



Risk Factors Associated with The Incidence of Low Birth Weight (LBW) at Haji Makassar Hospital in January-December 2018

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A B S T R A C T

Low birth weight babies (LBW) are newborns whose body weight at birth is less than 2,500 grams regardless of gestational age. In 2015, the incidence of LBW in Makassar City was 690 cases. By knowing the risk factors for LBW, health workers and government can perform the targeted intervention in groups with a high risk to reduce the incidence of LBW. This paper analyzes the correlation between parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies with the incidence of LBW. This study was analytical survey research with a cross-sectional approach. It was conducted at Haji Makassar Hospital for one month, using medical record data (secondary data). The population was 955 people who gave birth at the Haji Makassar Hospital in January-December 2018. Furthermore, the sample was 496 respondents with a purposive sampling technique. The bivariate analysis utilized the chi-square test. There was a significant correlation between parity ($p=0.000$), severe preeclampsia ($p=0.000$), and multiple pregnancies ($p=0.000$) with the incidence of LBW. Meanwhile, there was no significant association between maternal age ($p=0.134$), maternal occupation ($p=0.398$), maternal education ($p=0.306$), and premature rupture of membranes ($p=0.956$) with the incidence of LBW. In conclusion, risk factors for LBW are parity, severe preeclampsia, and multiple pregnancies. Meanwhile, unrelated factors with LBW are maternal age, maternal occupation, maternal education, and premature rupture of membranes.

INTRODUCTION

Low birth weight (LBW) babies are newborns whose body weight at birth is less than 2,500 grams regardless of gestational age (Sholeh *et al.*, 2014). The birth weight is the baby's weight in the first one hour of birth. The World Health Organization (WHO) reports that LBW babies contribute to 60-80% of all neonatal deaths and have a risk of death 20 times greater than babies with normal birth weight (Supiati, 2016). According to WHO, the neonatal mortality rate in 2015 was around 2.7 million deaths, or about 45% of all under-five deaths. Nearly one million neonatal deaths occur at birth, and two million neonatal died in the first week of life. In addition, WHO reveals that the proportion of child mortality in the neonatal period has increased worldwide over the last 25 years (WHO, 2016).

Indonesia Demographic and Health Survey (IDHS) in 2017 showed that the neonatal mortality rate was 15 per 1,000 births live, the infant mortality rate was 24 per 1000 births, and the under-five mortality rate was 32 per 1000 births live (Ministry of Indonesian Health, 2018). The direct causes of infant mortality in Indonesia are asphyxia (44-46%), low birth weight (15-20%), infection (24-25%), birth trauma (2-7%), and congenital disabilities (1-3%) (Nursusila, Majid and Ahmad, 2017).

The prevalence of LBW in South Sulawesi Province was ranked 7 (seven) out of 34 (thirty-four) provinces in Indonesia, with a percentage of 12% (Dinas Kesehatan, 2014). Furthermore, its incidence in 2015 increased to 4,697 infants (Dinas Kesehatan, 2016). The highest incidence of LBW in South Sulawesi Province was in Makassar City (690 cases), Gowa District (342 cases), and Luwu District (288 cases). Meanwhile, the lowest incidence was in Barru District (27 cases), Bantaeng District (47 cases), and Tanah Toraja District (65 cases) (Dinas Kesehatan, 2016).

By knowing the risk factors for LBW, health workers and government can perform the targeted intervention in groups with a high risk to reduce the incidence of LBW. The research found that the risk factors for LBW incidence were maternal, obstetric, fetal, and environmental (Atika and Ismawati, 2010; Trihardiani, 2011; Merzalia, 2012). In addition, a prior study in 302 samples revealed that parity factors, premature rupture of membranes, and hypertension increased the prevalence of LBW (Zahrah, Prasetyowati and Yuliawati, 2018).

Furthermore, in the Qur'an, the obligation of parents to their children is fulfilling children's welfare. It is stated in Surah An-Nisa (4) verse 9 as the word of Allah SWT:

لِيَخْشَ الَّذِينَ لَوْ اُدْفِهِمْ ذُرِّيَّةً اَوْ اَفْوا لِيهِمْ لِيَتَّقُوا اللهَ لِيَقُولُوا لَا سَدِيدًا

It means:

"And let people fear Allah, even if they leave their children, who are weak, they worry about their (welfare) Therefore, let them fear Allah and speak the truthful words."

According to the opinion of scholars, the verse above explains that the unstable physical health condition and lack of child's intelligence due to lack of nutritious food are the responsibility of parents. Islamic law prohibits parents from leaving their offspring or abandoning children, causing parents to worry about their children's welfare (Abdullah, 2015).

From the description above, the authors were interested in researching the risk factors for low birth weight (LBW) in January-December 2018. The study was carried out at the Haji Makassar Hospital because Makassar is one of the cities in South Sulawesi with the highest incidence of LBW. In addition, Haji Makassar Hospital is a referral hospital in the city of Makassar with an increased incidence of LBW. This paper analyzes the correlation between parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies with the incidence of low birth weight at Haji Makassar Hospital.

METHOD

This study was analytical survey research with a cross-sectional approach. The independent variables were parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies. In addition, the dependent variable was low birth weight

incidence. This research was conducted at Haji Makassar Hospital for one month, using medical record data (secondary data). The inclusion criteria were a wholly filled medical record. The population was 955 people who gave birth at Haji Makassar Hospital in January-December 2018. Furthermore, the sample was 496 respondents with a purposive sampling technique. Data analysis used univariate and bivariate analysis by SPSS Statistics software. The bivariate analysis utilized the chi-square test.

RESULT

Univariate analysis determines the characteristics of respondents in this paper.

Table 1. The Characteristics of Respondents by Parity, Maternal Age, Maternal Occupation, Maternal Education, Severe Preeclampsia, Premature Rupture of Membranes, Multiple Pregnancy, and Intrauterine Growth Restriction.

The Characteristics of Respondents	Frequency	Percentage (%)
Parity		
Primigravida	406	82%
multigravida	90	18%
Maternal Age		
At-risk	138	28%
Not at-risk	358	72%
Maternal occupation		
At-risk	66	13%
Not at-risk	430	87%
Maternal education		
At-risk	222	45%
Not at-risk	274	55%
Severe Preeclampsia (SP)		
No SP	460	93%
SP	36	7%
Premature rupture of membranes (PROM)		
No PROM	493	99%
PROM	3	1%
Multiple Pregnancy (MP)		
No MP	466	94%
MP	30	6%
Intrauterine growth restriction (IUGR)		
Respondents' babies do not have IUGR	494	99%
Respondents' babies have IUGR	2	1%
Low birth weight (LBW)		
Respondents' babies have a normal birth weight	338	68%
Respondents' babies have LBW	158	32%

Table 1 shows that most mothers are primigravida (82%), are not of at-risk age (72%), and do not have at-risk occupation (87%) or at-risk education (55%). In addition, respondents do not have severe preeclampsia (93%), premature rupture of membranes (99%), and multiple pregnancies (94%). Furthermore, most of their babies do not have intrauterine growth restrictions (99%) and have normal birth weight (68%).

Furthermore, the bivariate test determines the correlation between the independent and dependent variables.

Table 2. Cross-tabulation between parity and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	N	%	N	%	N	%	
Parity							
Primigravida	113	28%	293	72%	406	100%	0.000
Multigravida	45	50%	45	50%	90	100%	

72% of respondents with primigravida had babies with normal weight, and 28% had babies with LBW. In addition, 50% of respondents with multigravida had babies with normal weight, and 50% had babies with LBW. Furthermore, the chi-square test obtained $p=0.000$, indicating H_0 was rejected or H_a was accepted. Thus, there was a correlation between parity and the incidence of LBW (Table.2).

Table 3. Cross-tabulation between maternal age and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal Age							
At-risk	37	27%	101	73%	138	100%	0.134
Not at-risk	121	34%	237	66%	358	100%	

73% of at-risk-age mothers had babies with normal weight, and 27% had babies with LBW. In addition, 66% of not-risk-age respondents had babies with normal weight, and 34% had babies with LBW. Furthermore, the chi-square test obtained $p=0.134$, indicating H_0 was accepted or H_a was rejected. Thus, there was no correlation between maternal age and the incidence of LBW (Table 3).

Table 4. Cross-tabulation between maternal occupation and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal occupation							
At-risk	24	36%	42	64%	66	100%	0.398
Not at-risk	134	31%	296	69%	430	100%	

64% of working mothers (at risk) had babies with normal weight, and 36% had babies with LBW. In addition, 69% of housewives (not at-risk) had babies with normal weight, and 31% had babies with LBW. Furthermore, the chi-square test obtained $p=0.398$, indicating H_0 was accepted or H_a was rejected. Thus, there was no correlation between maternal occupation and the incidence of LBW (Table 4).

Table 5. Cross-tabulation between maternal education and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal education							
At-risk	76	34%	146	66%	222	100%	0.306
Not at-risk	82	30%	192	70%	274	100%	

66% of mothers with low education (at-risk) had babies with normal weight, and 34% had babies with LBW. In addition, 70% of mothers with higher education (not at-risk) had babies with normal weight, and 30% had babies with LBW. Furthermore, the chi-square test obtained $p=0.306$, indicating H_0 was

accepted or H_a was rejected. Thus, there was no correlation between maternal education and the incidence of LBW (Table 5).

Table 6. Cross-tabulation between severe preeclampsia and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Severe Preeclampsia (SP)							
No SP	129	28%	331	72%	460	100%	0.000
SP	29	81%	7	19%	36	100%	

72% of respondents with no severe preeclampsia gave birth to normal birth weight babies, and 28% delivered LBW babies. In addition, 81% of mothers with severe preeclampsia gave birth to LBW babies, and 19% had normal birth weight babies. Furthermore, the chi-square test obtained $p=0.000$, indicating H_0 was rejected or H_a was accepted. Thus, there was a correlation between severe preeclampsia and the incidence of LBW (Table 6).

Table 7. Cross-tabulation between premature rupture of membranes and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	n	%	n	%	
Premature rupture of membranes (PROM)							
No PROM	157	32%	336	68%	493	100%	0.956
PROM	1	33%	2	67%	3	100%	

68% of mothers with no premature rupture of membranes gave birth to normal birth weight babies, and 32% delivered LBW babies. In addition, 67% of mothers with premature rupture of membranes gave birth to normal babies, and 33% had LBW babies. Furthermore, the chi-square test obtained $p=0.956$, indicating H_0 was accepted or H_a was rejected. Thus, there was no correlation between premature rupture of membranes and the incidence of LBW (Table 7).

Table 8. Cross-tabulation between multiple pregnancies and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Multiple Pregnancy (MP)							
No MP	132	28%	334	72%	466	100%	0.000
MP	26	87%	4	13%	30	100%	

72% of respondents with no multiple pregnancies delivered normal birth weight babies, and 28% gave birth to LBW babies. In addition, 87% of mothers with multiple pregnancies had LBW babies, and 13% delivered normal birth weight babies. Furthermore, the chi-square test obtained $p=0.000$, indicating H_0 was rejected or H_a was accepted. Thus, there was a correlation between multiple pregnancies and the incidence of LBW (Table 8).

DISCUSSION

This study found a correlation between parity and the incidence of LBW ($p=0.000$). It is in line with previous research by Zahrah, et al. (2018) that showed an association between mother's parity and LBW incidence ($p= 0.024$). A study by Annisa (2017) also revealed a significant relationship between maternal parity and the incidence of low birth weight (LBW) infants at the Siti Khadijah Islamic Hospital Palembang ($p= 0.025$). Maternal parity affects thinning in the reproductive system due to frequent childbirth. Higher maternal parity decreases the endometrium quality. Repeat pregnancies will affect the distribution of nutrients to the fetus, so there is a decrease in the number of nutrients compared to previous pregnancies (Mahayana, Chundrayetti and Yulistini, 2015).

In addition, mothers with multigravida have a 6.588 times greater risk of experiencing anemia. The more often a woman becomes pregnant and gives birth, the greater the risk of experiencing anemia because pregnancy depletes iron reserves in the body. Furthermore, anemic pregnant women have the potential to give birth to babies with low birth weight (Rizkah and Mahmudiono, 2017). Mothers with multigravida can prevent their babies from low birth weight by counseling in antenatal care regularly. In addition, family planning programs can prevent multigravida (Lestari, Ulfa and Maryam, 2015).

This paper revealed no significant correlation between maternal age and the incidence of LBW ($p= 0.134$). This study is in line with previous research conducted by Maulinda, et al., (2021), indicating no significant relationship between maternal age and the incidence of LBW ($p= 0.310$). In addition, a study by Noni and Elvi (2017) revealed that mothers with no at-risk-age for the incidence of LBW were more than mothers with at-risk-age for the incidence of LBW. Our findings also showed that mothers who were not at-risk were more likely to give birth to LBW babies.

In addition, this research indicated no significant association between maternal occupation and the incidence of LBW ($p=0.398$). It is in line with a prior study by Noni and Elvi (2017), revealing no significant relationship between a mother's work and the incidence of LBW ($p= 0.728$). Physical work is associated with the role of a mother who has additional work outside of household work to increase family income (Laili *et al.*, 2022). Pregnant working mothers spend more energy and thoughts, potentially affecting their pregnancy check-ups. They sometimes forget to do a pregnancy check on time because of a lot of busyness.

Our finding also indicated no significant association between maternal education and the incidence of LBW ($p=0.306$). It is in line with previous research by Noni and Elvi (2017), showing no significant relationship between a mother's education and the incidence of LBW ($p=0.728$). Education is an activity and a person's effort to improve his personality by fostering an individual's potential in spiritual, thinking, feeling, intention, creativity, and conscience. Someone with higher education has a high possibility of health knowledge because they get more information about health than someone with low education.

Health knowledge can encourage healthy living behavior and fulfillment of maternal nutrition during pregnancy.

On the contrary, low-educated individuals will get less information about the importance of nutrition intake during pregnancy (Noni and Elvi, 2017). However, someone with low education doesn't mean having insufficient knowledge. It is because increasing knowledge is not only obtained in formal education. The more advanced times and increasingly sophisticated technological developments make it easier for mothers to access and get information even though their education history is low. Moreover, the excellent role of health workers in providing education during antenatal visits can enhance the mother's understanding of the mother's and fetus's health (Noni and Elvi, 2017).

In addition, the study result found that severe preeclampsia was associated with the incidence of LBW ($p=0.000$). It is in line with a study by Wen et al., (2019). The study revealed that preeclampsia was a risk factor for LBW ($p= 0.040$). Furthermore, mothers with severe preeclampsia have 2,166 times the chance of babies born with low birth weight. It is because pregnant women with preeclampsia experience decreased uteroplacental perfusion and hypovolemia. In addition, there are vasospasm and damage to endothelial cells of the placental vessels. Abnormalities of placental blood vessels in preeclampsia or eclampsia mothers can cause chronic hypoxia and impaired distribution of nutrients to the fetus. As a result, fetal growth retardation and low birth weight (LBW) often occur (Lestari, Ulfa and Maryam, 2015).

Furthermore, there was a significant relationship between multiple pregnancies and the incidence of LBW ($p= 0.000$). It is in line with previous research by Triana (2016), revealing that mothers with multiple pregnancies were 15 times more at risk of giving birth to babies with LBW (95% CI 4.8-45.1). In addition, studies also showed that multiple pregnancies were associated with LBW incidence (Merzalia, 2012). Fetal growth in twin pregnancies is susceptible to inhibition due to excessive uterine stretching due to the size of the fetus, placentas, and more amniotic fluid, causing premature parturition (Fadlun, Feryanto and Suslia, 2012). On average, the weight of 1 fetus in twin births is lighter than that of a single fetus, which is less than 2500 grams, with the weight differences of each twin fetus between 50-100 grams.

Our findings also indicated no significant association between premature rupture of membranes (PROM) and the incidence of LBW ($p=0.956$). It contrasts with research by Zahrah et al. (2018), showing a correlation between PROM and the incidence of LBW ($p= 0.010$). A study by Wijaya and Darusalam, (2022) also found that PROM correlated with LBW incidence ($p= 0.008$). Premature rupture of membranes is a rupture of the membranes before labor begins; the opening is less than 3 cm in primipara and less than 5 cm in multipara. It potentially causes LBW because of infection originating from the

vagina/cervix, causing biomechanics to occur in the amniotic membrane as proteolytic cells (Varney, M.Kriebs and L.Gegor, 2007).

There was no significant correlation between PROM and the incidence of LBW in this study because the more dominant factors causing LBW were severe preeclampsia (18%), multigravida (50%), and multiple pregnancies (16%). Some efforts for mothers with PROM to prevent giving birth to babies with LBW are giving antibiotics to prevent infection and routine monitoring in the hospital until the amniotic fluid no longer comes out. So the mother can maintain her pregnancy (Zahrah, Prasetyowati and Yuliawati, 2018).

CONCLUSION

Risk factors for LBW are parity, severe preeclampsia, and multiple pregnancies. Meanwhile, unrelated factors with LBW are maternal age, maternal occupation, maternal education, and premature rupture of membranes. Further research should analyze determinant factors of LBW at Haji Makassar Hospital in different year periods.

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