangan Energi Kronis (Kek) Pada Ibu Hamil Dengan Kejadian Bblr. *Jurnal Kesehatan Masyarakat, 11(2), 123–132*.

Antika, S. (2025). Efektivitas Intervensi Pendidikan Kesehatan Dalam Meningkatkan Kesadaran Gizi Pada Ibu Hamil: Systematic Literature Review. *Diagnosa: Jurnal Hasil Riset Dan Pengembangan Ilmu Kesehatan, 1(1), 11-19*.

Apriani, E., Subandi, A., & Mubarok, A. K. (2021). Hubungan Usia Ibu Hamil, Paritas Dan Usia Kehamilan Dengan Kejadian Bblr Di Rsud Cilacap. *Trends Of Nursing Science (Tens), 2(1), 45–52*.

Asman, A. (2021). Sumber Data, Populasi Dan Sampel Penelitian Hukum Islam. *Artikel*.

Astutik, S., & Kurniasari, R. (2020). Hubungan Kepatuhan Kunjungan Antenatal Care (Anc) Dengan Kejadian Berat Badan Lahir Rendah (Bblr). *Jurnal Kebidanan Dan Kesehatan, 12(2), 101–110*.

Azzahro, F. (2024). Hubungan Status Gizi Ibu Saat Hamil Dengan Kejadian Stunting Pada Bayi Usia 0-12 Bulan Di Wilayah Kerja Puskesmas Pegandon Kabupaten Kendal. *Doctoral Dissertation, Universitas Islam Sultan Agung Semarang*.

Baroroh, I. (2024). Buku Ajar Asuhan Kebidanan Neonatus, Bayi, Dan Balita. *Penerbit Nem*.

Conde-Agudelo, A., Rosas-Bermúdez, A., & Kafury-Goeta, A. C. (2019). Birth Spacing And Risk Of Adverse Perinatal Outcomes: A Meta-Analysis. *Jama, 321(6), 593–603. Https://Doi.Org/10.1001/Jama.2019.0123*.

Cunningham, F. G., Leveno, K. J., Bloom, S. L., Dashe, J. S., Hoffman, B. L., Casey, B. M., & Spong, C. Y. (2022). Williams Obstetrics (26th Ed.). *Mcgraw-Hill Education*.

Dagmawi, T., Alemayehu, G., Tesfaye, B., & Hiwot, A. (2023). Antenatal Care Follow-Up And Its Association With Maternal And Neonatal Outcomes: A Cross-Sectional Study. *Bmc Pregnancy And Childbirth, 23(1), 112–120. Https://Doi.Org/10.1186/S12884-023-05510-3*.

Darwin, D., Yulianti, N., & Safrillah, N. F. (2025). Stunting Dalam Aspek Sosial. *Penerbit Nem*.

Dewi, R., Yuliana, N., & Putri, A. (2021). Determinan Kejadian Bayi Berat Lahir Rendah Berdasarkan Karakteristik Ibu Hamil Di Daerah Pedesaan. *Jurnal Kesehatan Reproduksi, 12(2), 85–94*.

Ekariono, M., Siregar, A., & Putri, D. (2025). Pendekatan Kesehatan Masyarakat Terhadap Faktor-Faktor Yang Memengaruhi Kejadian Bayi Berat Lahir Rendah (Bblr). *Jurnal Kesehatan Masyarakat Indonesia, 20(1), 45–56*.

Fadli, M. R. (2021). Memahami Desain Metode Penelitian Kualitatif. *Humanika, Kajian Ilmiah Mata Kuliah Umum, 21(1), 33-54*.

Firdaus, F., Ahmad, S., Akhyar, A., & Haeril, H. (2024). Efektivitas Program Kesehatan Berbasis Masyarakat Untuk Mengurangi Prevalensi Stunting Di Kabupaten Bima. *Jurnal Syntax Imperatif: Jurnal Ilmu Sosial Dan Pendidikan, 5(3), 366-376*.

Fitriyani, F., Sari, D. P., & Putra, H. (2021). Hubungan Status Ekonomi Dengan Kejadian Anemia Pada Ibu Hamil Di Puskesmas X. *Jurnal Kebidanan Dan Kesehatan, 13(1), 45–52*.

Gedefaw, G., Alemnew, B., & Tekleab, A. M. (2020). Low Birth Weight And Its Associated Risk Factors: Health Facility-Based Case-Control Study. *Italian Journal Of Pediatrics, 46(1), 124. Https://Doi.Org/10.1186/S13052-020-00876-0*.

Ghozali, I. (2016). Aplikasi Analisis Multivariate Dengan Program Ibm Spss 23 (Edisi 8). *Badan Penerbit Universitas Diponegoro*.

Harahap, N. E., & Oktiarmi, P. (2024). Analisis Sistematis Prevalensi Dan Faktor Penyebab Bayi Berat Badan Lahir Rendah (Bblr). *Midwifery Health Journal, 8(2), 67-77*.

Hartanti, T., Nugroho, S., & Prasetya, E. (2020). Hubungan Status Ekonomi Keluarga Dengan Kejadian Berat Badan Lahir Rendah Di Kota Surabaya. *Jurnal Kesehatan Reproduksi, 11(1), 45–53*.

Hartini, L., Widiyanti, D., Maigoda, T. C., Yanniarti, S., & Yulyana, N. (2023). Kehamilan Sehat Untuk Cegah Stunting Pada 1000 Hari Pertama Kehidupan (Hpk). *Penerbit Nem*.

Haryanti, S. (2019). Anemia Dan Kek Pada Ibu Hamil Sebagai Faktor Risiko Kejadian Bayi Berat Lahir Rendah (Bblr) (Studi Di Wilayah Kerja Puskesmas Juwana Kabupaten Pati). *Jurnal Kebidanan Dan Kesehatan Tradisional, 4(2), 67–75*.

Hernandez, R., Gomez, L., & Martinez, J. (2025). Family-Based Interventions To Improve Maternal Nutrition And Reduce Low Birth Weight: A Community Health Perspective. *Journal Of Maternal And Child Health, 17(2), 145–158*.

Hidayati, Skm, S. (2024). Pengantar Ilmu Kesehatan Masyarakat. *Pengantar Ilmu Kesehatan Masyarakat, 62*.

Huang, Y., Zhang, Y., Wang, Y., & Li, X. (2022). Short Interpregnancy Interval And Risk Of Low Birth Weight: Evidence From A Population-Based Study In China. *Bmc Pregnancy And Childbirth, 22(1), 455. Https://Doi.Org/10.1186/S12884-022-04789-4*.

Hutami, W. F. (2024). Populasi Dan Sampel Dalam Penelitian. *Jurnal Public Relations Mercu Buana, Query Date, 21, 23*.

Iramayasari, A. (2023). Hubungan Kek Dan Anemia Pada Ibu Hamil Dengan Kejadian Bblr Di Puskesmas Aik Mual. *Jurnal Kebidanan Nusantara, 5(1), 55–63*.

Irawati, N. (2020). Hubungan Anemia Dan Kekurangan Energi Kronis (Kek) Pada Ibu Hamil Dengan Kejadian Bayi Berat Lahir Rendah (Bblr) Di Desa Wirun Kecamatan Mojolaban Kabupaten Sukoharjo. *Jurnal Kebidanan Indonesia, 11(2), 89–97*.

Jadida, A. K. (2025). Konvergensi Program Penurunan Stunting Dalam Kerangka Kebijakan Dan Kolaborasi Lintas Sektor Di Kabupaten Grobogan. *Jurnal Paradigma Grobogan, 2(1), 65-87*.

João, A. L., Silva, M. R., & Fernandes, T. (2024). Birth Interval And Its Effect On Maternal And Child Health Outcomes: Evidence From A Population-Based Cohort Study. *International Journal Of Gynecology & Obstetrics, 164(2), 201–209. Https://Doi.Org/10.1002/Ijgo.14987*.

Juntika, L. P., Rafidah, R., Yuniarti, Y., & Hipni, R. (2025). Hubungan Anemia, Umur, Dan Paritas Pada Ibu Bersalin Dengan Kejadian Berat Badan Lahir Rendah (Bblr) Di Rsud H. Boejasin. *Jurnal Kebidanan Bestari, 9(1), 1-14*.

Kartini, Y., Pratiwi, D., & Handayani, S. (2020). Peran Kualitas Pelayanan Antenatal Care (Anc) Dalam Pencegahan Komplikasi Kehamilan. *Jurnal Kesehatan Reproduksi, 7(1), 55–64*.

Kemendikdasmen. (2025). Statistik Pendidikan Indonesia Tahun 2025. *Kementerian Pendidikan Dasar Dan Menengah Republik Indonesia*.

Kementerian Kesehatan Republik Indonesia. (2021). Profil Kesehatan Indonesia Tahun 2021. *Kementerian Kesehatan Ri*.

Kementerian Kesehatan Ri. (2019). Profil Kesehatan Indonesia Tahun 2019. *Jakarta: Kementerian Kesehatan Republik Indonesia*.

Keputusan Gubernur Sulawesi Selatan. (2024). Upah Minimum Regional Kabupaten Luwu Tahun 2025. *Pemerintah Provinsi Sulawesi Selatan*.

Kusumawati, N., & Lestari, R. (2020). Pengaruh Pendapatan Keluarga Terhadap Status Gizi Ibu Hamil Di Kabupaten Yogyakarta. *Jurnal Gizi Dan Kesehatan Reproduksi, 2(2), 88–95*.

Lailatul Mustaghfiroh, S., Rahmawati, D., & Fitriyah, N. (2020). Perbedaan Berat Badan Lahir Bayi Pada Ibu Hamil Kekurangan Energi Kronik (Kek) Dan Ibu Hamil Anemia Di Puskesmas Mlonggo Kabupaten Jepara. *Jurnal Kebidanan Dan Kesehatan Tradisional, 5(1), 11–18*.

Lee, S. H., Kim, J. H., & Park, J. H. (2019). Maternal Risk Factors Associated With Low Birth Weight In South Korea: A Population-Based Study. *Bmc Pregnancy And Childbirth, 19(1), 138. Https://Doi.Org/10.1186/S12884-019-2280-2*.

Makhroh, I., Sari, R. N., & Widodo, A. (2018). Faktor-Faktor Yang Berhubungan Dengan Kejadian Berat Badan Lahir Rendah Di Kabupaten Banyumas. *Jurnal Kebidanan, 10(2), 75–82. Https://Doi.Org/10.26714/Jk.10.2.2018.75-82*.

Masan, L., Haryanti, Y., & Juliansyah, E. (2022). Riwayat Ibu Bersalin Kekurangan Energi Kronik Berhubungan Dengan Kejadian Bayi Berat Lahir Rendah. *Jurnal Sains Kebidanan, 4(1), 7-13*.

Musdalifa, & Rahmawati, L. (2023). Hubungan Ibu Hamil Kekurangan Energi Kronik (Kek) Dengan Kejadian Bayi Berat Lahir Rendah (Bblr) Di Blud Uptd Puskesmas Abeli Kota Kendari. *Jurnal Kesehatan Masyarakat, 15(1), 45–53*.

Mushofa, M., Hermina, D., & Huda, N. (2024). Memahami Populasi Dan Sampel: Pilar Utama Dalam Penelitian Kuantitatif. *Jurnal Syntax Admiration, 5(12), 5937-5948*.

Muthayya, S. (2020). Maternal Nutrition & Low Birth Weight: From Research To Practice. *Indian Journal Of Medical Research, 152(5), 415–422. Https://Doi.Org/10.4103/Ijmr.Ijmr_1237_20*.

Notoatmodjo, S. (2020). Ilmu Perilaku Kesehatan (Edisi Revisi). *Rineka Cipta*.

Nugraheni, S. A., Utami, R. A., & Sari, D. P. (2021). The Role Of Maternal Education On Low Birth Weight Incidence In Indonesia: Analysis Of Alternative Health Information Sources. *International Journal Of Public Health Science (Ijphs), 10(3), 546–553*.

Oduse, S., Adebayo, A., & Ayinde, O. (2021). Urban-Rural Disparities In Maternal Health Service Utilization In Sub-Saharan Africa: A Systematic Review. *African Journal Of Reproductive Health, 25(4), 112–124. Https://Doi.Org/10.29063/Ajrh2021/V25i4.11*.

Oktaviani, E. (2021). Pengaruh Kek Pada Ibu Hamil Terhadap Kejadian Bblr Di Puskesmas Rongkop Gunungkidul Yogyakarta Tahun 2020. *Doctoral Dissertation, Poltekkes Kemenkes Yogyakarta*.

Purboningtyas, E. (2021). Hubungan Kejadian Kurang Energi Kronis (Kek) Dan Usia Ibu Hamil Dengan Kejadian Berat Badan Lahir Rendah (Bblr) Di Wilayah Kerja Puskesmas Gondang. *Jurnal Ilmiah Kebidanan, 7(1), 23–30*.

Putri, A., & Hidayati, R. (2019). Hubungan Status Gizi Ibu Hamil Dengan Kejadian Berat Badan Lahir Rendah Di Puskesmas Kecamatan Sukajadi. *Jurnal Kebidanan Dan Kesehatan Tradisional, 4(2), 98–106*.

Putri, A. N., Handayani, L., & Sari, D. P. (2021). Maternal Age As A Determinant Of Low Birth Weight In Indonesia: Evidence From Demographic And Health Survey. *International Journal Of Public Health Science (Ijphs), 10(4), 789–796*.

Putri, D., & Maulani, N. (2023). Asuhan Kebidanan Komprehensif Pada Ibu Hamil Tm Ii Kekurangan Energi Kronik (Kek) Dengan Manajemen Nutrisi Di Pmb I Kota Bengkulu Tahun 2023. *Doctoral Dissertation, Sekolah Tinggi Ilmu Kesehatan Sapta Bakti*.

Qurniyawati, E. (2023). Perbedaan Studi Observasional. *Pengantar Epidemiologi, 1, 39*.

Rahman, H. N., Nugrahani, C. I., Ferdina, C. S., Christiana, E., Sari, A. P., Iszakiyah, N., & Rahman, T. (2023). Cegah Stunting Sebagai Upaya Wujudkan Generasi Emas. *Penerbit Nem*.

Rahmawati, F., & Kusuma, H. (2019). Pengaruh Kunjungan Antenatal Terhadap Kejadian Berat Badan Lahir Rendah Di Kabupaten Sleman. *Jurnal Kesehatan Reproduksi, 10(2), 77–84*.

Retnaningtyas, D., & Siwi, N. (2020). Analisis Kejadian Anemia Dan Kek Pada Ibu Hamil Terhadap Kejadian Bblr Di Rsud Gambiran Kediri. *Jurnal Kesehatan Prima, 14(1), 29–36*.

Rusli, A., Fadhil, M., Ishaq, M., Hidayatullah, R., & Harmonedi, H. (2025). Strategi Pengumpulan Dan Pengelolaan Data Dalam Penelitian Pendidikan: Kajian Teoretis Dan Praktis. *Ihsan: Jurnal Pendidikan Islam, 3(3), 573-581*.

Rusmiati. (2023). Hubungan Status Kekurangan Energi Kronik (Kek) Ibu Hamil Dengan Kejadian Berat Badan Lahir Rendah (Bblr) Di Puskesmas Sumbang Kabupaten Enrekang. *Jurnal Ilmiah Kebidanan, 9(2), 55–62*.

Saragatama, P., Frilasari, H., & Mardiyana, R. (2024). Analisis Faktor-Faktor Penyebab Angka Kejadian Bblr Di Rsud Syarifah Ambami Rato Ebuh Bangkalan. *Doctoral Dissertation, Perpustakaan Universitas Bina Sehat Ppni*.

Sari, D. P., Nurhayati, L., & Mulyani, R. (2020). Faktor-Faktor Risiko Berat Badan Lahir Rendah Di Rumah Sakit Umum Daerah Kota Bandung. *Jurnal Kesehatan Masyarakat, 12(2), 143–151*.

Sari, N. P., Handayani, D., & Pratiwi, H. (2019). Hubungan Jarak Kehamilan Dengan Kejadian Bayi Berat Lahir Rendah Di Wilayah Kerja Puskesmas X. *Jurnal Kebidanan Indonesia, 10(2), 123–130*.

Silva, A. A. M., Batista, R. F. L., & Simões, V. M. F. (2021). Socioeconomic And Maternal Factors Associated With Low Birth Weight In Brazil: A Population-Based Study. *Bmc Public Health, 21(1), 345. Https://Doi.Org/10.1186/S12889-021-10354-4*.

Silva, R., Santos, A., Oliveira, M., & Ferreira, L. (2022). Maternal Residential Status And Risk Of Low Birth Weight: A Population-Based Study. *Bmc Pregnancy And Childbirth, 22(1), 1–10*.

Sulaiman, E. S. (2021). Pemberdayaan Masyarakat Di Bidang Kesehatan: Teori Dan Implementasi. *Ugm Press*.

Susiyanti, S., Ariesti, N., & Samal, D. (2025). Hubungan Anemia Dan Kekurangan Energi Kronik Dengan Kejadian Bblr. *Sinergi: Jurnal Riset Ilmiah, 2(8), 3646-3655*.

Syarif, S. (2025). Faktor-Faktor Yang Mempengaruhi Terjadinya Bblr Di Rskdia Siti Fatimah Makassar Tahun 2024. *Proceedings Series On Health & Medical Sciences, 7, 94-99*.

Tiara, T. (2023). Asuhan Kebidanan Bayi Berat Lahir Rendah Untuk Pencegahan Stunting Di Tempat Praktik Bidan Nurul Marfuah Tulang Bawang Barat. *Doctoral Dissertation, Poltekkes Tanjungkarang*.

Titaley, C. R., Ariawan, I., Hapsari, D., Muasyaroh, A., & Dibley, M. J. (2020). Determinants Of Low Birthweight In Indonesia: Findings From The 2013 Indonesia Demographic And Health Survey. *Bmc Pregnancy And Childbirth, 20, 81. Https://Doi.Org/10.1186/S12884-020-2749-3*.

Tsegaye, B., Kassa, A., & Nigussie, A. (2019). Risk Factors Associated With Low Birth Weight Among Newborns Delivered In Public Hospitals In Addis Ababa, Ethiopia. *Journal Of Health, Population And Nutrition, 38(1), 16. Https://Doi.Org/10.1186/S41043-019-0177-Y*.

United Nations Children's Fund (Unicef). (2019). The State Of The World's Children 2019: Children, Food And Nutrition – Growing Well In A Changing World. *Unicef. Https://Www.Unicef.Org/Reports/State-Of-Worlds-Children-2019*.

Utami, A., & Yeni, Y. (2024). Determinan Kejadian Bblr Di Sumatera Selatan (Analisis Data Sdki 2017). *In Proceeding Seminar Nasional Keperawatan (Vol. 10, No. 1, Pp. 228-236)*.

Wahyuni, S., & Prasetya, R. E. (2019). Paritas Dan Faktor Maternal Lainnya Yang Berhubungan Dengan Kejadian Bblr. *Jurnal Kebidanan Dan Kesehatan Tradisional, 4(1), 45–53*.

Wang, Y., Li, X., & Zhou, M. (2020). Environmental And Maternal Risk Factors For Low Birth Weight In China: A Case-Control Study. *International Journal Of Environmental Research And Public Health, 17(12), 4567. Https://Doi.Org/10.3390/Ijerph17124567*.

Wari, F. E., Khasanah, N. A., & Noviliansari, P. P. (2025). Anemia Dan Kek Pada Ibu Hamil Dengan Kejadian Berat Badan Lahir Rendah. *Jurnal Mid-Z (Midwivery Zigot) Jurnal Ilmiah Kebidanan, 8(1), 8-17*.

Widjaja, G. (2025). Analisis Peningkatan Fasilitas Kesehatan Dan Pelatihan Tenaga Medis Dalam Mendukung Program Kesehatan Ibu Dan Anak: Kajian Pustaka. *Journal Of Community Dedication, 4(4), 212-224*.

Winancy, S. S. T Keb, M. (2025). Determinan Berat Badan Lahir Rendah. *Cv Jejak (Jejak Publisher)*.

World Health Organization. (2016). Who Recommendations On Antenatal Care For A Positive Pregnancy Experience. *World Health Organization. Https://Www.Who.Int/Publications/I/Item/9789241549911*.

World Health Organization. (2019). Low Birthweight: Policy Brief. *World Health Organization. Https://Www.Who.Int/Publications/I/Item/9789241550467*.

World Health Organization. (2021). World Health Statistics 2021. *World Health Organization. Https://Www.Who.Int/Data*.

Wulandari, R. D., & Laksono, A. D. (2020). Determinants Of Low Birth Weight In Indonesia: A Multilevel Analysis. *Journal Of Preventive Medicine And Public Health, 53(4), 243–250. Https://Doi.Org/10.3961/Jpmph.20.085*.

Wulandari, S., Pratiwi, R., & Nugroho, T. (2021). Faktor Risiko Berat Badan Lahir Rendah Di Wilayah Kerja Puskesmas Banyumanik Semarang. *Jurnal Kesehatan Reproduksi, 12(1), 67–75*.

Yanti, L., Rahmawati, D., & Nugroho, A. (2022). The Effect Of Maternal Age On Preterm Birth And Low Birth Weight In Indonesia. *Bmc Public Health, 22(1), 1187. Https://Doi.Org/10.1186/S12889-022-13412-5*.

Yumesri, Y. (2024). Etika Dalam Peneltian Ilmiah. *Jurnal Genta Mulia, 15(2), 63-69*.
Zahra, N., Putri, F., & Hidayat, R. (2022). Maternal Age And Its Association With Low Birth Weight: Evidence From Indonesia. *Journal Of Maternal And Child Health, 7(3), 245–253. Https://Doi.Org/10.26911/Thejmch.2022.07.03.05*.