# Factors associated with the incidence of low birth weight in Pontianak City, Indonesia

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## ABSTRACT

**Introduction: The weight of an infant at the time of birth is an indicator of its health. Infants with low birth weight (LBW) are at a higher risk of neonatal mortality and morbidity as well as stunted growth. Low birth weight (LBW) remains a public health concern in developing countries, such as Indonesia. In fact, the neonatal mortalities and morbidities that occur as a consequence of LBW can be prevented by addressing the relevant risk factors. It is believed that by identifying these risk factors, prevention and management efforts can be efficiently and effectively implemented to reduce incidences of LBW (LBWIs). As such, the present study determined the factors affecting LBWIs in a rural setting in Pontianak City, Indonesia.**

**Materials and methods: This is a retrospective unmatched case-control study. The required data was obtained from the medical records maintained by the University Tanjungpura Hospital, Pontianak City, Indonesia. Simple random sampling was used to select and equally divide the 60 chosen respondents into LBW case and normal birth weight control groups.**

**Results: Mothers with low educational levels had a 1.5 times greater chance of giving birth to LBW babies. The results of the multivariate analysis also revealed a correlation between gestational age (GA), incidence of premature rupture of membranes (PROM), and intrauterine growth restriction (IUGR) and that their combined effects that contributed to 56% of LBWIs.**

**Conclusion: Low maternal education level, low gestational age, IUGR, and premature rupture of membranes contribute to LBW babies. This study recommends that it is necessary to educate women of childbearing age about routine antenatal care checks to identify risk factors that can lead to LBW.**

**KEYWORDS:**
*Intrauterine growth restriction, Low birth weight, Premature, Risk factors*

## INTRODUCTION

In 2020, 19.8 million newborns or approximately 14.7% of all babies born globally had low birth weight (LBW). The incidence of LBW in developing countries is 16.5%, which is twice as high as that in developed countries.[1–4] Indonesia is a developing country ranked third among countries with the highest prevalence of LBW (11.1%), after India (27.6%) and South Africa (13.2%). Additionally, Indonesia has the second highest prevalence of LBW among Asian countries, which is at 6.37%[5] after the Philippines (21.2%).[6]

Low birth weight remains a public health concern in developing countries. Babies with LBW are at increased risk of morbidity, stunted growth, and neonatal death.[7] Jaundice has the highest morbidity rate (40.09%) in LBW babies, followed by respiratory problems (18.16%), sepsis (8.72%), and apnoea (4.48%). Premature infants with LBW have the highest morbidity rates from conditions, such as apnoea (100%), birth asphyxia (88.88%), respiratory problems (87.01%), sepsis (80.55%), and jaundice (67.64%). The incidence of LBW is associated with infant mortality,[8] and early neonatal mortality rate is 21.22 per 1000 live births. Low birth weight can lead to death from feed aspiration, sepsis, and hyaline membrane disease.[3]

The proportion of babies with birth weight <2500 g (LBW) from all provinces in Indonesia was 6.2% (this percentage is the average of all LBW cases that occurred throughout Indonesia).[9] Sixteen provinces, namely South Sumatra, Bangka Belitung, West Java, DI Yogyakarta, Banten, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, Central Kalimantan, Kalimantan, Central Sulawesi, South Sulawesi, South Maluku, North Maluku, West Papua, and Papua, have LBW prevalence rates above the national rate.[10–12]

In the last two years, there has been an increase in the number of cases at Tanjung Pura University Hospital, Pontianak (from 48 to 58 cases). A previous study reported that the factors causing LBW include maternal, baby, and other factors.[13] Another study found that missing iron and folate supplementation during pregnancy, maternal meal frequency during pregnancy, maternal haemoglobin level, food insecurity, and women's inadequate minimum dietary diversity score were significant determinants of LBW.[14] Maternal age, parity, arm circumference, haemoglobin grade, gestational age, and complications during pregnancy were significant maternal risk factors for LBW.[15]

LBW leads to a variety of complications, particularly in developing countries and the Third World. LBW infants who

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survive will face cognitive and neurological disorders, increased risk of high blood pressure, obstructive pulmonary disease, high blood cholesterol, kidney disease, acute watery diarrhea, and immune system disorders.[3,5] LBW also contributes to the development of neurodevelopmental disorders, such as mental retardation and learning disability, as well as psychodevelopmental disorders and chronic diseases in adulthood.[7] Therefore, identifying factors that influence the incidence of LBW is very important. By analyzing risk factors, pregnant women or women of childbearing age will be more alert to prevent LBW births.

Various efforts have been made to prevent LBW, one of which is to optimize antenatal care visits. Antenatal care visits can detect risk factors in pregnant women and enable immediate management; however, implementation is not yet optimal. By identifying the risk factors for LBW, prevention and management efforts can be carried out efficiently and effectively to reduce the incidence of LBW. Several mortalities and morbidities can be prevented by addressing the factors associated with LBW. This study aimed to identify the risk factors associated with LBW.[6]

## MATERIALS AND METHODS

The present quantitative study was conducted using a 1:1 comparison unmatched case-control design. Observational analytical epidemiological study examines the relationship between a particular outcome (disease or health condition) and its risk factors. This study included patients with LBW and a control group whose effects were unknown (normal birth weight). Secondary data were obtained from our hospital medical records for the last one year, with a sample size of 60 respondents, comprising 30 cases and 30 controls. Simple random sampling was to select the 60 respondents while taking into consideration the study's inclusion criteria; namely mothers who had given birth in the last one year, mothers who did not have diabetes mellitus and/or hypertension, and mothers living in Pontianak City. Meanwhile, the exclusion criteria included the mothers of babies born gemelli and/or prematurely. The questionnaire was developed by the researchers and comprised three parts that collected the respondent's demographic data, information about the mother's health, and information about the baby's health. Its validity and reliability were tested and deemed valid and reliable.

This study passed the ethical test (ethical permission No. 187/II.1. AU/KET.ETIK/VI/2021). Statistical data analysis was performed using data software, bivariate analysis was performed using the chi-square test, and multivariate analysis was performed using logistic regression analysis.

## RESULTS

The present quantitative study was conducted using a 1:1 comparison unmatched case-control design. Observational analytical epidemiological study examines the relationship between a particular outcome (disease or health condition) and its risk factors. This study included patients with LBW and a control group whose effects were unknown (normal birth weight). Secondary data were obtained from our hospital medical records for the last one year, with a sample size of 60 respondents, comprising 30 cases and 30 controls. Simple random sampling was to select the 60 respondents while taking into consideration the study's inclusion criteria; namely mothers who had given birth in the last one year, mothers who did not have diabetes mellitus and/or hypertension, and mothers living in Pontianak City. Meanwhile, the exclusion criteria included the mothers of babies born gemelli and/or prematurely. The questionnaire was developed by the researchers and comprised three parts that collected the respondent's demographic data, information about the mother's health, and information about the baby's health. Its validity and reliability were tested and deemed valid and reliable.

The univariate analysis was used to explain or describe the characteristics of each study variable. The results of statistical tests on characteristics of the respondents based on education, parity, gestational spacing, gestational age, premature rupture of membranes (PROM), pre-eclampsia, antepartum bleeding, intrauterine growth restriction (IUGR), and maternal age in both groups are shown in Table I. The results of the statistical tests showed the characteristics of the respondents in both groups. In the case group, 52.1% of the respondents had low education, while it was 47.9% in the control group. Regarding parity, the percentage of respondents at risk of LBW was 51.3% in the case group and 48.7% in the control group. The results of the statistical tests on pregnancy spacing showed that 55.2% of the respondents in the case group were at risk of LBW, whereas in the control group, it was 44.8%. In the case group, the percentage of respondents with preterm gestational age was 82.4%, whereas it was 17.6% in the control group. The proportion of respondents who experienced PROM in the case group was 81.8%, while it was 18.2% in the control group. The percentage of respondents who experienced pre-eclampsia in the case group was 62.5%, while it was 37.5% in the control group. The percentage of respondents who experienced bleeding in the case group was 60%, while it was 40% in the control group. The percentage of respondents who experienced IUGR in the case group was 87.5%, while it was 12.5% in the control group. For the maternal age, in the case group, 75% of the respondents gave birth in the risk age, while it was 25% in the control group.

In the bivariate analysis, data on the incidence of LBW in both groups were analysed using the chi-square test. The results of the bivariate analysis are presented in Table II. The results of the statistical test showed that there was no significant relationship between mother's educational level and the incidence of LBW ($p = 0.52$; $p>0.05$). Estimation test for low educational level reported an odds ratio (OR) of 1.52 (OR >1, 95% confidence interval (CI): 0.42–5.47), which indicates that respondents who have low education are 1.52 times more likely to have LBW births than those with higher education. For parity, the statistical test reported a p-value of 0.78 ($p>0.05$), indicating that there was no significant relationship between parity and the incidence of LBW. The estimation test reported an OR of 0.86 (OR <1, 95% CI: 0.29–2.49), indicating that parity in the risk category is a protective factor for the incidence of LBW. The results of the statistical tests on pregnancy spacing showed a p-value of 0.44 ($p>0.05$), indicating that there is no significant relationship between pregnancy spacing and the incidence of LBW. The

**Table I: The characteristics of respondents in the case and control groups**

| Characteristics of respondents | Birth weight (n=60) | | | |
|---|---|---|---|---|
| | Case (LBW) | | Control (NBW) | |
| | f | % | f | % |
| Education | | | | |
| Low education | 25 | 52.1% | 23 | 47.9% |
| Higher education | 5 | 41.7% | 7 | 58.3% |
| Parity | | | | |
| At risk | 20 | 51.3% | 19 | 48.7% |
| No risk | 10 | 47.6% | 11 | 52.4% |
| Spacing of pregnancy | | | | |
| At risk | 16 | 55.2% | 13 | 44.8% |
| No risk | 14 | 45.2% | 17 | 54.8% |
| Gestational Age | | | | |
| Preterm | 14 | 82.4% | 3 | 17.6% |
| Term | 16 | 37.2% | 27 | 62.8% |
| PROM | | | | |
| Yes | 9 | 81.8% | 2 | 18.2% |
| No | 21 | 42.9% | 28 | 57.1% |
| Disease | | | | |
| Pre-eclampsia | 10 | 62.5% | 6 | 37.5% |
| No pre-eclampsia | 20 | 45.5% | 24 | 54.5% |
| Bleeding | | | | |
| Yes | 6 | 60.0% | 4 | 40.0% |
| No | 24 | 48.0% | 26 | 52.0% |
| IUGR | | | | |
| Yes | 21 | 87.5% | 3 | 12.5% |
| No | 9 | 25.0% | 27 | 75, 0% |
| Mother's Age | | | | |
| At risk | 3 | 75.0% | 1 | 25.0% |
| No risk | 27 | 48.2 | 29 | 51.8% |

LBW, low birth weight; NBW, normal birth weight; PROM, premature rupture of membranes; IUGR, intrauterine growth restriction

**Table II: An analysis of the factors affecting birth weight**

| Variable | Birth weight (n=60) | | | | X | p | OR | 95% CI |
|---|---|---|---|---|---|---|---|---|
| | Case (LBW) | | Control (NBW) | | | | | |
| | f | % | f | % | | | | |
| Education | | | | | | | | |
| Low education | 25 | 83.8 | 23 | 76.7 | 0.42 | 0.52 | 1.52 | 0.42–5.47 |
| Higher education | 5 | 16.7 | 7 | 23.3 | | | 1 | |
| Parity | | | | | | | | |
| At-risk | 19 | 63.3 | 20 | 66.7 | 0.07 | 0.78 | 0.86 | 0.29–2.49 |
| No risk | 11 | 36.7 | 10 | 33.3 | | | 1 | |
| Spacing of pregnancy | | | | | | | | |
| At-risk | 16 | 53.3 | 13 | 43.3 | 0.60 | 0.44 | 1.49 | 0.54–4.13 |
| No risk | 14 | 46.7 | 17 | 56.7 | | | 1 | |
| Gestational Age | | | | | | | | |
| Preterm | 14 | 46.7 | 3 | 10.0 | 9.93 | 0.002* | 7.87 | 1.95–31.67 |
| Term | 16 | 53.3 | 2 | 90.0 | | | 1 | |
| PROM | | | | | | | | |
| Yes | 9 | 30.0 | 2 | 6.7 | 5.46 | 0.02* | 6.00 | 1.17–30.72 |
| No | 21 | 70.0 | 28 | 81.7 | | | 1 | |
| Disease | | | | | | | | |
| Pre-eclampsia | 10 | 33.3 | 6 | 20.0 | 1.36 | 0.24 | 2.00 | 0.62–6.46 |
| No pre-eclampsia | 20 | 66.7 | 24 | 80.0 | | | 1 | |
| Bleeding | | | | | | | | |
| Yes | 6 | 20.0 | 4 | 13.3 | 0.48 | 0.48 | 1.63 | 0.41–6.47 |
| No | 24 | 80.0 | 26 | 86.7 | | | 1 | |
| IUGR | | | | | | | | |
| Yes | 21 | 87.5 | 3 | 10 | 22.5 | 0.000** | 21 | 5.05–87.38 |
| No | 9 | 25.0 | 27 | 90 | | | 1 | |
| Mother's Age | | | | | | | | |
| At-risk | 3 | 10 | 1 | 3.3 | 1.07 | 0.31 | 3.22 | 0.32–32.89 |
| No risk | 27 | 90 | 29 | 96.7 | | | 1 | |

Significant * p<0.05 ** p<0.001
OR, odds ration; CI, confidence interval; LBW, low birth weight; NBW, normal birth weight; PROM, premature rupture of membranes; IUGR, intrauterine growth restriction

**Table III.: Multivariate logistic regression analysis**

| Variable | p | OR (95% CI) |
|---|---|---|
| IUGR | | |
| Yes | 0.000** | 22.07 (4.68–104.08)** |
| No | | 1 |
| Gestational Age | | |
| Preterm | 0.034* | 6.57 (1.15–37.45)* |
| Term | | 1 |
| Premature rupture of membranes | | |
| Yes | 0.441 | 2.44 (0.25–23.58) |
| No | | 1 |
| -2 log-likelihood | | 50.87 |
| R2 | | 0.56 |
| Df | | 3 |

Significant * p<0.05 p<0.001
OR, odds ration; CI, confidence interval; IUGR, intrauterine growth restriction

estimation test reported an OR of 1.49 (OR >1, 95% CI: 0.54–4.13), indicating that respondents with pregnancy spacing in the risk category have a 1.49 times chance of having LBW compared to those with a spacing not in the risk category. The statistical test for gestational age showed a p-value of 0.002 (p<0.05), indicating a significant relationship between gestational age and the incidence of LBW. The estimation test reported an OR of 7.87 (OR >1, 95% CI: 1.95–31.67), indicating that respondents with preterm gestational age have a 7.87 times chance of having LBW compared to those with term pregnancy intervals. The results of this study also found that there was a significant relationship between PROM and the incidence of LBW, and the statistical test obtained showed a p-value of 0.02 (p<0.05). The estimation test reported an OR of 6 (OR >1, 95% CI: 11.17–30.72), indicating that respondents who experience PROM are six times more likely to have LBW compared to those who do not experience PROM. The statistical test on the incidence of pre-eclampsia showed a p-value of 0.24 (p>0.05), indicating that there is no significant relationship between pre-eclampsia and the incidence of LBW. The estimation test for pre-eclampsia reported an OR of 2 (OR >1, 95% CI: 0.62–6.46), indicating that respondents with pre-eclampsia have a two times chance of having LBW compared to those without pre-eclampsia. The statistical test for bleeding during delivery showed a p-value of 0.31 (p> 0.05), indicating that there is no significant relationship between bleeding and the incidence of LBW. The estimation test reported an OR of 1.63 (OR >1, 95% CI: 0.41–6.47), indicating that respondents who experience bleeding have a 1.63 times chance of having LBW compared to those who do not experience bleeding during childbirth. The chi-square test for IUGR showed a p-value of 0.000 (p<0.05), indicating a significant relationship between IUGR and the incidence of LBW. The estimation test reported an OR of 21 (OR >1, 95% CI: 5.05–87.38), indicating that infants who have IUGR have a 21 times chance of having LBW compared to those who do not have IUGR. The statistical test for maternal age showed a p-value of 0.48 (p> 0.05), indicating that there is no significant relationship between maternal age and the incidence of LBW. The estimation test showed an OR of 3.22 (OR >1, 95% CI: 0.32–32.89), indicating that maternal age in the risk category has a 3.22 times chance of resulting in LBW compared to those whose ages were not in the risk category.

The multivariate analysis was conducted to analyse several factors related to the incidence of LBW. The analysis was carried out at a modelling stage, which aimed to determine the relationship between the independent and dependent variables by considering maternal and foetal factors with the incidence of LBW. The test used was a logistic regression test with a 95% CI, significance at a p-value of <0.05, value of the OR, value of -2 log-likelihood, and $R^2$. TThe results of the statistical analysis in Table III show the relationship between the independent variables, including maternal and foetal factors (gestational age, incidence of PROM, and IUGR), and dependent variable (incidence of LBW), which were analysed simultaneously. Statistical significance was obtained by calculating the difference in -2 log-likelihood. When the three variables were analysed simultaneously, there was a 0.89 increased risk of LBW incidence for gestational age, 0.25 for PROM, and 1.07 for IUGR. The presence of these three variables simultaneously contributed to a LBW incidence of 56%.

## DISCUSSION

The education level of a mother influences behaviour, including meeting nutritional needs through diet and understanding prenatal care during pregnancy. A person's educational background is an important element that can influence their nutritional status and what good things need to be done during pregnancy. With a higher level of education, it is expected that knowledge or information about pregnancy and how to maintain pregnancy until delivery can be obtained. Thus, baby care is expected to improve. This study found that although maternal education was not statistically significant in the incidence of LBW, the estimation test showed that mothers with low educational levels had a 1.5 times greater chance of giving birth to LBW babies than those with higher education. This statement is supported by a previous study, which reported that low educational level affects a baby's birth weight; mothers with low educational level tend to give birth to babies with LBW. However, educational level was not a risk factor for LBW. This is because a mothers' knowledge is not just a race for final academic education. However, there is an advancement among younger mothers in accessing and obtaining information, as well as the role of the midwives in providing information, education, and communication to pregnant

women during antenatal visits. These results are consistent with the results of this study because the frequency and antenatal care quality of majority of the respondents were good.[16,17]

Parity is an important factor affecting foetal health during pregnancy. A high-parity state increases the risk of LBW because the ability of the uterus to provide nutrients during pregnancy is reduced, thereby hampering the distribution of nutrients between the mother and foetus. The results of previous studies reported that at parity >3, the risk was 0.92 times higher than that at parity ≤3.18 Too many deliveries in the mother can result in a decrease in the function of the mother's reproductive system.[17] Low birth weight can occur with parity as a risk factor because the mother's reproductive system has experienced thinning due to frequent childbirth; this is due to the high parity of the mother and decrease in endometrial quality. This study is in line with a previous study that found that respondents with parity in the risk category are 0.86 times likely to give birth to LBW babies.[18] The first or more than three deliveries can harm the mother and foetus. After three deliveries, the mother is at risk of giving birth to a baby with disabilities or LBW. More than three child birth increase the health risk of pregnancy and maternity mothers, which can cause complications for both mother and baby, resulting in LBW babies. This study is also in line with previous studies that showed no significant relationship between parity and the incidence of LBW ($p>0.05$).[19]

In healthy reproduction, the safe age for pregnancy and childbirth is 20–35 years, whereas those at risk for pregnancy and childbirth are those aged <20 years or >35 years.[20] The results of this study are in line with the results of previous study, which showed that there was no significant relationship between maternal age and the incidence of LBW ($p>0.05$).[19] Meanwhile, the results of other studies reported that there was a relationship between maternal age and the incidence of LBW, namely the age of the mother at risk with p-value = 0.014 ($p<0.05$).6 The difference is that based on the results of a previous study, it is thought that only a small number of maternal factors were studied, whereas there are many factors that can influence the incidence of LBW, including foetal, placental, and environmental factors. Other risk factors that influence LBW births are external factors, including the mother's work activities and economic status, and internal factors, such as the mother's age, pregnancy spacing, parity, pregnancy checks, maternal nutritional status, pregnancy history, and pregnancy complications.[21]

Pregnancies that are too close together prevent the reproductive organs from functioning optimally, resulting in poor foetal growth. Additionally, infants can experience LBW, poor nutrition, and shorter breastfeeding times. A good pregnancy interval for the health of a mother and child is >2–5 years; the shorter (<2 years) the pregnancy interval, the higher the risk of developing pre-eclampsia and other pregnancy complications, which have severe effects on the baby, such as early delivery or small for gestational age, thereby leading to LBW.[18] The ideal gestational interval between births is >2 years, which allows the body to repair and prepare the reproductive organs for the next pregnancy. A disturbed reproductive system hinders foetal development and growth, and a pregnancy interval of <2 years can pose foetal risks, one of which is LBW.[19] The results of this study are in line with those of previous studies, which reported no significant relationship between pregnancy interval and the incidence of LBW ($p>0.05$).[18] However, other studies found a relationship between birth spacing and the incidence of LBW.[23] Differences in results and studies can be explained because they are not always caused by birth spacing. Other risk factors that influence LBW are external factors, including the mother's work activities and economic status, and internal factors, including the mother's age, pregnancy spacing, parity, pregnancy checks, maternal nutritional status, pregnancy history, and pregnancy complications.[4,5,24]

Gestational age groups are divided into preterm (<37 weeks), term (37–42 weeks), and post-term (42 weeks). A baby's weight increases according to gestational age because the shorter the pregnancy period, the less perfect the growth of the body's organs, which affects the baby's birth weight. The risk factor of gestational age is related to the incidence of LBW; a gestational age of <37 weeks can be one of the factors causing LBW because foetal growth is not yet complete at this age; this affects the baby's birth weight. This study is in line with previous findings that showed a relationship between gestational age and the incidence of LBW, and that mothers who experience premature pregnancy have 15-fold risk of experiencing LBW compared to those with full-term gestation.[25]

Pre-eclampsia is a potentially dangerous pregnancy complication characterized by high blood pressure. It usually begins after 20 weeks of gestation or after delivery and is characterized by an increase in blood pressure of up to 140/90 mmHg, accompanied by increased levels of proteinuria. One of the maternal diseases that can affect a baby's weight at birth is pre-eclampsia, which can cause IUGR, resulting in a smaller and weaker baby at birth. This condition allows babies to be born with LBW. Other studies have shown that mothers who experience pre-eclampsia are twice as likely to give birth with LBW infants than those who do not experience pre-eclampsia, although the relationship between the two is not statistically significant. The results of this study are in line with previous studies that found no relationship between pre-eclampsia and the incidence of LBW.[26]

Bleeding during pregnancy is the leading cause of maternal and perinatal death, although the specific cause is unknown. In late pregnancy, considerable vaginal bleeding can occur due to detachment of the placenta from the uterine wall (placenta abruption) and tear in the implantation site of the placenta that partially covers the birth canal (placenta previa), which can cause LBW. Previous studies have reported that antepartum bleeding affects LBW. The difference with previous studies can be due to other factors that affect LBW; antepartum bleeding can affect foetal growth and cause LBW. Mechanical trauma and severity of bleeding are also thought to influence the incidence of LBW. In this study, no further investigation of bleeding or causes of bleeding was conducted. Further studies using primary data and other methods are necessary.

Premature rupture of membranes refers to premature rupture of the amniotic fluid. If the membranes rupture before 37 weeks of pregnancy, it is called premature rupture of the membranes. Premature rupture of membranes also affects the incidence of LBWs. Premature rupture of membranes can be caused by infection. This infection can result from the biomechanical process of amniotic fluid in the form of protein hydrolysate; this is because the strength of the amniotic fluid is weak, and connective tissue and blood vessels are lacking, which can cause premature birth. This study is in line with previous studies that explained that one of the factors associated with the incidence of LBW is PROM.[27]

Based on the researchers' conclusions, there is a relationship between IUGR factors and the incidence of LBW. Low birth weight can also occur at 37–42 weeks of gestation, and may be caused by foetal growth disorders (IUGR) due to malnutrition before and during pregnancy, which play a major role. The foetus in the uterus grows and develops as its mother ages. Most foetuses have a small size and weight when they are born too early (premature birth). However, babies can also have a small size and weight, even if they are born at term. This condition is known as IUGR. The two main causes of LBW are premature birth and slow foetal growth (IUGR). Mothers with anaemia during pregnancy or those with IUGR can give birth to small babies. A mother's need for nutrients increases in multiple pregnancies, which causes anaemia and other deficiency diseases, resulting in delivery of small babies.[28] During pregnancy, mothers require additional calories, proteins, and minerals for the growth of the foetus, placenta, and uterine tissue. Generally, the pregnancy of a premature baby with LBW is related to a situation in which the uterus is unable to maintain the foetus, disturbances during pregnancy, or stimulation that causes uterine contractions before maturity.

The limitations of the present study include a small sample size and respondent characteristics that did not match between the two groups. Therefore, more studies should be conducted with a larger sample size and respondent characteristics that match between the two groups. The findings of the present study may prevent unnecessary risks as well as improve maternal and infant health. It is believed that, by identifying the factors influencing LBWIs, it may be prevented from occurring. This would not only affect the short-term health of the infant, but its health in the long run as well. Lastly, the findings of the present study may be used to develop maternal and child health programmes that effectively decrease the new-born mortality rate.

## CONCLUSION

This study found that gestational age, IUGR, and premature rupture of membranes were associated with the incidence of LBW. The presence of these three variables simultaneously contributed to an LBW incidence of 56%. This study recommends that it is necessary to educate women of childbearing age about routine antenatal care checks to avoid risk factors that can cause LBW. Further studies can be performed with a larger sample size and examine the socio-cultural aspects that affect the incidence of LBW.

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## CONFLICT OF INTEREST

Authors declared no conflicts of interest.

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