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Determinants of Low Birth Weight Incidence at Padangsidimpuan City Hospital in 2025

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ABSTRACT

The infant mortality rate in Indonesia based on the 2012 Indonesian Demographic and Health Survey (SDKI) was 32 per 1,000 live births and the Neonatal Mortality Rate (AKN) in 2012 was 19 per 1,000 live births.This research is a quantitative analytical study with a case-control design using secondary data from medical record. The population size in this study was 104 mothers who gave birth with low birth weight (LBW).Padangsidimpuan City Hospital in 2025 period from January to September 2025. Researchers can draw the following conclusions 51% of mothers who gave birth to LBW were at risk, 79.8% had low education, 78.8% had high risk parity, 41.3% were working mothers and 65.4% experienced complications during pregnancy. Factors related to the incidence of LBW are maternal age (p value 0.000), education (p value 0.002), parity (p value 0.002) and pregnancy complications (p value 0.000). The dominant variable is maternal age with an OR value of 5.042 (95% CI 2.782-9.132) which means that mothers who are at risk (<20 and >35 years) have a 5.04 times higher chance of giving birth to LBW babies compared to mothers who are not at risk (20-35 years).

Keywords:

Low, Birth, Weight

1. INTRODUCTION

In the Sustainable Development Goals (SDGs) era, from 2016 to 2030, each country has the task of achieving several targets. Of the 17 goals set by the SDGs, goal number three, namely good health by ensuring healthy lives and promoting well-being for all at all ages, has a target to stop newborns and under-five deaths worldwide. The target neonatal mortality rate is 12 per 1,000 live births, whereas the target under-five mortality rate is 25 per 1,000 live births (Ministry of Health of the Republic of Indonesia, 2015). The infant mortality rate in Indonesia based on the 2012 Indonesian Demographic and Health Survey (SDKI) was 32 per 1,000 live births, and the Neonatal Mortality Rate (AKN) in 2012 was 19 per 1,000 live births.

Millennium Development Goals achievement targets in the MDGs (Micro, Small, and Medium-Term Development Goals), the Ministry of Health has set a target of reducing the infant mortality rate in Indonesia from an average of 36 deaths per 1,000 live births to 23 per 1,000 live births by 2015 (Ministry of Health, 2010). According to WHO estimates, in 2007, almost all (98%) of the 5 million neonatal deaths occurred in developing or low-income countries. More than two-thirds of these deaths were due to low birth weight (LBW), that is, babies weighing less than 2500 g. Globally, there are an estimated 25 million births per year, of which 17% are low birth weight babies (LBW) and almost all occur in developing countries [1].

The prevalence of low birth weight (LBW) is estimated to be 15% of all births worldwide, with a range of 3.3%-38%, and is more common in developing or low-socioeconomic countries. Statistics show that 90% of LBW cases occur in developing countries, and the mortality rate is 35 times higher than that in babies weighing > 2,500 g. Low birth weight (LBW) is a risk factor contributing to infant mortality, particularly during the perinatal period. Furthermore, babies with low birth weight can experience mental and physical impairments later in life, resulting in high healthcare costs.

The incidence in Indonesia varies greatly from region to region, ranging from 9% to 30%. A multicenter study in seven regions reported an LBW rate ranging from 2.1% to 17.2%. Based on further analysis using the Indonesian Demographic and Health Survey (SDKI), the LBW rate was approximately 7.5%. This figure exceeds the LBW target set in the 2010 Nutrition Improvement Program for Healthy Indonesia, which is a maximum of 7%.

From a preliminary survey at Padangsidimpuan City Hospital, in the period January-September 2025 there were 1350 mothers who gave birth and 104 babies or around 7.7% experienced LBW, the numberThis is still higher than the national incidence and this figure is greater than the LBW target.The target set in the nutrition improvement program towards Healthy Indonesia 2010 is a maximum of 7%.

2. METHOD

This research was a quantitative analytical study with a case-control design using secondary data from medical records. This study was conducted to determine the determinants of low birth weight (LBW) at the Padangsidimpuan City Hospital in 2025. This research was conducted at the Padangsidimpuan City Hospital in 2025. The research was conducted in October 2025, starting after Ethical Clerence was carried out.

A population is a generalization area consisting of objects that have certain quantities and characteristics determined by researchers to be studied, and then conclusions are drawn [2]. The population in this study was all pregnant women who gave birth to InPadangsidimpuan City Hospital in 2025The study involved 1,350 mothers from January to September 2025. The case population (mothers who gave birth to low birth weight babies) was 104, and the control population (mothers who gave birth to low birth weight babies) was 1,246.

The population size in this study was 104 mothers who gave birth with low birth weight (LBW). Padangsidimpuan City Hospital in 2025period from January to September 2025

Using the total sampling technique, all the population numbers were used as case samples, so the sample size in the case was 104 groups of LBW cases and met the minimum number of samples, namely 83. As a control, 208 were not LBW because the case ratio was 1:2. The sampling technique for control uses Systematic Random Sampling, and sampling is carried out systematically, where the probability of being taken as a sample is 208 / 1,246 = 1 / 6. To consider the first element, a simple random method is used from the first to the sixth number. For example, the first number obtained was four, and one sample was taken every six distances. For example, 4, 10, and 16, meaning the patient's RM number taken is in accordance with the results of the numbers obtained [3].

Secondary data were used in this study. Secondary data were obtained indirectly. The data collection instrument was documentation obtained from the research site in the form of patient status data. According to Hidayat (2007), documentation is a data collection method that involves taking data from original documents. The data collection used the form in Appendix 3 prepared by the researcher [4].

This involves collecting data from a single worksheet for subsequent analysis. The coded data were then entered into a software program for the analysis. The data collection process at the Padangsidimpuan City Hospital in 2025 was conducted by collecting data from the hospital's medical records. The data collected were recorded in the patient register, namely, data on 104 mothers with low birth weight (LBW) and data on mothers without low birth weight (LBW) according to the specified registration number. These data consisted of age, education, occupation, parity, and maternal complications. Data were recorded in the provided form. After the researcher collected the data, it was analyzed using statistics, and data analysis was used to process the data obtained from this research.

3. RESULTS AND DISCUSSION

3.1. Univariate Analysis Results

Univariate analysis was conducted to determine the frequency of each variable, including the independent variables of age, education, occupation, parity, and complications and the dependent variable of low birth weight (LBW) incidence. The results for each variable.

The results of the research on the frequency distribution of LBW incidents can be seen in the following table, which provides a description of the sample categories that are LBW and not LBW.

Table 1. Baby Weight (BB) Characteristics

	Variables	Mean	Median	Standard Deviation	Min-Max
(LBW) Cases	BB (grams)	2019,23	2000	237,023	1500 - 2450
Control (Not LBW)	BB (grams)	3128.85	3000	427,056	2500 - 4500

Based on table 1, it was found that of the 104 LBW babies and 208 non-LBW babies, the average weight of LBW babies was 2019.23 grams, while that of non-LBW babies was 3128.85 grams. The minimum and maximum weights of LBW babies were 1500-2450 g, while that of non-LBW babies was 2500-4500 g. The distribution of each independent variable is as follows:

Table 2. Maternal Age Characteristics

	Variables	Mean	Median	Standard Deviation	Min-Max
(LBW) Cases	Age (years)	20.51	20	4,293	15-37
Control (Not LBW)	Age (years)	26.13	26	5,694	16-39

On Table 2 shows that of the 104 LBW babies and 208 non-LBW babies, the average age of mothers who gave birth to LBW babies was 20.51 years, whereas the average age of mothers who gave birth to normal-weight babies was 26.13 years. The youngest to oldest age of mothers who gave birth to LBW babies was 15-37 years, whereas the youngest to oldest age of those who did not give birth to LBW babies was 16-39 years.

Table 3. Characteristics of Mother's Education

	Variables	Mean	Median	Standard Deviation	Min-Max
(LBW) Cases	education	2.96	3.00	0.696	1-5
Control (Not LBW)	education	2.63	300	0.787	1-5

table 3, it shows that the average number of mothers who gave birth to LBW infants and those who did not give birth to LBW had a low level of education, namely junior high school. In this case, there were 20.2% (63) mothers who had a junior high school education and in the control group, 35.9% (112) mothers, for mothers who had a high level of education in the case group, 0.6% (2) mothers and in the control group, 5.1% (16) mothers.

Table 4. Characteristics of Maternal Parity

	Variables	Mean	Median	Standard Deviation	Min-Max
(LBW) Cases	parity	2.00	1.00	1,539	1-6
Control (Not LBW)	parity	2.69	1.00	2,010	1-7

As shoen in table 4, the average parity of mothers who gave birth to LBW was two times, while in the control it was 2-3 times. In cases of at-risk parity, there were 19.9% (62) mothers of parity 1, 4.2% (13) mothers of parity 5, and 1% (6) mothers of parity 6. In the control group, 35.6% (111) of mothers had parity 1, 18.9% (59) had parity 5, 4.5% (14) had parity 6, and 0.6% (2) had parity 7.

Table 5. Description of Age, Education, occupation, parity, complications Mother Gives Birth at Padangsidimpuan City District Hospital

Independent Variables	Case		Control	
	n (104)	%	n (208)	%
Age				
Risti (<20&>35 years old)	53	51	31	14.9
Not Risky (20-35 years)	51	49	177	85.1
Education				
Tall	21	20.2	80	38.5
Low	83	79.8	128	61.5
Work				
Work	43	41.3	99	47.6
Doesn't work	61	58.7	109	52.4
Parity				
Risti	78	75	186	89.4
No Risk	26	25	22	10.6
Complications				
Yes (there are complications)	68	65.4	59	28.4
No (no complications)	36	34.6	149	71.6

Based on table 5. The data obtained show that 51 age of mothers who gave birth to LBW babies were at high risk compared to 15% mothers who gave birth to LBW babies. Low education in mothers who gave birth to LBW babies was 79.8% higher than that in mothers who gave birth to LBW babies (61.5%). High-risk parity data in mothers who

gave birth to LBW babies was 78.8, which was lower than that of mothers who gave birth to LBW babies (89.4%). Data on the number of employed mothers who gave birth to LBW babies was 41.3%, lower than that of mothers who gave birth to LBW babies (47.6%). The data on pregnancy complications in mothers who gave birth to LBW babies was 65.4%, which was higher than that of mothers who gave birth to LBW babies (28.4%).

3.2. Bivariate Analysis Results

Bivariate analysis was conducted to determine the relationship between the independent variables (age, education, parity, occupation, and pregnancy complications) and the dependent variable, the incidence of low birth weight (LBW), analyzed using the chi-squared test. The results are presented in the following table.

Table 6. Distribution by age, education, occupation, parity, and complications with the LBW incident at Padangsidimpuan City Hospital

	Case		Control		*P Value*	OR (95% CI)
	n (104)	%	n (208)	%		
Age						
Risti (<20&>35 years old)	53	51	31	14.9	0,000	5,934
Not Risky (20-35 years)	51	49	177	85.1		(3,452 - 10,199)
Education						
Tall	21	20.2	80	38.5	0.002	2,470
Low	83	79.8	128	61.5		(1,419 - 4,300)
Work						
Work	43	41.3	99	47.6	0.335	0.776
Doesn't work	61	58.7	109	52.4		(0.482 - 1.249)
Parity						
Risti	78	75	186	89.4	0.002	0.355
No Risk	26	25	22	10.6		(0.190 - 0.664)
Complications						
Yes (there are	68	65.4	59	28.4	0,000	4,770
complications)	36	34.6	149	71.6		(2,882 - 7,898)
No (no complications)						

Based on table 5.6, high-risk age data for mothers who gave birth to LBW infants was 51%, while for mothers who gave birth to LBW infants, it was 14.9%. The chi-square test results obtained a P value of 0.000, so there was a significant difference between high-risk ages (<20 and >35 years) in mothers who gave birth to LBW infants and those who did not give birth to LBW infants. It can be concluded that there is a relationship between maternal age and the incidence of LBW with an OR value of 5.9, meaning that mothers who are at high-risk ages are 5.9 times more likely to experience LBW compared to mothers who are not at high-risk ages.

The analysis results showed that 79.8% of mothers with low education gave birth to LBW infants, and 61.5% of mothers gave birth to LBW infants. The results of the chi-square test showed a P value of 0.002, indicating a significant difference in low education between cases and controls. Thus, it can be concluded that there is a relationship between maternal education and the incidence of LBW. The OR value obtained was 2.4, indicating that mothers with low education had a 2.4 times greater risk of giving birth to LBW infants than mothers with higher education.

Table 5.6 shows that 41.3% of working mothers were in the group of mothers who gave birth to LBW babies, while 47.6% were in the group of mothers who gave birth to LBW babies. The chi-square test results obtained a P value of 0.33, indicating no significant difference between working mothers who experienced LBW and those who did not experience LBW babies. It can be concluded that there is no relationship between employment status and the incidence of LBW babies.

From table 5.6, the data obtained on high-risk maternal parity in the group of mothers who gave birth to LBW were 75% and 89.4% in the group of mothers who gave birth to LBW. The results of the chi-square test showed P 0.002, indicating a significant difference in high-risk parity between cases and controls. It can be concluded that there is a relationship between parity and the incidence of LBW with an OR value of 0.35, meaning that mothers with parity that is not at risk (2-4 times) will prevent the occurrence of LBW by 0.35 times.

Based on table 5.6, data on pregnancy complications in mothers who gave birth to LBW babies were 65.4%, while 28.6% of mothers gave birth to LBW babies. The results of the chi-square test showed a P value of 0.000, indicating a significant difference in mothers who experienced complications between cases and controls. It can be concluded that there is a relationship between complications during pregnancy and the incidence of LBW, with an OR value of 4.77, meaning that mothers who experienced pregnancy complications had a 4.8 times greater risk of giving birth to LBW babies than mothers who did not experience complications.

3.3.Multivariate Analysis Results

Multivariate analysis was performed to determine the predictive model of variables related to the dependent variable using multiple logistic regression. In multivariate analysis, the first step is to conduct bivariate selection in the omnibus test block section that produces a p-value <0.25. Then, the variable can be included in the multivariate selection. After bivariate selection, multivariate selection was performed to determine the relationship between the most dominant independent variables and dependent variable. The first stage determines the multivariate candidate variables to be included in the multivariate selection, namely, the results of the bivariate selection.

The first step involved conducting a simple logistic test between the independent and dependent variables. If the p-value is <0.25 in the bivariate selection, the variable can be included in the multivariate model in the bivariate selection. If the p-value is >0.25 but is substantially important, the variable can be included in the multivariate model. table shows the multivariate candidate selections.

Table 7. Related Multivariate Candidate Variables with the LBW incident at Padangsidimpuan City Hospital

No	Variables	*P Value*	Information
1	Age	0,000	Candidate
2	Education	0.001	Candidate
3	*Work	0.295	Candidate
4	Parity	0.001	Candidate
5	Complications	0,000	Candidate

The bivariate selection results obtained a P-value <0.25, namely, age, education, parity, and complications, but the work variable was still included in the modeling because the substance of work was considered important or could be related to the incidence of LBW.

The next step was to perform modeling by including all the candidate variables. This analysis aimed to identify the best model to determine the dominant factors associated with LBW incidence at Padangsidimpuan City Hospital. The following are the results of the multivariate modeling.

Table 8. Initial Multivariate Modeling of the Relationship between Age, Education, Occupation, Parity, and Complications with the Incidence of Low Birth Weight (LBW) at Padangsidimpuan City Hospital

Stage 1	*P Value*	OR	95% CI	
			Lower	Upper
Age	0,000	5,028	2,772	9,120
Education	0.014	2,204	1,173	4,140
Work	0.517	0.833	0.479	1,448
Parity	0.041	0.464	0.222	0.970
Complications	0,000	4,540	2,606	7,909

In the first stage of modeling, there was one variable with a P-value > 0.05, namely occupation. This variable is eliminated from the second model. Besides occupation, other variables had P-values of < 0.05.

Table 9. Multivariate Modeling of the Relationship between Age, Education, Parity, Complications and the Incidence of Low Birth Weight (LBW) at Padangsidimpuan City Hospital

Stage 2	*P Value*	OR	95% CI		OR Change
			Lower	Upper	
Age	0,000	5,042	2,782	9,137	9.73%
Education	0.014	2,210	1,176	4,152	4.02%
Parity	0.043	0.468	0.224	0.977	0.86%
Complications	0,000	4,573	2,627	7,961	-1.07%

In the second stage of modeling, all variables had a P-value <0.05, after the occupational variable was removed, indicating a relationship between the four variables and the incidence of LBW. The second modeling result showed no change in the OR value of 10%. Therefore, occupational variables were not included in the final model.

Table 10. Multivariate Final Modeling of the Relationship between Age, Education, Parity, Complications and the Incidence of Low Birth Weight (LBW) at Padangsidimpuan City Hospital

Variables in the Equation

		B	SE	Wald	df	Sig.	Exp(B)	95% CI for EXP(B)	
								Lower	Upper
Step 1a	Age	1,618	.303	28,436	1	.000	5,042	2,782	9,137
	Education	.793	.322	6,070	1	.014	2,210	1,176	4.152
	Parity	-.759	.376	4,086	1	.043	.468	.224	.977
	Complications	1,520	.283	28,889	1	.000	4,573	2,627	7,961
	Constant	-1,836	.447	16,844	1	.000	.160		

4. CONCLUSION

The following conclusions were drawn: 51% of mothers who gave birth to LBW were at risk, 79.8% had low education, 78.8% had high-risk parity, 41.3% were working mothers, and 65.4% experienced complications during pregnancy. The factors related to the incidence of LBW were maternal age (P-0.000), education (P-0.002), parity (P-0.002), and pregnancy complications (P-.000). The dominant variable was maternal age with an OR value of 5.042 (95% CI 2.782-9.132), which means that mothers who are at risk (<20 and >35 years) have a 5.04 times higher chance of giving birth to LBW babies compared to mothers who are not at risk (20-35 years).

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