Factors Associated with Low Birth Weight Incidence

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ABSTRACT

Low Birth Weight (LBW) is an important indicator of newborn health and the quality of maternal care. This study aims to analyze the relationship between maternal age, parity, and gestational age with the incidence of LBW in Padang City. This study used a case-control design with a sample of 110 mothers from September to June 2022 at Adnan WD Regional General Hospital divided into case (LBW) and control (non-LBW) groups. Data were collected secondary from medical records and analyzed using the Chi-Square test. The research findings indicate that maternal age <20 years and >35 years, as well as high parity (≥4 times), are associated with a higher likelihood of LBW, although this association is not statistically significant (p>0.05). Premature gestational age also shows a tendency toward LBW, but this is not significant (p=0.061). The researcher's observations indicate that maternal age, parity, and gestational age are influenced by health conditions and access to prenatal services, while maternal nutritional status plays a significant role in fetal growth. Researchers concluded that comprehensive health interventions, including nutritional education and optimal prenatal monitoring, are needed to reduce the incidence of LBW.

Keywords: Low Birth Weight, Maternal Age, Parity, Gestational Age

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INTRODUCTION

Low Birth Weight (LBW) is an important indicator in assessing the health status of newborns and the quality of maternal health services. LBW is defined as a baby born weighing less than 2500 grams, regardless of gestational age (World Health Organization, 2023) (Claude et al., 2021) . Worldwide, approximately 14.6% of babies born are LBW, with the majority of cases occurring in developing countries (UNICEF, 2024) . The incidence of LBW is closely related to an increased risk of morbidity, neonatal mortality, and growth disorders that can continue into adulthood, including cognitive problems, physical disorders, and an increased risk of chronic diseases (Putri, 2018). Therefore, LBW is a major concern in efforts to reduce the Infant Mortality Rate (IMR), especially in developing countries including Indonesia.

In Indonesia, LBW) s one of the main causes of the Infant Mortality Rate (IMR), which reflects inequality in access to optimal maternal health services. Based on the results of the Basic Health Research. The prevalence of low birth weight (LBW) in Indonesia reached 6.2% nationally, with significant variations between regions (Ministry of Health of the Republic of Indonesia, 2019) . West Sumatra Province recorded a prevalence of low birth weight (LBW) from 19 regencies/cities in West Sumatra, Padang City is one of the areas with the highest cases of low birth weight (1.5%) . Despite a national decline, the prevalence of low birth weight (LBW) in several provinces, particularly in West Sumatra, remains relatively high, indicating a gap in the quality of pregnancy care (Padang City Health Office, 2024). This shows the importance of paying more attention to the factors that influence the incidence of low birth weight in order to reduce the burden on neonatal health.

Based on data obtained in 2024, the prevalence of LBW in Padang City from 13,190 newborns weighed in 2023, found 459 people (3.5%) LBW babies consisting of 228 boys and 231 girls. This number has increased from the previous year (143 cases / 3.5%) (Padang City Health Office, 2024) . This increase indicates that although access to antenatal care (ANC) services has increased, there are still major challenges in ensuring optimal maternal nutrition, pregnancy spacing, and the quality of obstetric care. This figure indicates the need for special attention to risk factors that can be controlled through preventive and promotive interventions.

Several studies have identified maternal factors that play a major role in the incidence of LBW, including maternal age, parity, gestational age, and maternal nutritional status (Damayanti et al., 2022) ; (Mira Miraturrofi'ah, 2025) . Mothers aged less than 20 years or more than 35 years have a higher risk of giving birth to LBW babies, due to physiological unpreparedness or related medical conditions such as hypertension, gestational diabetes, and placental insufficiency (Backes EP, 2020) . Various studies have shown that maternal factors such as maternal age, parity, interpregnancy spacing, and nutritional status have a major contribution to the incidence of LBW (Permana & Wijaya, 2019) . Pregnant women aged <20 years or >35 years tend to have a higher risk of pregnancy and childbirth complications, including the birth of LBW babies.

Furthermore, high parity and short interpregnancy intervals can deplete maternal nutritional reserves, affect uterine function, and inhibit fetal growth (Srimiyati, 2021) . Maternal nutritional status, especially for those experiencing Chronic Energy Deficiency (CED), is also an important

determinant of LBW incidence. A mid-upper arm circumference (MUAC) measurement of <23.5 cm is a common indicator of CED in pregnant women and has been shown to correlate with fetal growth disorders (Wiwik, 2020) . Poor maternal nutritional status will impact suboptimal placental growth and reduce nutrient transfer to the fetus, thereby increasing the risk of low birth weight (Mira Miraturrofi'ah, 2025) .

Recent research also emphasizes the importance of integrated maternal care in preventing LBW. A cohort study in Iran by (Dehghani et al., 2024) found that early screening for anemia, micronutrient supplementation, and regular prenatal visits can significantly reduce the risk of LBW by improving oxygen and nutrient flow to the fetus. Similarly, research in Bangladesh revealed that maternal education, antenatal visits, and food security play a crucial role in ensuring optimal fetal growth (Sathi et al., 2022) . These findings underscore the importance of LBW prevention involving comprehensive medical, nutritional, and behavioral interventions.

Socioeconomic disparities also exacerbate the problem of low birth weight (LBW). Research in Indonesia by (Laksono et al., 2023) shows that mothers from low-income households are three times more likely to give birth to low-birth-weight babies than mothers with higher socioeconomic status. Low education, limited dietary diversity, and limited access to health facilities exacerbate their vulnerability. Therefore, improving maternal literacy and strengthening community-based interventions such as *the Youth Integrated Health Post (Posyandu)* and *the Family Hope Program (PKH)* can be effective in reducing the prevalence of low birth weight through early prevention and empowerment.

From a public health perspective, low birth weight (LBW) is a multifactorial issue that requires collaboration between the health, nutrition, and social sectors. The Indonesian Ministry of Health's Strategic Plan (Renstra 2020–2024) prioritizes maternal and child health programs targeting neonatal mortality reduction through improved antenatal care, iron supplementation, and early detection of pregnancy risks. Strengthening the role of midwives and community health workers (*posyandu cadres*) in monitoring the nutritional status of pregnant women and providing counseling on pregnancy spacing is also crucial (Ministry of Health, 2022) .

From the survey data, out of 10 respondents with low birth weight babies, two mothers gave birth at the age of 20 or 35, mothers with a parity of more than 4, two mothers with a 2-year interval who gave birth to LBW babies, and seven mothers with a LBW birth height of <23 cm. Based on this background, this study aims to analyze the relationship between maternal age, parity, pregnancy spacing, and nutritional status with the incidence of low birth weight (LBW). The results are expected to inform maternal health policymaking at the local level and provide a scientific contribution to efforts to reduce the incidence of low birth weight (LBW) nationally.

METHODS

This study used a quantitative approach with a case-control design. The population was all 862 infants born at a private hospital in Padang City. This study used a case-control design with a sample of 110 mothers from September to June 2022 at Adnan WD Regional Hospital. The data were

collected secondary from medical records. A purposive sampling method was used to select 110 mothers, divided into case (LBW) and control (non-LBW) groups. Secondary data were obtained from medical records and analyzed using the Chi-Square test with $\alpha=0.05$.

RESULTS

1. Relationship Between Maternal Age and the Incidence of Low Birth Weight

Bivariate analysis in this study used chi-square statistical test results analysis, namely concluding the significance of the relationship between two variables. The results showed that at most each of the 110 respondents, 28 (22.5%) were at risk due to age (<20 years and >35), with a higher proportion of respondents experiencing low birth weight (LBW), specifically 17 (30.9%) in the case group compared to respondents without LBW in the control group. Based on the results of the chi-square test, the p-value = 0.274 (p-value> 0.05). This can be interpreted into the categories with the following results:

Table 1. Relationship Between Maternal Age and the Incidence of Low Birth Weight

Maternal Age	The Incidence of Low Birth Weight Levels						
	Case		**Control**		**Total**		**p-value**
a. Risk	17	30.9%	11	20.0%	28	25.5	0.274
b. No risk	38	69.1%	44	80.0%	82	74.5	
Total	55	100%	55	100%	110	100	

2. Relationship Between Parity and the Incidence of Low Birth Weight

The results of the study showed that most of the 110 respondents who were pariity were mostly respondents with risk categories, namely 87.3%. Of the 55 respondents in case group had 7 respondents (12.7%) with risk of parity categories. In contrast the number of 55 respondents from the control group had 9 respondents (16.4%) with risk parity and did not have low birth weight incidence. The chi-square test results show that the p-value is 0.787 (p-value > 0.05).

Table 2. Relationship Between Parity and the Incidence of Low Birth Weight

Parity	The Incidence of Low Birth Weight Levels						
	Case		**Control**		**Total**		p-value
a. Risk	7	12.7%	9	16.4%	16	14.5	0.787
b. No risk	48	87.3%	46	83.6%	94	85.5	
Total	55	100%	55	100%	110	100	

3. Relationship Between Gestational Age and the Incidence of Low Birth Weight.

The table above shows that compare the gestational age of 110 mothers with a low birth weight incident. Overall, compare of both groups in case group did not have risk of low birth weight incidence slightly with the percentage 87.3 % higher than control group with the percentage 83.6%. In contrast the number of control group (16.4%) with risk of gestational age categories were more than the case group (12.7%). Bivariate analysis in this study used the analysis of the results of the

chi-square statistical test, namely concluding there was no significance of the relationship between the two variables. The chi-square test's p-value results = 0.061 (p-value > 0.05).

Table 3. Relationship between Gestational Age and the Incidence of Low Birth Weight

Gestational age	The Incidence of Low Birth Weight Levels						
	Case		Control		Total		p-value
a. Risk	16	29.1%	7	12.7%	23	20.9	0.061
b. No risk	38	70.9%	48	87.3%	87	79.1	
Total	55	100%	55	100%	110	100	

DISCUSSION

1. Relationship Between Maternal Age and the Incidence of Low Birth Weight

The results of this study indicate that the most respondents who experienced low birth weight were respondents with risk of age (<20 years and >35). This study's bivariate analysis concluded did not have the significance between two variables using the chi-square statistical test results. The chi-square test results show that the p-value is 0.274 (p-value > 0.05).

The low birth weight factor of maternal age in this study is the result of the respondent's risk, which is related to the mother's physical and mental readiness for pregnancy. Younger mothers (<20 years old) are often not physically prepared for pregnancy, while older mothers (>35 years old) are more likely to face medical problems such as hypertension, gestational diabetes, or placental disorders that can affect fetal growth.

These findings align with previous research showing that extreme age (too young or too old) can increase the risk of pregnancy complications, including low birth weight (Damayanti et al., 2022) . Young age (<20 years) can lead to impaired maternal physical development, while older mothers (>35 years) often experience impaired placental function and an increased risk of preeclampsia (Putri & dkk, 2019)

Researchers hypothesize that although maternal age is associated with low birth weight (LBW), other factors, such as underlying medical conditions like hypertension or gestational diabetes, may be more influential. Furthermore, access to adequate healthcare and good pregnancy monitoring can reduce the risk of low birth weight, regardless of whether the mother is younger or older.

Maternal age is one of the biological factors that most influences pregnancy outcomes. Mothers under 20 years of age tend to have less mature reproductive organs and optimal mental readiness, while mothers over 35 years of age have an increased risk of obstetric complications such as hypertension in pregnancy and gestational diabetes (Backes EP, 2020) . Biological and psychological unpreparedness at a young age often results in suboptimal nutrient supply to the fetus, while decreased tissue elasticity and vascular disorders in older age inhibit fetal growth.

Recent research shows that mothers at extreme ages (<20 and >35 years) are twice as likely to give birth to low-birth-weight babies compared to those at the ideal reproductive age of 20–35 years (JF Lestari et al., 2021) . This is associated with Lower Antenatal Care (ANC) visits among young

mothers and increased comorbidities among older mothers. These two age groups require special attention in the form of high-risk screening and reproductive health education from adolescence.

Besides biological factors, social factors also play a role. Young mothers often have low economic status, limited education, and lack family support, all of which are correlated with delayed access to healthcare (Wulandari & Laksono, 2021) . Meanwhile, older mothers may face difficulties balancing household responsibilities and self-care during pregnancy, resulting in reduced attention to nutrition and regular check-ups.

Promotional and preventive efforts aimed at raising awareness of the ideal age for childbirth need to be continuously promoted. Reproductive health education programs in schools and youth health posts (Posyandu) can be an effective strategy to reduce the rate of early pregnancy (WHO, 2023). Furthermore, premarital counseling and preconception screening for women over 35 are also crucial to assess physical readiness and detect diseases that can trigger low birth weight (LBW).

Thus, maternal age is an important indicator related not only to biological readiness but also to socioeconomic factors that influence pregnancy quality. A multidimensional approach is needed to prevent low birth weight babies through interventions at ideal reproductive age and optimizing maternal care throughout the life cycle.

2. Relationship Between Parity and the Incidence of Low Birth Weight

This study found that high parity (≥4 times) did not show a significant association with the incidence of LBW (p=0.787). In this study, although mothers with high parity were more likely to give birth to LBW babies, this association was not statistically tested.

Researchers observed that while high parity can influence the risk of low birth weight (LBW), other factors such as maternal physical exhaustion, lack of attention to health during pregnancy, or lack of medical monitoring may be more influential in the incidence of low birth weight in high-parity mothers. Furthermore, high-parity women tend to have more experience in childbirth, which may be a protective factor.

This research aligns with findings (Permana & Wijaya, 2019) , which also stated that high parity can increase the risk of pregnancy complications, but does not always significantly impact infant birth weight. Factors such as maternal health, access to healthcare, and suboptimal pregnancy management in high parity infants play a greater role in influencing the incidence of LBW than parity itself.

Research by (Syarif, 2025) shows that mothers with high parity are 1.8 times more likely to give birth to low-birth-weight babies than those with low parity, especially if the interval between pregnancies is less than two years. However, another study by (YD Lestari et al., 2024) shows that this effect can be reduced if mothers receive adequate health monitoring and nutritional intake. This confirms that parity is not the sole factor, but rather interacts with nutritional status and access to healthcare.

Psychological factors also play a role in high parity. Mothers with multiple children tend to have divided attention, often neglecting prenatal care and nutritious food consumption (Rahmadani

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& Yusuf, 2022). Furthermore, the economic pressures of extended families can worsen a mother's nutritional status, especially in low-income households.

Strategies to prevent low birth weight (LBW) in mothers with high parity require educational and social approaches. Family planning (FP) programs play a crucial role in spacing pregnancies, while regular ANC visits should be strengthened, especially in the second and third trimesters. Health workers need to emphasize the importance of adequate rest and iron supplementation for multiparous mothers (Mira Miraturrofi'ah, 2025) .

Researchers believe that although high parity is not directly related to low birth weight (LBW), fatigue and lack of adequate prenatal monitoring in high-parity mothers can worsen their health, ultimately affecting their babies' birth weight. Therefore, special attention to high-parity mothers is needed to reduce the risk of low birth weight.

3. Relationship Between Gestational Age and the Incidence of Low Birth Weight

This study shows that there is a tendency for more LBW incidents in shorter-term pregnancies (premature), but there is no significant relationship between gestational age and LBW (p=0.061).

Researchers have observed that preterm birth is often associated with low birth weight (LBW), but many factors can influence gestational age, such as infection, hypertension, or placental abnormalities that can hinder fetal growth. While there is a trend, other factors, such as the quality of healthcare during pregnancy and medical complications, are more significant.

This study aligns with the findings of (Dehghani et al., 2024) , which state that preterm birth is often associated with low birth weight (LBW), although other factors also influence it, such as maternal nutritional status and the presence of other complications during pregnancy. While gestational age is an important factor, maternal health and good pregnancy management can reduce the risk of prematurity and low birth weight.

Research by (Shaohua et al., 2022) confirmed that each week of gestational age contributes to a 150–200 gram increase in fetal weight. However, this relationship is not linear, as maternal nutrition and stress can also slow fetal growth even at term. This demonstrates the importance of monitoring pregnancy health from the first trimester.

In addition to medical conditions, behavioral factors such as smoking, alcohol consumption, and lack of rest can also shorten gestational age (Utami, 2020) . Interventions through promoting a healthy lifestyle for pregnant women can prevent premature births and reduce low birth weight (LBW) rates.

Researchers believe that while gestational age is a significant factor, many mothers who deliver prematurely can deliver babies with normal birth weight if they receive optimal medical care. Therefore, good prenatal care, along with early detection of problems that can affect gestational age and birth weight, are essential to reducing the risk of low birth weight (LBW).

CONCLUSIONS

This study revealed that several maternal factors, such as maternal age, parity and gestational age have an influence on the incidence of Low Birth Weight (LBW), although not all showed a statistically significant relationship. Specifically, maternal age that is too young (<20 years) or too old (>35 years) has a higher tendency to give birth to babies with LBW, although the results of the chi-square test did not show a significant relationship (p = 0.274). Likewise, high parity (≥4 times) was not proven to be significantly associated with the incidence of LBW (p = 0.787). Researchers recommend the need for more comprehensive health interventions, including increasing pregnant women's understanding of the importance of good nutrition, as well as routine and optimal health monitoring during pregnancy. More aggressive preventive efforts against controllable risk factors, such as nutritional status and proper pregnancy management, can be an effective step to reduce the incidence of LBW, especially in areas with a high prevalence.

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