BIDAN
Bulletin of Inspiring Developments And Achievements in Midwifery


Vol. 01, No. 1, December 2024, 32-42
*e*-ISSN: **3089-672X**

# Factors Related to Mothers and the Prevalence of LBW

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**Article Information**
Received: October 31, 2024
Revised: January 28, 2025
Online: January 29, 2025

**Keywords**
*LBW, Anemia, Parity, Nutritional Status*

**ABSTRACT**

*Birth weight is a crucial indicator of infant health, influencing survival and future growth and mental development. In 2020, 40 mothers (7.19%) experienced preeclampsia during childbirth. Among mothers giving birth, 216 (39%) were primiparous, 300 (54%) multiparous, and 40 (7.19%) grand multiparous. This study aimed to identify maternal factors associated with the prevalence of low birth weight (LBW) in hospitals. Utilizing a case-control research design, this quantitative study employed an observational analytical method. The sample consisted of 60 controls and 30 cases of LBW infants, randomly selected from mothers who delivered between January and December. Data were analyzed using bivariate chi-square tests.The analysis revealed a significant relationship between preeclampsia and LBW incidence, with a prevalence ratio (PR) of 2.667 (95% CI = 1.591-4.470). To mitigate LBW rates, the Indonesian Ministry of Health has established health check-up guidelines for pregnant women. This initiative aims to enhance hospital programs addressing factors that contribute to LBW. Additionally, variables such as parity, anemia, and nutritional status did not show a significant correlation with LBW incidence.In conclusion, while preeclampsia was significantly linked to LBW, other maternal factors such as parity and nutritional status require further investigation to understand their potential impacts on birth weight outcomes effectively. The findings underscore the importance of comprehensive maternal healthcare to improve neonatal health outcomes and reduce the prevalence of LBW in future pregnancies.*

***Keywords*** *: LBW, Anemia, Parity, Nutritional Status*


http://doi.org/10.69855/bidan.v1i1.79
https://gpijournal.com/index.php/bidan
PUBLISHED BY : GPress Indonesia

## INTRODUCTION

An infant weighing less than 2,500 grams is referred to as an LBW, regardless of gestational age, according to WHO statistical data indicators. Babies and children born with LBW have long-term effects on their future lives, and it is a significant contributing factor to the rise in newborn mortality, morbidity, and disability (Aryana, dkk., 2021).

According to WHO, the prevalence of LBW babies worldwide is 15.5%, or about 20 million babies born each year, with 96.5% of these babies being in developing countries. Efforts are underway to reduce the number of LBW babies by 30% by 2025, and thus far, the number of LBW babies has decreased from 2.9% in 2012 to 2014, bringing the total number of LBW babies down from 20 million to 14 million LBW babies ( Asih, Y., 2014).

Based on Riskesdas data in 2018, it shows that the incidence of LBW in Indonesia in 2010 was 5.8%, in 2013 it was 5.7% and in 2018 it was 6.2%. There was an increase in the trend of the incidence of LBW in 2018. In 2018, the highest incidence of LBW was in the Special Region of Yogyakarta Province, which was 7.6% (Badan Pusat Statistik DKI Jakarta., 2019). According to data from the 2018 DKI Jakarta Provincial Health Profile, 1,287 LBW newborns, or 0.7% of the total number of babies born in the DKI Jakarta area, were distributed among six regions of the DKI Jakarta Province. state of LBW infants. The Thousand Islands have the largest percentage of LBW babies (3.8%), followed by Central Jakarta (1.5%)(Basuki Rahmat, dkk., 2019) .

In addition to other factors like maternal age, multiple pregnancies, infections, chronic diseases of the mother like diabetes mellitus, thyroid, anemia, and malnutrition, and numerous factors related to the fetus, preeclampsia is one of the most common causes of preterm birth and perinatal death that are currently known. Low birth weight and a high risk of newborn mortality are characteristics of children whose mothers suffer preeclampsia (Faadhilah, A., & Helda, H. 2020).

Based on the results of preliminary data observations, the number of deliveries in 2020 was 556 deliveries. From these data, the number of mothers giving birth with preeclampsia in 2020 was 40 (7.19%). The description of parity in mothers giving birth in 2020 was 216 (39%) of mothers with primiparous parity, 300 (54%) of mothers giving birth with multiparous parity, while 40 (7.19%) of mothers with grandemultiparous parity. Researchers believe that maternal factors are the cause of the incidence of LBW. Preeclampsia, parity, HB levels, and dietary condition are examples of maternal variables. Furthermore, it was discovered from the interview findings that the hospital has not yet adopted the BBLR prevention program for expectant mothers. Given the foregoing context, researchers are eager to investigate maternal factors that impact the prevalence of LBW.

## METHODS

This study is a quantitative study using an observational analysis method. This study's design is a case-control study, which is an observational analytical epidemiological study that looks at the connection between specific risk factors and specific effects (diseases or health conditions). The study's independent variables include nutritional status, parity, Hb levels, and preeclampsia.

The incidence of LBW is the dependent variable. All mothers who gave birth between January and December 2020, or 556 mothers in total, made up the study's population. The sample, which consists of 90 mothers, was chosen using a 1:2 ratio. The study's sample, which included 60 controls and 30 instances of low birth weight infants, was drawn at random from among mothers who gave birth to children between January and December. The chi-square test was used to process the data bivariately A checklist sheet containing data analysis techniques, specifically univariate and bivariate analysis, was the research tool utilized in the data collection phase of this study.

## RESULTS

### 3.1 Univariate

#### 3.1.1 Frequency Distribution of LBW Incidence in Mothers Giving Birth

**Table 1. Frequency Distribution of LBW Incidence in Mothers Giving Birth**

| LBW Incident | Frequency (F) | Percentage (%) | LBW Incident |
|---|---|---|---|
| Yes | 30 | 33.3 | Yes |
| No | 60 | 66.7 | No |

Based on the data, it shows that out of 90 mothers giving birth, 30 mothers giving birth (33.3%) gave birth to LBW babies. According to the study's findings, newborns weighed an average of 2778.4 grams at birth, with the lowest weight being 2015 grams and the highest being 4230 grams.

#### 3.1.2 Frequency Distribution of Preeclampsia in Women in Labor

**Table 2. Frequency Distribution of Preeclampsia in Women Giving Birth**

| Preeclampsia Occurrence | Frequency (f) | Percentage (%) |
|---|---|---|
| Severe Preeclampsia | 10 | 11.1 |
| Mild Preeclampsia | 8 | 8.9 |
| No Preeclampsia | 72 | 80.0 |

Based on the data, it shows that out of 90 mothers giving birth, 10 mothers gave birth who experienced severe preeclampsia (11.1%), 8 mothers gave birth (8.9%) with preeclampsia, while 72 mothers gave birth without preeclampsia (80.0%). According to the research, the moms who gave birth had the lowest blood pressure of 90/60 mmHg and the highest blood pressure of 180/120 mmHg. The average blood pressure of 90 respondents who gave birth was systolic 117 mmHg and diastolic 78 mmHg.

#### 3.1.3 Frequency Distribution of Parity in Mothers Giving Birth

**Table 3. Frequency Distribution of Parity in Mothers Giving Birth**

| Parity | Frequency (f) | Percentage (%) |
|---|---|---|
| At risk | 10 | 11.1 |
| No Risk | 80 | 88.9 |

Based on the data, it shows that out of 90 mothers giving birth, 10 mothers giving birth (11.1%) gave birth with high-risk parity.

### 3.1.4 Distribution of Hb Levels in Mothers Giving Birth by Frequency

**Table 4. Distribution of Hb Levels in Mothers Giving Birth by Frequency**

| Hb levels | Frequency (f) | Percentage (%) |
|---|---|---|
| Anemia | 40 | 44.4 |
| No Anemia | 50 | 55.6 |

Based on the data, it shows that out of 90 mothers, 40 mothers giving birth (44.4%) experienced anemia. According to the study's findings, the average hemoglobin level among the 90 postpartum moms was 11%; the lowest and highest hemoglobin levels among postpartum mothers were 7 and 14.2 g%, respectively. If the Hb level is less than 11 g%, anemia is diagnosed; if it is greater than 11 g%, anemia is not.

### 3.1.5 Frequency Distribution of Nutritional Status in Women Giving Birth

**Table 5. Frequency Distribution of Hb Levels in Mothers Giving Birth**

| Nutritional status | Frequency (f) | Percentage (%) |
|---|---|---|
| Malnutrition | 17 | 18.9 |
| Normal | 73 | 81.1 |

Based on the data, it shows that out of 90 mothers giving birth, 17 mothers (18.9%) experienced malnutrition. According to the study's findings, the average nutritional status of 90 moms who responded to the survey was 26.42 kg/m2, their lowest BMI was 15.4 kg/m2, and their highest BMI was 36.1 kg/m2. The study's nutritional status was determined by comparing the body mass index of moms who gave birth before and after pregnancy.

## 3.2 Bivariate

### 3.2.1 The Relationship Between Preeclampsia and the Incidence of Low Birth Weight in Mothers Giving Birth

**Table 6. Relationship between Preeclampsia and the Incidence of LBW in Mothers**

| Preeclampsia | LBW Incident | | | | Pvalue | PR(95%CI) |
|---|---|---|---|---|---|---|
| | Low | | Normal | | | |
| | F | % | F | % | | |
| Preeclampsia | 12 | 66.7 | 6 | 33.3 | 0.002 | 2,667 |
| No Preeclampsia | 18 | 25.0 | 54 | 75.0 | | (1,591-4,470) |

The results of the chi-square test showed a strong correlation between preeclampsia and the incidence of LBW, with a p value of 0.002 (p <0.05). Preeclampsia is a risk factor for the occurrence of LBW, according to the risk estimate calculation, which yielded a PR value = 2.667 (95% CI = 1.591-

4.470). Compared to women without preeclampsia, mothers who give birth at risk for the condition had a 2.667-fold increased risk of developing LBW.

### 3.2.2 The Relationship Between Parity and the Incidence of LBW in Mothers Giving Birth

**Table 7. Relationship between Parity and the Incidence of LBW in Mothers Giving Birth**

| Parity | LBW Incident | | | | Pvalue | PR(95%CI) |
|---|---|---|---|---|---|---|
| | Low | | Normal | | | |
| | F | % | F | % | | |
| No Risk | 29 | 36.2 | 51 | 63.8 | 0.155 | 0.708 |
| No Preeclampsia | 1 | 10.0 | 9 | 90.0 | | (0.544-0.923) |

The results of the chi-square test analysis indicated that there is no significant correlation between parity and the incidence of LBW, with a p value of 0.155 (p>0.05). The incidence of parity is a risk factor for the incidence of LBW, according to the risk estimate calculation, which yielded a PR value = 0.708 (95% CI 0.544-0.923). Mothers giving birth who are at risk of parity have a 0.708 times chance of experiencing LBW compared to mothers giving birth who are not at risk of parity.

### 3.2.3 Relationship between Hb Levels and the Incidence of LBW in Mothers Giving Birth

**Table 8. Relationship between Hb Levels and the Incidence of LBW in Mothers Giving Birth**

| Hb levels | LBW Incident | | | | Pvalue | PR(95%CI) |
|---|---|---|---|---|---|---|
| | Low | | Normal | | | |
| | F | % | F | % | | |
| Anemia | 18 | 45.0 | 22 | 55.0 | 0.061 | 1,875 |
| No Preeclampsia | 12 | 24.0 | 38 | 76.0 | | (1,028-3,418) |

Hb levels and the incidence of LBW do not significantly correlate, according to the chi-square test analysis, which revealed a p value of 0.061 (p>0.05). Hb levels are a risk factor for the occurrence of LBW, according to the risk estimate calculation, which yielded a PR value = 1.875 (95% CI 1.028-3.418). Compared to mothers without anemia, mothers with anemia are 1.875 times more likely to experience LBW.

### 3.2.4 Relationship between Nutritional Status and the Incidence of Low Birth Weight in Mothers Giving Birth

**Table 9. Relationship between Nutritional Status and the Incidence of LBW in Mothers Giving Birth**

| Nutritional status | LBW Incident | | | | Pvalue | PR(95%CI) |
|---|---|---|---|---|---|---|
| | Low | | Normal | | | |
| | F | % | F | % | F | % |
| Malnutrition | 4 | 23.5 | 13 | Malnutrition | 0.505 | 0,556 (0,164-1,882) |
| Normal | 26 | 35.6 | 47 | Normal | | |

*chi-square* test analysis showed that the p value = 0.505 (p>0.05), so it can be concluded that there is no significant relationship between nutritional status and the incidence of LBW. The calculation of *the risk estimate* obtained a PR value = 0.556 (95% CI 0.164-1.882) so it can be concluded that mothers who give birth who are malnourished have a 0.556 times chance of experiencing LBW compared to mothers who give birth without parity risk.

## DISCUSSION

### 4.1 Univariate

According to data on the frequency distribution of low birth weight (LBW) among pregnant women, up to 30 out of 90 moms (33.3%) gave birth to low-birth-weight babies. This indicates that LBW affected one-third of the study participants, which may raise the risk of neonatal morbidity and death.

This study is consistent with Ita Rosdiana's research (2019) at the Kediri Regency Hospital, which found that the number of mothers giving birth at the Kediri Regency Hospital in 2018 was 2002 mothers giving birth, of which 490 mothers giving birth (24.4%) gave birth to LBW babies.

In 2007, Basic Health Research revealed that a number of factors contributed to infant death, including pneumonia (15.4%), congenital abnormalities (18.1%), sepsis (20.5%), preterm, and low birth weight (LBW) (12.8%). Of these factors, LBW accounts for over half of all newborn deaths across all deliveries( Fajriana, A., & Buanasita, A., 2018). In order to combat the high rate of LBW, pregnant women's health services must be improved, particularly in the areas of nutritional status monitoring, early anemia detection, and risk factor management, including preeclampsia. This study highlights the significance of LBW prevention initiatives in healthcare settings, particularly for pregnant women who are at high risk.

According to the data in Table 2, the frequency distribution of preeclampsia in 90 parturient woman reveals that 10 of them had severe preeclampsia (11.1%), 8 of them had moderate preeclampsia (8.9%), and 72 of them did not have preeclampsia (80.0%). According to the study's findings, mothers with systolic blood pressure of 160 mmHg or diastolic blood pressure of 110 mmHg were considered to have severe preeclampsia. Mothers with preeclampsia if systolic blood pressure (≥ 140 to <160 mmHg) or diastolic blood pressure (≥90 to <110 mmHg and mothers who did

not have preeclampsia if there was no diagnosis of preeclampsia in the medical record and blood pressure <140/90 mmHg.

Preeclampsia plays a role in intrauterine death and perinatal mortality. Preeclampsia is one of the risk factors for slow fetal growth, LBW, fetal dismaturity and prematurity and even intrauterine fetal death (IUFD). Mothers who suffer from preeclampsia will experience impaired placental vascular dysfunction, so that the fetus's need for nutrition and oxygen is not optimally met. This condition causes delayed fetal growth ( Ferdiyus., 2019).

According to the data in Table 3, the frequency distribution of parity events in 90 pregnant women showed that up to 10 of them (11.1%) had dangerous parity. From the results of the study, mothers who experienced the number of deliveries > 3 had a risk of parity, while if the number of deliveries = 1-3 were not at risk of parity.

Maternal parity is classified into primipara (mothers who give birth to their first child), multipara (mothers who give birth to their second and third children), and grandemultipara (mothers who give birth to their fourth or more children). Multiparous mothers or mothers who giving birth more than 3 times will be at greater risk of experiencing low birth weight (LBW) [8] . Mothers with more than 3 births have certainly experienced decreased organ function. In addition, there are complications such as placenta (Magriples, U., 2018). Other studies state that LBW is related to maternal age and parity factors, where age <18 years and low parity are related to the incidence of LBW (Momeni et al, 2017).

According to table 4's statistics on the frequency distribution of anemia among 90 laboring mothers, 40 of them (44.4%) had anemia. According to the study's findings, laboring women' average hemoglobin levels were 11%. A Hb level of less than 11 grams is considered anemia, whereas a level of more than 11 grams is considered non-anemia. The weight of the unborn child is significantly influenced by the hemoglobin level of the pregnant woman. If a pregnant woman's hemoglobin level is less than 11 grams per deciliter, she is considered to have anemia. This undoubtedly results in conceptus growth abnormalities, which frequently lead to immaturity, preterm, congenital malformations, or low birth weight fetuses (Ministry of Health, 2009)(Maiti & Bidinger., 2018).

According to earlier research, up to 14 pregnant women in the Tampaksiring I Health Center work area had low hemoglobin levels, with a percentage of 36.84%. These women were primarily in high-risk pregnancy ages (Trimester I and Trimester III) (Marlenywati, Hariyadi, D., & Ichtiyati, F., 2015). Previous studies have shown that the newborn baby weighs more when the hemoglobin levels in pregnant women are greater. Due to decreased blood flow to the uterus, low hemoglobin levels during pregnancy might raise the risk of a low birth weight (LBW) infant by obstructing the placenta and fetus from receiving oxygen and nutrients (Naconha, A.E., 2021).

According to the table's 5, 17 mothers (18.9%) out of 90 gave birth to a child that was malnourished. The study's nutritional status was determined by comparing the body mass index of mothers who gave birth before and after pregnancy. If a mother's BMI difference is less than 18.5

and greater than 29 kg/m², she is considered malnourished; if it is normal, she is considered normal. 18.5–29 kg/m² .

Pregnant women frequently experience dietary issues such as nutritional anemia and Chronic Energy Deficiency (CED). Pregnancy-related CED will stunt fetal growth, increasing the chance of LBW. Poor nutritional status is closely related to the occurrence of anemia. Because the lack of complete nutritional fulfillment in pregnant women can result in a lack of iron obtained, which can result in iron deficiency anemia even though iron is very necessary for pregnant women (Naconha, A.E., 2021).

### 4.2 Bivariate

#### 4.2.1 The Relationship Between Preeclampsia and the Incidence of Low Birth Weight in Mothers Giving Birth

Table 6 shows that 12 mothers (66.7%) who experience LBW have the largest proportion of at-risk, while 54 mothers (75%), who do not experience LBW, have the highest proportion of non-preeclampsia. The chi-square test results indicate that there is a substantial correlation between preeclampsia and the incidence of LBW, with a p value of 0.002 (p <0.05). Preeclampsia is a risk factor for the occurrence of LBW, according to the risk estimate calculation, which yielded a PR value = 2.667 (95% CI = 1.591-4.470). The risk mothers with preeclampsia to deliver low birth weight baby have 2,667 times higher than mothers didn't have preeclampsia.

The results of this study are in line with the results of a study conducted by adintianta in 2017 which revealed a relationship between preeclampsia and the incidence of LBW with *a p value* = 0.001 (p <0.05). The PR association value is 1.483 with 95% CI (1.21-1.86). This means that mothers with preeclampsia have a 1.483 risk of having a baby with LBW (Permana, P., & Wijaya, G.B.R., 2019).

Internal factors that affect birth weight include maternal age during pregnancy, gestational age, parity, nutrition during pregnancy, status and comorbidities such as diabetes mellitus, TORCH, hypertension including preeclampsia and eclampsia (Putra, A.N.E., Hasibuan, H.S., & Fitriyati, Y., 2014) . Some signs and symptoms of severe preeclampsia include epigastric pain, headaches and visual disturbances due to cerebral edema. The Association between the Incidence of Low Birth Weight and Pregnant Women with Severe Preeclampsia (PEB) (Putri, A.R., & Al Muqsith, A.M., (2018).

#### 4.2.2 The Relationship Between Parity and the Incidence of LBW in Mothers Giving Birth

Table 7 indicates that the highest percentage of at-risk parity was nine mothers (90%) who gave delivery without LBW, whereas the highest percentage of mothers who did not give birth at risk was fifty-one (63.8%). There is no significant correlation between parity and the incidence of LBW, according to the chi-square test analysis, which revealed a p value of 0.155 (p>0.05). LBW is

3.625 times more likely to occur in moms who are at risk of parity than in women who are not at risk of parity.

Mothers with parity 1 and greater than 4 are more likely to get LBW because of scar tissue from prior pregnancies and deliveries. Scar tissue results in an insufficient blood flow to the placenta, which impairs placental attachment and disrupts the fetus's ability to receive nutrients from the mother. In the meantime, pregnant women's inexperience and ignorance of pregnancy management contribute to the prevalence of LBW in moms with first parity (Putri, N.A., dkk., 2019).

This study is inversely proportional to the results of research at the Bekasi City Regional General Hospital in 2012, that the birth of LBW based on parity, the highest frequency is mothers with multiparity parity, which is 108 mothers giving birth (55.8%). Based on the results of the study, the incidence of LBW births based on parity is not in accordance with the theory.

### 4.2.3 Relationship between Hb Levels and LBW Incidence in Mothers Giving Birth

Based on table 8, the highest proportion of anemia was 18 mothers giving birth (45%) with LBW, while the highest proportion of non-anemia was 38 (76%) and did not experience LBW. The results of the *chi-square test analysis* showed that the p value = 0.061 (p> 0.05), so it can be concluded that there is no significant relationship between Hb levels and the incidence of LBW. The calculation of *the risk estimate* can be concluded that Hb levels are a risk factor for the incidence of LBW. Mothers giving birth with anemia have a 2.591 times greater chance of experiencing LBW compared to mothers giving birth without anemia.

There is no significant correlation between the incidence of LBW in Semampir District and anemia in pregnant women, according to the study's results, which are consistent with those of other research with a p value of 0.217, meaning that p> $\alpha$. The study's negligible findings were from the majority of moms not having anemia. According to the study's findings, maternal hemoglobin levels and the incidence of LBW at the Regional Public Hospital were positively correlated (r = 0.439) (Setyawati, R., & Arifin, N.A.W., 2022).

### 4.2.4 Relationship between Nutritional Status and the Incidence of Low Birth Weight in Mothers Giving Birth

Table 9 demonstrates the highest rate of malnutrition, with up to four moms (76.5%) giving birth with LBW, while the highest proportion of normal is 47 (64.4%) and does not experience LBW. The results of the *chi-square test analysis* show that the p value = 0.505 (p> 0.05), so it can be concluded that there is no significant relationship between nutritional status and the incidence of LBW. The calculation of *the risk estimate* obtained can be concluded that mothers giving birth who are malnourished have a 0.556 times chance of experiencing LBW compared to mothers giving birth without parity risk.

Based on the results of the analysis, the type of postpartum maternal delivery has statistical significance since the p value (0.002) is higher than 0.05, which means that the incidence of LBW is

not significantly correlated with the style of delivery [18]. n this respect, this work is in line with past research (Sri Martini, R.K.D., 2018). Because not all pregnant women with poor nutritional status give birth to low birth weight babies, and not all mothers with adequate, excess, or even obese nutritional status can give birth to normal birth weight babies, researchers have found that the incidence of low birth weight (LBW) is unaffected by the nutritional status of mothers, whether they are undernourished or normal. Previous research is inversely proportional to this study. The results showed that, in 2020, there was a significant relationship between the nutritional status of pregnant women and the incidence of low birth weight (LBW) in the Ngarip Health Center UPTD, Ulu Belu District, Tanggamus Regency. The p-value was 0.000 <0.05, the odds ratio was 0.360, and the confidence interval was 0.187500 (Yolanda, G., Mirani, P., & Swany, S., 2015)

## CONCLUSIONS

The incidence of LBW in mothers giving birth is correlated with preeclampsia (p=0.002 and OR= 6.000). Parity and the frequency of LBW in mothers giving delivery did not correlate. There was no relationship between Hb levels and the incidence of LBW in mothers giving birth. There is no relationship between nutritional status and the incidence of LBW in mothers giving birth.

## ACKNOWLEDGMENT

In order for the researcher to successfully finish this research, we would like to express our gratitude to the respondents and other relevant parties who assisted with the research process and offered suggestions for making this report excellent.

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