



## Risk Factor of Low-Birth-Weight Baby Prevalence at Fakfak Public Hospital West Papua

Dian Rizky Amelia<sup>1\*</sup>, Lasmauli Situmorang<sup>1</sup>

<sup>1</sup> Departement of Neonatology, Fakfak Public Hospital, West Papua

\*Corresponding author: ameliadianrizky@gmail.com

DOI: 10.33086/iimj.v3i2.2770

### ARTICLE INFO

#### Keywords:

Low birth weight,  
Premature,  
Preeclampsia.

Submitted: March  
02<sup>nd</sup> 2022

Reviewed: June  
28<sup>th</sup> 2022

Accepted:  
October 27<sup>th</sup> 2022

### ABSTRACT

**Background:** The high number of infant mortality rate in Indonesia relate to Low Birth Weight (LBW) babies that be a problem of public health sector. LBW babies are facing several health problems such as various diseases that arise in the first six days of life, and can experience long-term problems such as impaired development and growth. This is inseparable from the mother's risk factors during pregnancy. West Papua Province contributes 23.8% of LBW cases in Indonesia. Fakfak District Hospital as the only referral hospital in West Papua Fakfak district still has many problems related to cases of low birth weight babies.

**Objective:** To know the risk factors of LBW prevalence based on maternal age, gestational age, parity, hemoglobin levels, premature rupture of membranes (PROM), and preeclampsia in Fakfak public hospital, West Papua.

**Methods :** This study is an observational analytic with cross sectional study in Fakfak public hospital during April 2021 till October 2021. Purposive sampling method used to obtain the samples from medical records that fit to inclusion and exclusion criteria (N=418). Data was analyzed with SPSS statistic for Mac used Chi-square test and logistic regression method. The significant level of the test was  $p < 0,05$ .

**Results:** A total of 418 newborn were included during study period. There were significant results in gestational age ( $p=0,000$ ) (OR 7,23, CI95% 1,13-10,4), premature rupture of membranes (PROM)  $p=0,000$  ( $p<0,05$ ) OR 14,23 (CI95% 7,7-26,2), hemoglobin levels ( $p=0,000$ ) (OR 3,47 CI95% 1,99-6,03), preeclampsia ( $p=0,000$ ) (OR 9,76 CI95% 5,39-17,6). The regression test showed significant result at four variables.

**Conclusion :** Gestational age, PROM, hemoglobin levels, and preeclampsia are risk factors that significant lead to LBW prevalence in Fakfak public hospital, West Papua.

### Introduction

The low number of infant mortality rate (IMR) is an indicator of public health improvising (De Onis, *et al.*, 2019). According to the World Health

Organization (WHO), newborns with birth weight less than 2,500 grams (LBW) have a risk of death twenty-times higher than the normal birth weight. As many as 34% of neonatal deaths are caused by conditions of

LBW. WHO estimates that globally from 20 million births, there are about 15% to 20% of newborns with LBW each year (WHO, 2014).

Birth weight has an essential impact on the growth and development process in newborns. In LBW babies, the lungs are immature and immunodeficiency that lead to several illness such as infections and even a death (Hartiningrum and Fitriyah, 2018). Several factors that relate to LBW are maternal, fetal, and environmental factors. Maternal factors include maternal age below twenty years and above thirty five years, as well as pregnancy complications such as anemia, antepartum bleeding, hypertension, preeclampsia, PROM, low socioeconomic conditions, and deficient nutritional status. Fetal factors include chromosomal abnormalities, Intra uterine growth restriction (IUGR), and environmental factors such as radiation and exposure to toxic substances (WHO, 2014).

Based on data, The five-highest provinces of LBW are Papua (27%), West Papua (23.8%), East Nusa Tenggara (20.3%), South Sumatra (19.5%) and West Kalimantan (16.6%) (Risksdas, 2015). Fakfak public hospital, that is the only referral hospital in Fakfak Regency, has many problems related to LBW cases. It is interesting to distinguish the factor of LBW

in newborns baby who cared at Fakfak public hospital, West Papua.

## Methods

This study is an analytical observational study using cross sectional research design to determine the risk factors of LBW prevalence in Fakfak public hospital-West Papua during April 2021 until October 2021. The population of this study were all live newborns with LBW that meet the inclusion and exclusion criteria. Sampling in this study using purposive sampling method according to research criteria. The independent variables in this study were maternal age, gestational age, parity, PROM, hemoglobin levels, and preeclampsia. The dependent variable was the prevalence of LBW. Data analyzed using SPSS, with Chi-square test method and logistic regression where  $p < 0.05$  showed a significant difference.

## Result and Discussion

The total sample were 418 (LBW 50%;n=209) (normal birth weight-NBW 50%; n=209). The data was extracted to the characteristic of respondents, Chi-square analysis and multivariate test. Subject characteristics are described in table 1.

Table 1. The characteristic of LBW risk factor.

Characteristic	LBW (n=209)	NBW (n=209)
Maternal age		
< 20 or > 35 years	103 (52,9%)	92 (47,1%)
20-35 years	106 (47%)	96 (43%)
Gestational age		
< 37 weeks	125 (69,8%)	54 (30,2%)
37-42 weeks	83 (34,9)	155 (65,1%)
> 42 weeks	1 (100%)	0 (0%)
Parity		
>3	93 (48,1%)	100 (51,9%)
<3	116 (51,6%)	109 (48,4%)
PROM		
Yes	146 (78,5%)	40 (21,5%)
No	63 (27,2%)	169 (72,8%)
Hemoglobin levels		
Anemia	130 (68,1%)	61 (31,9%)
No anemia	79 (34,8%)	148 (65,2%)
Preeclampsia		
Yes	142 (76%)	45 (24%)
No	67 (29%)	164 (70,1%)

Bivariate *Chi square* analysis showed that four of six variables resulted significance risk of LBW in gestational age (OR 2,76; 95%CI 1,54 – 8,93;  $p=0,000$ ),

hemoglobin levels (OR 3,99; 95%CI 2,65 – 6,09;  $p=0,000$ ), PROM (OR 7,79; 95%CI 6,21 – 15,41;  $p=0,004$ ) and preeclampsia (OR 7,72; 95%CI 4,97 – 11,98;  $p=0,000$ ).

Table 2. Risk factors of LBW

Variable	n (%)	Odds Ratio (OR)	CI 95%	P
Gestational age				
< 37 weeks	125 (59,8)			
37 – 42 weeks	83 (39,7)	2,76	1,54 – 8,93	0.000
>42 weeks	1 (0,5)			
Maternal age				
< 20 or $\geq$ 35 years	103 (49,3)	-		0.281
20 till < 35 years	106 (50,7)			
Parity				
>4	93 (44,5)	-		0.492
$\leq$ 4	116 (55,5)			
Hemoglobin levels				
Anemia		3,99	2,65 – 6,09	0.000
No anemia	130 (62,2) 79 (37,8)			
PROM				
Yes		9,79	6,21 – 15,41	0.004
No	146 (69,9) 63(30,1)			
Preeclampsia				
Yes	142 (68)	7,72	4,97 – 11,98	0.000
No	67 (32)			

From logistic regression analysis obtained four significance variables, they are maternal age (OR 7,234; 95%CI 1,13 – 10,40;  $p=0,000$ ), hemoglobin levels (OR 3,471; 95%CI 1,99 – 6,04;  $p=0,000$ ),

premature rupture of membranes (OR 14,296; 95%CI 7,78 – 26,28;  $p=0,000$ ) and preeclampsia (OR 9,762; 95%CI 5,39 – 17,66;  $p=0,000$ ) (table 3).

Table 3. Multivariate analysis of LBW risk factor

Risk factors	Exp(B)	CI 95%	P
Maternal age	7.234	1.13 – 10.40	0.000
Hemoglobin levels (Hb)	3.471	1.99 – 6.04	0.000
PROM	14.296	7.78 – 26.28	0.000
Preeclampsia	9.762	5.39 – 17.66	0.000

## Discussion

This study showed that gestational age was a significant risk for the LBW prevalence. Delivery before 37 weeks of gestation in Ghana is one of the predictors of LBW (WHO, 2014). Gestational age is an important role in determining birth weight. WHO estimates that about one third of LBW in the world is caused by premature delivery (Adam, *et al.*, 2019). It is clear that preterm newborns, either due to gynecological or medical factors, have higher risk of being born with LBW, because growth below 37 weeks of gestation has not yet reached the optimal growth and development (Riskesdas, 2015; Aboye W, *et al.*, 2018).

Maternal age has no significant risk of of LBW prevalence. These results are in line with a study stated that there was no significant result between maternal age and LBW prevalence (Elisa and Andriana, 2019). The distribution of LBW based on

maternal age showed that the age of mothers between twenty years till below thirty-five years who are not at risk but gives birth to LBW (48%). Maternal age below twenty years and above thirty-five years were not at risk for the LBW prevalence, contrary in this study the result obtained for maternal age below twenty years or above thirty-five years were 52%. Women at the risky age (<20 years and >35 years) should remain avoided to have a pregnancy, because the optimal age for a mother to give birth is at the age of twenty till below thirty-five years old. Pregnancy at the age of teenagers below twenty years has an impact to growth failure because they have several risks such as frequent anemia, impaired fetal growth and development, miscarriage, prematurity or low birth weight, birth disorders, preeclampsia. and antepartum haemorrhage. In addition, mothers who give birth at the age above thirty-five years are not recommended and

harmful, considering that women who are pregnant at the age above thirty-five years are one of the reason of pregnancy complications, especially the increase number of giving birth to babies with LBW (Manuaba, et al., 2010).

In this study, parity has no significant difference with LBW prevalence. It in line with a study of Permana, 2019 (*p value = 0,15*). This study results that LBW (birth weight below 2500 gr) from low parity (parity  $\leq 4$ ; n=116) has higher number than multiparity (parity  $>4$ ; n=93). A study from Manuaba has contrary, stated that parity two until four has a secure pregnancy and delivery, however the primipara and multiparity than four are not secure because of the fibroid tissues as the result from previous pregnancy. The fibroid tissues caused a thrombosis to the placenta that make placenta adhesions. Placenta become thinner and wide invasions. This condition resulted the decrease of uterus vascular supply to the fetus (Sulistyawati, 2015).

The first maternal and delivery are probable to have LBW because the lack of the experience. During the pregnancy, relative anemia happened because the hemodilution that resulted from the increase number of relative plasma that has bigger volume than erythrocyte. Hemodilution is one of the physiology adaptations of maternal circulation to fulfilling uterus and fetus that have vascular hypertrophy

(Cunningham, et al., 2010). Hemoglobin normal is 12,5 g/dl, the hemodilution effect resulted the hemoglobin around 11 g/dl. If the number below 11 g/dl, it is an iron deficiency anemia (Prawirohardjo, 2016).

The results of this study showed that the examination of hemoglobin levels is a risk for the incidence of LBW. Based on the results of statistical tests, the OR value is 3.99, this indicates that the hemoglobin level examination is a risk factor for the incidence of LBW or in other words, mothers who do not regular examination of hemoglobin levels have a 3.99 times greater risk to give birth of LBW compared to mothers who do. Coverage of hemoglobin levels examination. This is because during antenatal care visits there are still many pregnant women who have not regular examination for hemoglobin levels so that hemoglobin levels are not properly controlled during pregnancy that can result in pregnant women experiencing anemia and having a high risk of LBW. Simple preventions of LBW are routine antenatal care visits and routine hemoglobin examination two times during pregnancy.

Pregnant women who suffer from anemia experience LBW by 3.1 times greater than women who are not anemic (Nur and Adhar, 2016). Anemia led to decrease oxygen supply to tissues, besides that it can also change the structure of the placental vascular, that will interfere with

fetal growth so that it will strengthen the risk of developing anemia. The occurrence of preterm labor and the birth of babies with LBW, especially for low hemoglobin levels starting from the early trimester of pregnancy.

PROM shows a significant risk factor for LBW prevalence. Similar to the results of Indriani, 2018, stated that mothers with PROM (n=203), experienced LBW in the delivery ( $p < 0.05$ ) (Indriani, 2014). PROM will affect the weight of the baby being born which results in premature birth and the risk of giving birth to babies with pure prematurity that are included in the LBW category (Cunningham, et al., 2010). The rupture of the amniotic membrane is due to an imbalance between the synthesis and degradation of the extracellular matrix, transforms in cell structure and collagen catabolism. One of the complications of PROM is increase the risk of premature labor and LBW. The cause of PROM is not known for certain, but the possible predisposing factors are abnormal membranes infection, fetal position abnormalities, incompetent cervix, maternal age below 20 years or above 35 years, multigravidity or parity factors, previous history of PROM, excessive uterine tension, narrowing of the pelvis, maternal fatigue at work, as well as trauma obtained such as sexual intercourse, internal

examination or amniocentesis (Prawirohardjo, 2016).

Preeclampsia shows a significant risk factor for the incidence of LBW. The results of the research according to the theory, there is vasoconstriction of blood vessels in the uterus in preeclampsia, which causes an increase in peripheral resistance, and leading to an increase in blood pressure. Vasoconstriction of blood vessels in the uterus can result the decreased blood flow so that the supply of oxygen and nutrients to the fetus is reduced. When this happens, it can implicate to the intrauterine growth restriction (IUGR) and give birth to the LBW (Backes, *et al.*, 2013). Another condition is explained by the failure of spiral arteries in the myometrium to maintain their musculoelastic structure, in addition to acute atherosclerosis in the spiral arteries which can cause arterial lumen. If the size gets smaller, this situation will induce placental infarction and lead to fetal hypoxia and fetal death (Castro, 2014).

In this study, preeclampsia has risk factor 7.72 times higher to generate LBW compared to non-preeclampsia. According to the study of Bacak (2017), preeclampsia increases the risk of IUGR and low birth weight due to decreased uteroplacental blood flow, and it will lead to LBW. Preeclampsia is a multisystemic disease characterized by hypertension that develops after twenty weeks of gestation that was

previously normal, accompanied by proteinuria or, if not present, accompanied by signs of organ injury (Cunningham, *et al.*, 2010).

The incidence of LBW is related to the handling of serious cases of preeclampsia and eclampsia requiring active action, called termination of pregnancy immediately regardless of gestational age and estimated fetal weight. Therefore, it is important to have health workers monitoring for maternal who have complications in prior pregnancy, so that they get early treatment then minimize LBW prevalence (Mulyanti, 2014).

Socialization and early diagnosis in pregnancy at the primary health center are needed to decrease the risk factors that cause LBW so that maternal problems that arise can be detected earlier. Supports from obstetricians, pediatricians, and primary health center will minimize problems of pregnant women such as preeclampsia, anemia, preterm pregnancy, and PROM that can increase LBW prevalence.

Limitation of this study lies in the time of study. This study probably has better result with longer time, in order to get more samples to get more significant results in assessing risk factors that cause LBW.

## Conclusion

Among several risk factors for LBW that showed significant results in this study

were gestational age below 37 weeks, anemia, preeclampsia and PROM. The results of this study can be used as information material to determine the risk factors for the prevalence of LBW.

## Reference

- Aboye W. *et al.* 2018. *Prevalence and associated factors of low birth weight in Axum town, Tigray, North Ethiopia*. BMC Res Notes. 2018 Oct 1;11(1):684. doi: 10.1186/s13104-018-3801-z.
- Adam, Z. *et al.* 2019. Determinants of low birth weight in neonates born in three hospitals in Brong Ahafo region, Ghana, 2016- an unmatched case-control study. *BMC Pregnancy and Childbirth*, 19(1). doi: 10.1186/s12884-019-2315-6.
- Backes CH, Kara Markham, Pamela Moorehead, Leandro Cordero, Craig AN, Peter J. Giannone. 2013. Maternal Preeclampsia and Neonatal Outcomes. *Journal of Pregnancy*. 2012 [Cited 2013 Dec]; <http://www.hindawi.com/journals/jp/2011/214365/>
- Bacak SJ *et al.* 2017. Risk factors for neonatal mortality among extremely low birth weight infants. *American Journal of Obstetrics and Gynecology*.
- Castro C. 2014. *Disorders of pregnancy. In : Essential of Obstetri and Gynecology 4th Ed.* Elsivlersaunders: Philadelphia. pp 200.
- Cunningham FG, Leveno K, Bloom S, Hauth J, Rouse D, Spong C. 2010. *Obstetric Williams. Edisi ke- 23.* Jakarta: EGC.
- De Onis, M., Borghi, E., Arimond, M., Webb, P., Croft, T., Saha, K., Flores-Ayala, R. 2019. Prevalence thresholds

- for wasting, overweight and stunting in children under 5 years. *Public Health Nutrition*, 22(1):175–179.
- Elisa Hadiwijaya, Andriana Kumala. 2019. Hubungan Kehamilan Usia Remaja dengan Kejadian BBLR di RSUD Ciawi-Kabupaten Bogor Periode 2016-2017. *Tarumanagara Medical Journal*. 1(2): 270-276.
- Hartiningrum, I., & Fitriyah, N. 2018. Bayi Berat Lahir Rendah ( BBLR ) di Provinsi Jawa Timur Tahun 2012-2016. *Jurnal Biometrika dan Kependudukan*, 7(2):97–104.
- Indriani, P. L. N. 2020. Hubungan Anemia Pada Ibu Hamil, Hidramnion, Dan Ketuban Pecah Dini (KPD) Terhadap Kejadian Berat Bayi Lahir Rendah (Bblr) Di Rumah Sakit Islam Siti Khadijah Palembang Tahun 2018. *Masker Medika*, 8(1):185-192.
- Manuaba, Ida Ayu Chandranita, Ida Bagus Gde Fajar Manuaba dan ida Bagus. 2010. *Ilmu Kebidanan, Penyakit Kandungan, dan KB Untuk Pendidikan Bidan*. Jakarta: EGC
- Mulyanti. 2014. *Hubungan Antara Komplikasi Kehamilan dengan Kejadian BBLR di RSUD Kelas B Kabupaten Subang*. J Univ Padjajaran. pp.145–50.
- Nur Rosmala, Adhar Arifuddin. 2016. Analisis Faktor Risiko Kejadian Berat Lahir Rendah di Rumah Sakit Umum Anutapura Palu. *Jurnal Preventif*, 7(1):1-64.
- Permana, P., & Wijaya, G. B. R. 2019. Analisis faktor risiko bayi Berat Badan Lahir Rendah (BBLR) di Unit Pelayanan Terpadu (UPT) Kesehatan Masyarakat (Kesmas) Gianyar I tahun 2016-2017. *Intisari Sains Medis*, 10(3):674–678.
- Prawirohardjo, S. 2016. *Ilmu Kebidanan*. Jakarta: PT Bina Pustaka Sarwono Prawirohardjo.
- Sulistiyawati, W. 2015. *Pengaruh Faktor Maternal Terhadap Kejadian Berat Badan Lahir Rendah Di Kabupaten Mojokerto*. Tesis. Universitas Airlangga Surabaya.
- Riskesdas. 2015. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia.
- World Health Organization. (2014). *WHO Global Nutrition Targets 2025: Low Birth Weight Policy Brief*. [online] WHO.  
[https://www.who.int/nutrition/publications/globaltargets2025policybrief\\_1bw/en/](https://www.who.int/nutrition/publications/globaltargets2025policybrief_1bw/en/) (10 Oktober 2019).