



Maternal Risk Factors for Low Birth Weight

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Abstract. Background: Low Birth Weight (LBW) is a condition of a baby's birth weight of less than 2500 gr measured at one hour after the baby is born. The quality of life of future generations is greatly influenced by the incidence of LBW. LBW babies will experience obstacles in their growth and development which results in a decrease in children's intelligence. Mothers with gravida <5 have a lower risk of giving birth to babies with low birth weight. Meanwhile, mothers who have hemoglobin levels of <11 mg/dl and aged more than 35 years are more likely to give birth to babies with low birth weight.

Aim: The purpose of this study is to determine maternal risk factors with the incidence of LBW.

Methods: The method used is an analytical survey method using a *cross-sectional* approach. The population in this study is all mothers who gave birth to LBW in the work area of the Bangetayu Health Center in Semarang City from September 2021 to September 2022. The sampling technique uses Consecutive Sampling.

Results: Maternal risk factors are the age of the mother when she is pregnant <20 years and the >35 years as many as 10 (33.3%), working mothers are 19 (63.3%), the most maternal education is high school education, which is 22 (73.3%), the gestational age of 28 (93.3%) is a term, parity >4 as much as 3 (10%), mothers who have anemia in her pregnancy as many as 11 (36.7%).

Conclusion: Maternal age, Parity, and Anemia status are maternal risk factors that can be prevented related to LBW. Other risk factors during pregnancy must also be examined in future studies to reduce the number of LBW babies.

Keywords: maternal risk factors · LBW · maternal age · parity · anemia · gestational age

1 Introduction

The World Health Organization (WHO) describes Low Birth Weight (LBW) as a condition where a baby's birth weight is less than 2500 g which is measured one hour after the baby is born. Furthermore, LBW is categorized into babies with very low birth weight (BBLSR < 1500 g), and babies with very, very low birth weight (BBL SAR < 1000 g) [1]. The World Health Organization (WHO) states that low birth weight (LBW) is globally significant with health problems and is associated with all consequences in the short and long term [2].

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In 2015, WHO stated that each yr around 20 million newborns (17% of live births) weigh less than 2,500 g and more than 90% of them are born in developing countries. The global prevalence of LBW is 15% [3]. The prevalence of LBW in 2020 in Indonesia was 129,815 (three.1%) cases and the most common motive of neonatal death was the low birth weight (LBW) [4]. The incidence of LBW in central Java province in 2021 is 22,240 cases or an increase in 2020, namely 21,001 cases. The incidence of LBW in Semarang city is 449 cases in 2021 [5].

LBW can be caused by different factors, one of which is the mother's factor. Maternal elements affect the delivery weight of infants because while they are in the womb, the fetus gets its needs for survival from the mom, thus affecting the increase and development of the fetus. Maternal factors include the mother's age at the time of pregnancy, the parity status of the mother, specifically the number or quantity of children born, and the history of the mother's pregnancy with LBW [6].

Low Birth weight (LBW) dies 40 times more than normal-weight babies, and LBW babies are more likely to develop long-term disability conditions [7]. Some of the factors that occur in LBW are the history of pregnancy before giving birth LBW, maternal age, anemia, parity, maternal height, birth distance, and maternal occupation [8].

Research from Moreira AI, *et al* (2021) states that there is a relationship between the age when pregnant women and LBW activities. A systematic review of existing references to pregnancy complications in adolescence suggests that this age group has a higher number of maternal and infant complications [9]. Pregnant women with the age of >35 years are more likely to give birth to newborns with LBW. Pregnant women with old age may increase the risk of comorbidities (hypothyroidism, type 2 diabetes, hypertension), obstetric complications (preeclampsia/eclampsia and emergency cesarean section) and a history of spontaneous abortion and cesarean delivery [10].

Research from Maru Mekié, *et al.* (2019) states that mothers living in urban areas are already planning a pregnancy, and gravida <5 have a lower risk of giving birth to babies with low birth weight. Meanwhile, mothers who have hemoglobin levels of <11 mg/dl are more likely to give birth to babies with low birth weight [11]. Research from T. Shah, Muhammad Saleh Khaskheli, S. Ansari *et al.* (2022) showed that 98 (47.5%) of newborns of anemic mothers had low birth weight [12].

Low Birth Weight (LBW) is closely related to neonatal mortality and morbidity, growth retardation and cognitive development, as well as various chronic diseases in adulthood. The quality of life of future generations is greatly affected by the incidence of LBW because the growth and development of children will experience obstacles that result in a decrease in their intelligence. Maternal factors and fetal factors are two factors that in general affect the incidence of [2].

One of whose goals is to reduce the birth rate of babies weighing less than 2,500 g by 30% by 2030 [13]. To prevent LBW, an understanding of the key risk factors is critical, so that policymakers and health practitioners can use planning strategies and implement appropriate interventions to improve health outcomes [14]. Affordable, accessible, and appropriate healthcare is essential for the prevention and treatment of LBW [11]. Therefore, the purpose of this study is to determine the maternal risk factors for the incidence of LBW.

2 Methods

Study Design and Participant

The method used is a survey method using a *cross-sectional approach*, which aims to make measurements or observations at the same time (once upon a time) between risk factors/exposure to disease. The population in this study was all mothers who gave birth to low birth weight babies (LBW) in THE work area of Puskesmas Bangetayu Kota Semarang from September 2021 to September 2022. In this study, the sample was a part of the population taken by consecutive sampling. The is where each subject who meets the inclusion criteria is selected with the required sample size reached. The inclusion criteria in this study are all pregnant women who give birth to babies with LBW in the work area of the Bangetayu health center in semarang city. exclusion criteria in this study were incomplete patient medical records, multiple pregnancies and stillbirths. secondary data is obtained from the patient's medical records, then collected by midwives who are appointed by researchers as enumerators. data collection using questionnaires and checklists provided by researchers.

Statistical Analysis Data

Using univariate analysis with SPSS 26.

Ethical consideration

The research was conducted after obtaining approval from the ethics committee of Sultan Agung University (UNISULLA) with a registration number No. 366/IX/2022/Komisi Bioetik

3 Results

Table 1 shows that the age of mothers during pregnancy is categorized into two, namely high risk and not high risk. As many as 20 (66.7%) mothers' age are not at high risk, and as many as 10 (33.3%) mothers' age are at high risk. The age of high risk is <20 years and >35 years, the age of not high risk is ≥ 20 years to ≤ 35 years. The respondents' jobs were categorized into two, namely work and not work. A total of 11 (36.7%) respondents were out of work and 19 (63.3%) respondents were employed. The education of the respondents was 7 (23.3%) with a junior high school education, 22 (73.3%) the respondent's education was high school, and 1 (3.3%) was the education of university respondent the lowest education of the mother is not going to school and the highest education is College.

The gestational age of the respondents was categorized into three, namely *preterm*, *aterm* and *post term*. A total of 1 (3.3%) of respondents' gestational age was *preterm*, as many as 28 (93.3%) of pregnant age of aterm respondents, and 1 (3.3%) of respondents with *post-term* gestational age. The highest gestational age is *aterm*. Anemia status is categorized into anemia and non-anemia. A total of 11 (36.7%) respondents experienced anemia in their pregnancy and as many as 19 (63.3%) respondents did not suffer from anemia during their pregnancy.

Table 1. Univariate Analysis of Maternal Risk Factors of LBW Incidence

Maternal Risk Factors	Sum	Percent (%)
1. Mother's Age during Pregnancy		
High Risk (aged <20 and >35 years old)	10	33,3%
Low Risk (age \geq 20 years to \leq 35 years)	20	66,7%
2. Occupation		
Not Working	11	36,7%
Work	19	63,3%
3. Maternal Education		
No School	0	0%
Primary School	0	0%
Junior High School	7	23,3%
Senior High School	22	73,3%
College	1	3,3%
4. Gestational Age		
Pre-Term	1	3,3%
Aterm	28	93,3%
Postterm	1	3,3%
5. Parity		
>4	3	10%
<4	27	90%
6. Anemia Status		
Anemia	11	36,7%
No Anemia	19	63,3%
Total	30	100%

The history of Preeclampsia is categorized into two, namely the presence and no history of preeclampsia in previous pregnancies. Most of the 2 (6.7%) respondents had a history of preeclampsia in previous pregnancies and 28 (93.3%) respondents had no history of preeclampsia.

4 Discussion

Low birth weight is one of the main causes of neonatal death and is influenced by various factors, one of which is maternal factors. maternal factors are the mother's age while pregnant, maternal work, maternal education, gestational age, parity, nutritional status,

anemia status, history of preeclampsia, history of lbw and the presence of complications during emptiness.

The age of the mother during pregnancy is one of the maternal factors of bblr. Respondents with a high-risk age in this study were 10 (33.3%). Research from emmanuel attali (2020) states that low birth weight and premature birth are more prevalent in women over 35 years of age. Ibu who first gave birth at the age of 35-40 years, was 1.9 times higher to give birth to a baby with a very low birth weight (<1500 gr) compared to women aged 20-24 years [15]. A research studi in Malaysia states that younger mothers (<20 years old) have a higher risk of giving birth to lbw babies. Younger and older pregnant women tend to have a higher risk for LBW. Nutritional deficiencies that usually occur in young pregnant women are one of the contributing factors. On the other hand, increasing maternal age is associated with a decrease in the growth potential of the fetus, due to the aging of the maternal biological tissue system or the cumulative effects of the disease [16].

As many as 19 (63.3%) respondents were working mothers. The research results of Mahmoodi Z (2015) show that work factors have an important role in the incidence of LBW. Working mothers have a 5 times greater chance of giving birth to LBW babies compared to housewives (not working). Conditions when working with bad working hours affect the condition of babies who are born a long time. There is a positive relationship between work-related physical activity, long working hours, and/or shift work and poor pregnancy outcomes. These effects can be attributed to the physical stress on the muscles at work and the increased release of catecholamine and narrowing of the arterioles, which causes a redistribution of blood flow in the pregnant woman and reduced blood flow to the placenta, as well as the hormonal disturbances and nutritional deficits that can occur. Also, cause side effects and greatly affect the growth of the fetus [18].

As many as 22 (73.3%) of the respondents in this study had a high school education. Research from Suarez, et al (2021) shows that a mother's education, mother's age, marital status, parity, socioeconomic conditions, and antenatal care are related to low birth weight (LBW). Living in poverty is associated with lower levels of education, unplanned pregnancies, stress, and lack of access to health facilities. Despite going to school, women living in social deprivation have low academic achievement, as well as poor social, cultural, and reproductive health barriers [19].

The gestational age in this study obtained the results of 28 (93.3%) respondents who gave birth to LBW babies whose gestational age was quite months (aterm). Research from Afaya, Agani, et al. (2021) states that Neonates born in sufficient months (37 weeks of pregnancy and more) are 85% less likely to experience LBW compared to premature babies [AOR 0.15, (95% CI: 0.10–0.24), $p < 0.001$]. This means that babies born before 37 weeks gestational age are more likely to have LBW compared to babies born just months [17]. 50% of LBW babies are premature. The lower the number of gestational ages, the lower the birth weight of the baby due to poor fetal growth [13].

Parity in this study was <4 as many as 27 (90%) respondents. Research findings from Bekele, Alehegn (2019) show that the risk of giving birth to LBW babies is higher in multipara grand women (parity = 5 or more) compared to multipara women. In contrast, primiparous and nulipara women do not have an increased risk of giving birth to LBW

babies [20]. High parity causes disruption of the function of the placenta in providing nutrients to the fetus due to frequent childbirth, this condition will have an impact on the disruption of the growth of the fetus in her bladder [6].

A total of 11 (36.7%) respondents experienced anemia during their pregnancy. Research from Siramaneerat, et al. (2018) found that mothers with anemia had a higher incidence of LBW than mothers who did not suffer from anemia [21]. Pregnant women who have hemoglobin levels of less than 11gr/dl are at higher risk of having children with low birth weight compared to mothers who do not experience anemia during pregnancy. A decrease in hemoglobin levels causes changes in placental angiogenesis, limiting the availability of oxygen for the fetus and consequently leading to the potential restriction of intrauterine growth and low birth weight [22].

5 Conclusion

Maternal risk factors for the incidence of LBW at the Bangetayu Health Center in Semarang City are maternal age, occupation, maternal education, gestational age, parity, and anemia status. Preventable risk factors are maternal age, parity, and anemia status. It is hoped that good cooperation will increase between all health agencies in Semarang City and related agencies to provide effective and targeted socialization about maternal risk factors for LBW events. Other risk factors during pregnancy must also be examined in future studies to reduce the number of LBW babies.

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