Journal of Health and Behavioral Science
Vol.4, No.1, March 2022, pp. 130~143

Factors Related to the Incidence of Low Birth Weight (LBW)

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Abstract. The biggest cause of infant death is the low birth weight (LBW). LBW is a weight at birth of fewer than 2500 grams. The prevalence of LBW in RSUD Prof. DR. W. Z. Johannes in 2019 is about 23.6% of 553 deliveries. This study aimed to determine the factors associated with the incidence of LBW in RSUD Prof. DR. W. Z. Johannes Kupang in 2019. This research is an analytical survey research with a cross-sectional method. Samples in this study numbered 82 people. This study shows that the factors associated with LBW are maternal age (p=0.000), parity (p=0.004), nutritional status (p=0.000), and anemia of pregnancy (p=0.000). Factors that were not related to LBW were the mother's education (p=0.184) and the mother's occupation (p=0.379). It is recommended for health workers to increase health promotion efforts in the community, especially for pregnant women, about the importance of monitoring pregnancy conditions, by providing counseling for pregnant women and their families.

***Keywords**: Low Birth Weight, Pregnant Women*

Abstrak. Penyebab terbesar kematian bayi masih berat badan lahir rendah (BBLR). BBLR adalah bayi baru lahir yang lahir dengan berat badan lahir kurang dari 2500 gram. Data Rekam Medik RSUD Prof. Dr. W. Z. Johannes menunjukkan menunjukkan prevalensi kejadian berat badan lahir rendah (BBLR) tahun 2019 sekitar 23,6% dari 553 persalinan. Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan kejadian BBLR di RSUD Prof. DR. W. Z. Johannes Kupang tahun 2019. Penelitian ini merupakan jenis penelitian survey analitik dengan pendekatan *cross sectional.* Jumlah sampel adalah 82. Hasil penelitian ini menunjukkan bahwa faktor yang berhubungan dengan BBLR adalah umur ibu (p=0.000), paritas (p=0.004), status gizi (p= 0.000), dan anemia kehamilan (p=0.000). Faktor yang tidak berhubungan dengan BBLR adalah pendidikan ibu (p=0.184) dan pekerjaan ibu (p=0.379). Disarankan untuk petugas kesehatan, meningkatkan upaya promosi kesehatan kepada masyarakat khususnya ibu hamil tentang pentingnya memantau kondisi kehamilan, dengan memberikan penyuluhan atau konseling ibu hamil dan keluarga.

Kata Kunci*: *Berat Badan Lahir Rendah, Ibu hamil

Journal of Health and Behavioral Science
Vol.4, No.1, March 2022, pp. 130~143

Article history:
Received 6 September 2021
Received in Revision 7 December 2021
Accepted 28 December 2021
Available online 29 March 2022

Introduction

Health is a form of basic human need. The high and low infant mortality rate is still an indicator of a country's health. The infant mortality rate (IMR) is defined as the number of babies who die before reaching the age of one year per 1000 live births in a given year. IMR is an indicator that is usually used to determine the degree of public health. Low birth weight (LBW) is one of the factors contributing to the high infant mortality rate (IMR) (Kemenkes, 2018).

LBW is a key measure of reproductive health and overall public health. A baby with a birth weight of fewer than 2500 grams, irrespective of gestational age, is LBW. Birth weight is the weight of babies who are weighed at the age of 1 hour after birth (Sulistiani, 2014).

According to the *World Health Organization* (WHO), low birth weight infants contribute 60% to 80% of neonatal deaths. Based on WHO data, the prevalence of LBW in the world is 20 million (15.5%) annually, and developing countries are the largest contributors, at around 96.5% (WHO, 2018). After India (27.6%) and South Africa (13.2), Indonesia is one of the emerging countries with the greatest prevalence of LBW (11.1%). In addition, behind the Philippines, Indonesia is the second country in the Association of Southeast Asian Nations (ASEAN) with the greatest frequency of LBW (21.2%) (WHO, 2016)

The results of the Indonesia Demographic and Health Survey (IDHS) in 2017 showed an infant mortality rate (IMR) was 24 per 1,000 live births (IDHS, 2017). Meanwhile, based on the results of Riskesdas 2018, the national prevalence of LBW is 6.2%. Five provinces that have the highest percentage of LBW are the province of Central Sulawesi (8.9%), North Maluku (8.7%), Gorontalo (8.6%), East Nusa Tenggara (8.4%), and DIY (8, 3%).

Data from the Kupang City Health Office in 2017 showed the infant mortality rate in Kupang City was 4.57 per 1000 live births and decreased in 2018 to 4.00 per 1000 live births. Meanwhile, the infant mortality rate in Kupang City in 2019 was 4.5 per 1,000 live births. This figure shows an increase when compared to the infant mortality rate in 2018. Data from the Family Health Sector of the Health Office in 2019 showed 40 cases of infant mortality out of 8,875 live births. Meanwhile, stillbirth cases amounted to 40 cases of death. Cases of death categorized as stillbirth are babies with a birth weight of more than 500 g with a gestational age of more than 22 weeks who are born without signs of life. While the incidence of low birth weight in Kupang City in 2019, there were 392 (4.7%) LBW cases out of 8,835 live births (Dinkes Kota Kupang, 2019).

Based on a preliminary study conducted by researchers from the Medical Record section of the RSUD Prof. Dr. W. Z. Johannes, the prevalence of low birth weight (LBW) in 2019 was around 23.6% of 553 deliveries.

There are so many elements that impact the IMR that determining the most prominent and least significant component is difficult. Most of the causes of infant mortality are still dominated by low birth weight (LBW). The causes of LBW are generally multifactorial, so it is sometimes difficult to take preventive measures. Premature birth, on the other hand, is the most prevalent cause of LBW (Dinkes Kota Kupang, 2019).

Factors causing low birth weight are influenced by maternal factors (disease, age, multiple pregnancies, closely spaced pregnancies, socioeconomic events, and other causes such as smoking, drugs, etc.) and fetal factors (chromosomal abnormalities, malformations, congenital infections during pregnancy), placental factors (viral placentitis, placenta previa, detached placenta, tumors), and environmental factors (located at high altitudes, exposed to radiation and toxic substances) (Atikah and Cahyo, 2010).

The study aims to determine the factors related to low birth weight (LBW) incidence by RSUD Professor DR. W. Z. Johannes Kupang.

Method

This research is analytic survey research with a *cross-sectional* approach where all the objects studied will be observed at the same time. The study was conducted in June 2021, located in the Medical Record Room at Prof. DR. W. Z. Johannes Hospital Kupang. The population in this study were all babies born alive from January to December 2019 at Prof. DR. W. Z. Johannes Hospital, with a total sample of 82 people. The sample size is determined using a technique called *simple random sampling*. The source of data in this study is secondary data, namely the mother's medical record. The results of this study were then analyzed by univariate and bivariate analysis using the *chi-square* test with a significant level of (0.05) and a 95% confidence level. Then the results of the analysis will be presented in the form of tables and narratives. This study has been ethically accredited via the Health Research Ethics Commission, Faculty of Medicine, the University of Nusa Cendana with the Number: 15/UN15.16/KEPK/2021.

Result

The results of this study are divided into two, namely, univariable analysis and bivariable analysis to assess the relationship between independent variables and dependent variables studied at Prof. DR. W. Z. Johannes Hospital Kupang.

1. Univariate analysis

The following table shows the univariate analysis results related to age, education, parity, occupation, nutritional status, and pregnancy anemia of Professor DR. W. Z. Kupang Hospital.

Table 1.
Frequency Distribution of Age, Education, Parity, Occupation, Nutritional Status, and Anemia of Pregnancy in Prof. Dr. W. Z. Johannes Hospital Kupang.

Variable	Category	N	%
Age	Risky	11	13.4
	No-Risk	71	86.6
Education	Low	23	28
	Middle	48	58.5
	High	11	13.4

Variable	Category	N	%
Parity	Risky	45	54.9
	No-Risk	37	45.1
Profession	Housewife	49	59.8
	Working Mom	33	40.2
Nutritional Status (SEZ)	Yes (SEZ)	27	32.9
	No	55	67.2
Pregnancy Anemia	Yes	30	36.6
	No	52	63.4

Table 1 shows that of the total respondents, based on the age variable, the majority of women fall into the "not at risk" age category (86.6%). When viewed from the education variable, most mothers have the latest education, including in the middle category (58.5%) and the least education is included in the high category (27.3%). Most mothers are included in the risk parity category (54.9%) when viewed from the parity variable. When viewed from the occupation variable, most mothers work as housewives (43.4%). When viewed from the variable nutritional status (SEZ) most mothers did not experience nutritional status disorders (67.2%). When viewed from the pregnancy anemia variable, most mothers did not experience pregnancy anemia (63.4%).

2. Bivariate Analysis

The *chi-square* test was used to assess the relationship between the independent variables, namely age, education, parity, occupation, nutritional status, and anemia of pregnancy with low birth weight (LBW) as the dependent variable, at Prof. DR. W. Z. Johannes Hospital Kupang.

Table 2.
Relationship of Age, Education, Parity, Occupation, Nutritional Status, and Anemia of Pregnancy with Low Birth Weight at Prof. DR. W. Z. Johannes Hospital Kupang

Variable	LBW				Total		P-Value
	Yes		No				
	N	%	N	%	N	%	
Age							
Risky	10	43.5	1	1.7	11	13.4	0.000
No-Risk	13	56.5	58	98.3	71	86.6	
Education							0.184

Variable	LBW				Total		P-Value
	Yes		No				
	N	%	N	%	N	%	
Low	9	39.1	14	23.7	23	28	
Middle	13	56.5	35	59.3	48	58.5	
High	1	4.3	10	16.9	11	13.4	
Parity							
Risky	19	82.6	26	44.1	45	54.9	0.004
No-Risk	4	17.4	33	55.9	37	45.1	
Profession							
Housewife	16	69.6	33	55.9	49	59.8	0.379
Working Mom	7	30.4	26	44.1	33	40.2	
Nutritional status							
SEZ	16	69.6	11	18.6	27	32.9	0.000
No	7	30.4	48	81.4	55	67.1	
Pregnancy Anemia							0.000
Yes	17	73.9	13	22	30	36.6	
Not	6	26.1	46	78	52	63.4	

Table 2 shows that the education variable is not related to the incidence of LBW (0.184), as well as the work variable is not related to the incidence of LBW (0.379). Meanwhile, age variables (p-*value* = 0.000), parity variables (*p-value* = 0.000), nutritional status (*p-value* = 0.000), and pregnancy anemia (*p-value* = 0.000) had a relationship with the incidence of LBW.

Discussion

1. Relationship of Age with Low Birth Weight

Age is the length of time lived or since birth. Age determines a mother's health. Mothers are said to be at high risk if pregnant women are under 20 years old and over 35 years old (Sembiring, 2017).

The results of the *chi-square* test indicate that there is a relationship between maternal age and the incidence of LBW in Prof. DR. W. Z. Johannes Hospital Kupang. The results of this study are the same as the result conducted by Permatasari (2018) which shows that there is a statistically significant relationship. The findings of this study contrast with the result conducted by

Sunarseh (2018), who found that there was no link between maternal age and the occurrence of LBW.

The ideal age for women to get pregnant is in the age range of 20-35 years because at that age the function of a woman's reproductive organs has matured or is ready and psychologically mature. The age range of 20-35 years is said to be the most productive for pregnancy and childbirth because the reproductive organs are ready to receive the products of conception where the endometrium as the implantation site has functioned normally and the reproductive organs have not undergone a process of degeneration (Sulistiani, 2014).

Maternal age of fewer than 20 years and greater than 35 years is considered a high-risk age due to the maturity of the reproductive organs; in women younger than 20 years old, these organs are called immature for pregnancy and can harm the mother's and fetus's health. If accompanied by pressure or stress on the mother, there is a risk of miscarriage, infection, poor nutritional status, pregnancy anemia, *preterm* birth, and low birth weight (Septiani, 2014).

This constriction can cause inadequate blood flow to the endometrium, resulting in a reduction in uteroplacental blood flow, which impairs the transport of nutrients from the mother to the baby and fetal growth and development. This constriction can cause inadequate blood flow to the endometrium, resulting in a reduction in uteroplacental blood flow, which impairs the transport of nutrients from the mother to the baby and fetal growth and development (Sulistiani, 2014).

Based on the research, it can be seen that there is a link between maternal age and the occurrence of LBW in mothers aged 20 years or more. The prevalence of LBW is higher in the reproductive organs that have not yet reached optimal growth and in mothers aged more than 35 years who have experienced a decline in the function of the reproductive organs. Therefore, a woman should plan pregnancy at an ideal or productive age (20-35 years) and need to be supported by good nutritional status and regular prenatal check-ups so that fetal development can be monitored.

2. Relationship of Education with Low Birth Weight

Educational level is the number of years spent in formal education, whether it is a public school, private school, or an equivalent religious school. Mothers' education levels are classified as low (primary school, junior high school), medium (senior high school, vocational school), and higher (academics, polytechnics, high schools, institutes, or universities).

Mother's education will affect knowledge in decision making and will indirectly affect her behavior, including in terms of fulfilling nutritional needs through a pattern of examination visits during pregnancy. In general, women with low education are less likely to behave healthily towards themselves and they have an adverse risk of pregnancy. When compared to women with low levels of education, moms with a relatively high degree of education had a lower risk of giving birth to LBW (Purwanto, 2016).

The results of the analysis conducted to assess the relationship between maternal education and the incidence of LBW showed that the mother's education level had no relationship with the incidence of LBW in Prof. DR. W. Z. Johannes Hospital Kupang in 2019. The results of this study are similar to the results of research conducted by Susanti (2018) which shows that there is no statistically significant relationship between maternal education and the incidence of LBW. The results of this study are different from the results of Sunarseh's research (2018) which shows that there is a relationship between maternal education and the incidence of LBW at the UPT Outpatient Health Center Saptosari Gunungkidul.

Because the majority of the mothers are well educated, the findings of the research show that there is no link between maternal education and the prevalence of LBW. Then, mothers with secondary and higher education levels still experience LBW events that can occur due to other factors such as pre-eclampsia, anemia, premature rupture of membranes, maternal age, birth spacing, and gestational age.

Therefore, health workers need to increase outreach activities with more adequate facilities, such as leaflets, pamphlets, or other teaching aids that can help facilitate the absorption of information for pregnant women.

3. Relationship of Parity with Low Birth Weight

Parity is birth after 20 weeks of gestation, regardless of whether the baby is alive or dead. Maternal parity refers to the frequency with which mothers have given birth to live or dead children, but not abortions.

In terms of maternal and perinatal mortality, the safest is parity 2-3. Parities 1 and 4 have a higher maternal mortality rate. Mothers with parity 1 are more likely to give birth to LBW babies. In primiparas, it is linked to the organs' unprepared function in maintaining pregnancy and accepting the existence of the fetus, the mother's ability to care for herself and her infant, and the mother's psychological aspects. Parity 4 is at risk of giving birth to LBW because it will cause uterine disruption. The uterine blood vessel walls will be damaged by repeated pregnancies. This will impair the fetus' nutrition in following pregnancies, perhaps leading to development problems and the birth of LBW babies (Susanti, 2018).

The results of the analysis carried out to assess the relationship between parity and the incidence of LBW, the results showed that there was a relationship between maternal parity and the incidence of LBW in Prof. DR. W. Z. Johannes Hospital Kupang. The results of this study are in line with research conducted by Sunarseh (2018) at the UPT Puskesmas Outpatient Saptosari Gunungkidul which showed that there was a relationship between parity and the incidence of LBW.

The higher the parity of the mother, the higher the chances of the mother giving birth to a baby with low birth weight. Based on the analysis, there is a relationship between parity and the incidence of LBW. This is because, with parity, the mother is at risk of being weak due to frequent pregnancy, childbirth, breastfeeding, and caring for her children, which often results in various problems, such as mothers suffering from anemia and malnutrition.

Therefore, couples of childbearing age (PUS) should plan the number of children they want to have and mothers can plan their pregnancies by participating in the Family Planning program recommended by the government. This can prevent mothers from not having parity at risk so that the incidence of LBW, maternal and perinatal deaths can be prevented.

4. Relationship of Employment Status with Low Birth Weight

A woman while pregnant is still allowed to carry out daily activities or even work outside the home. The thing that must be considered is the type of work and the workload in the job. The work done must be tolerated during pregnancy, not too heavy (reduce physical activity), and with a good level of safety (Purwanto, 2016).

Working mothers are more likely to give birth to babies who are underweight at delivery. Activities carried out during work that affects the increase in the incidence of LBW are working too long due to long working hours, high physical activity, and workloads that pose a threat to the condition of pregnant workers, which can cause stress. Physical exhaustion or stress caused by the mother's job might have an impact on the fetus's growth and development. Working hard without getting enough rest might raise the chance of having a baby with low birth weight (Septiani, 2014).

The results of the analysis conducted to assess the relationship between maternal employment status and the incidence of LBW showed that there was no relationship between maternal occupation and the incidence of LBW in Prof. DR. W. Z. Johannes Kupang Hospital in 2019. The results of this study are in line with research conducted by Septiani (2014). which shows that there is no statistical relationship between the mother's occupation and the incidence of LBW. Reinforced by research conducted by Sulistiani (2014), it shows that the work of mothers is not at risk for the incidence of LBW in the work area of the Tangerang City Health Center.

Based on the results of the analysis, the conclusion that there is no relationship is possible because most working mothers can reduce the risk of harm from their work

by taking early prevention measures. The higher the mother's education, the more capable she is of making decisions about health services during pregnancy that can prevent disturbances for the mother and fetus as early as possible. As a result, even though there is no relationship between the mother's employment status and the incidence of LBW, efforts to reduce the incidence of LBW must be made, namely, mothers who work while pregnant must be cautious and maintain physical activity and eating patterns so that the fetus they carry grows healthy and develops normally.

5. Relationship of Nutritional Status (SEZ) with Low Birth Weight Incidence

The occurrence of LBW due to nutritional status disorders (SEZ) in pregnant women begins with pregnant women who suffer from SEZ which causes the blood volume in the mother's body to decrease, and the *cardiac output* of pregnant women is not enough, causing a decrease in blood flow to the placenta. Decreased blood flow to the placenta causes two things, namely reduced transfer of nutrients from the mother to the placenta, which can cause fetal growth retardation, and smaller placental growth, which causes low birth weight (LBW) babies (Sulistiani, 2014).

Based on the results of the analysis conducted to assess the relationship between nutritional status (SEZ) and LBW, it shows that there is a relationship between maternal SEZ status and the incidence of LBW in Prof. DR. W. Z. Johannes Kupang Hospital in 2019. This study also supports the research of Sulistiani (2014) in South Tangerang that found SEZ in pregnant women has a risk of 8.719 times giving birth to LBW compared to pregnant women who do not have SEZ. Based on the analysis of the results of the study, there is a relationship between maternal nutritional status (SEZ) and the incidence of LBW because during pregnancy the fetus receives nutrition from its mother. The nutritional status of the mother before and during pregnancy is an important factor that affects the weight of the baby at birth. Based on the size of the upper arm circumference, mothers with a size of 23.5 cm will tend to give birth to babies with low body weight.

Therefore, mothers need to know when the time is right for the process of pregnancy and delivery, and it is important to maintain nutritional status during pregnancy. Health workers should be more responsive in detecting problems that trigger the incidence of LBW, increase awareness of mothers about the importance of carrying out prenatal care, provide information about good nutritional adequacy for pregnant women, and increase knowledge about the importance of healthy living for mothers, especially during pregnancy with a regular and balanced diet.

6. Relationship of Pregnancy Anemia with Low Birth Weight

Hemoglobin is the parameter most commonly used to determine the prevalence of anemia. Hemoglobin status can be interpreted as a person's hemoglobin level as obtained from certain measurement results. Thus, a hemoglobin level that is less than normal indicates anemia. The risk of anemia increases with increasing gestational age. Pregnant women experience physiological changes such as an imbalance in the amount of blood plasma and red blood cells. The drop in hemoglobin levels reflects this imbalance. This will reduce oxygen levels in the uterus and interfere with intrauterine circumstances, particularly placental development, resulting in fetal growth disruption and a low birth weight fetus (Susanti, 2018).

The findings of the analysis undertaken to analyze the association between anemia and LBW at Prof. DR. W. Z. Johannes Kupang in 2019 revealed that there was a relationship between anemia and the incidence of LBW.

The findings of this study are in line with Normayanti's research (2019) which found a relationship between maternal anemia and the incidence of LBW but not in accordance with Susanti's research (2018) which found no relationship between Hb levels and the prevalence of LBW in Wates Hospital.

According to the findings of the study, there is a link between anemia and the occurrence of LBW because anemia in pregnant women can influence the fetus' growth and development, causing mothers to give birth to newborns with LBW. As

a result, health providers must educate moms about the relevance of supplements in assisting mothers throughout pregnancy.

Conclusion

Factors related to the incidence of low birth weight (LBW) in Prof. DR. W. Z. Johannes Hospital Kupang are age, parity, anemia of pregnancy, and nutritional status. While factors that are not related to LBW are, education and occupation.

Suggestion

It is recommended to continue to improve health promotion efforts to the community, especially pregnant women about the importance of monitoring the condition of pregnancy, by providing counseling or counseling for pregnant women and their families.

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