

# Factors That Influence The Incidence of Low Birth Weight

Heri Saputro\*, Supraptini

Institut Ilmu Kesehatan STRADA Indonesia, East Java, Indonesia

Mother and Child Hospital Putri Surabaya, East Java, Indonesia

\*Corresponden Author: Heri Saputro ([nsheri@strada.ac.id](mailto:nsheri@strada.ac.id))



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## ABSTRACT

**Background:** The causes of the birth of Low Birth Weight (LBW) babies vary greatly, many references state that it is related to maternal hypertension, maternal nutritional status, maternal age and the number of previous births the mother has had. This research aimed to determine the relationship between factors that influence LBW and the incidence of LBW.

**Methods:** This research uses an analytical survey with a cross sectional approach. The number of research participants was 80 postpartum mothers who were taken using a simple random sampling technique. Data analysis was carried out using regression logistics.

**Results:** The results of statistical analysis using the logistic regression test showed that there was no significant relationship between nutrition (0.101), age (0.447) and parity (0.681). The results of logistic regression analysis showed pregnancy hypertension ( $p=0.000$ ). There is a relationship between pregnancy hypertension and low birth weight.

**Conclusion:** The research results showed that pregnancy hypertension is the dominant factor in the incidence of LBW so that during pregnancy it is hoped that pregnant women can control pregnancy hypertension with pharmacological or non-pharmacological therapy.

## I. Introduction

The more science and technology in the health sector develops, the more problems in the health sector increase. If observed properly, as science and technology in the health sector increases, there will be fewer health problems that arise. But the reality says differently, what is emerging now, especially in the Republic of Indonesia, is that health problems have not been resolved properly. For example, it can be seen that the maternal and infant mortality rates are increasing from year to year due to various different causes. One of them is that many mothers give birth to babies with low birth weight (LBW), which causes death in babies (Shaikh, 2016).

Based on the World Health Organization (WHO), the infant mortality rate (IMR) was 43 per 1000 live births. In the Southeast Asia region, IMR is 24 per 1000 live births (WHO 2018). According to the 2017 SDKI, the neonatal mortality rate or infant deaths in the first month is 15 babies per 1000 births. The prevalence of LBW babies is estimated at 15% of all births in the world with a limit of 3.3% to 38% and occurs more often in developing or low socio-economic countries. Statistics show that 90% of LBW cases occur in developing countries and the death rate is 35 times more than 2500 grams. LBW is a major factor in increasing mortality, morbidity and disability of neonates, infants and children and has a long-term impact on their lives in the future. The incidence rate in Indonesia varies greatly from one region to another, ranging from 9% - 30%. The results of studies in 7 multicenter regions obtained LBW rates ranging from 2.1% - 17.2%. Nationally, based on further analysis by the IDHS, the LBW rate is around 7.5%. This figure is greater than the LBW target set in the nutritional improvement program target towards a healthy Indonesia in 2010, namely 7% (Sembiring, 2019).

According to the East Java Province Central Statistics Agency (BPS), in 2016 the number of low birth weight (LBW) babies in the city of Surabaya was 1110 babies out of 43,164 births. The most

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common cause of LBW is premature birth, other maternal factors are age, parity and so on. Placental factors such as vascular disease, multiple pregnancies and fetal factors are also causes of LBW (Sembiring, 2019). The LBW mortality rate is 35 times higher compared to babies born with more than 2500 grams (Chalise, 2021). LBW is the second highest cause of perinatal death in Indonesia after intrauterine fetal death (IUFD), which is 11.2% (Ministry of Health, 2019).

From a preliminary study conducted by researchers, data on live births at Putri Surabaya Hospital in 2017 was 940. baby, There were 60 babies with LBW, while in 2018 there were 1220 live birth data, and there were 93 babies with LBW (Mother and Child Hospital Putri Surabaya Medical Records). The author is interested in conducting research on the factors that influence the incidence of Low Birth Weight at Mother and Child Hospital Putri Surabaya.

## II. METHODS

The research design is observational analytics with a cross sectional design, namely a study to study the dynamics of correlation between effect risk factors by approaching, observing or collecting data at one time (Point Time Approach) (Bowling, 2014). This research was conducted to explain the factors associated with the incidence of LBW. The factors studied were pregnancy hypertension, Nutrition of pregnant women, maternal age and parity. Researchers conducted research on the causes of LBW and the incidence of LBW by looking at the patient's medical record and then documenting it on the observation sheet. The population was all postpartum mothers in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya.

The sampling technique in this study was simple random sampling. Testing the hypothesis of this research using logistic regression is used in this research to determine the effect of each independent variable on the dependent variable with the confidence level testing criteria used being 95% or a significance level of 5% ( $\alpha = 0.05$ ), acceptance criteria or Hypothesis rejection is based on the significance of the  $p$ -value. If the significance level is  $> 0.05$ ,  $H_0$  is rejected (the regression coefficient is not significant). This means that the independent variable does not have a significant influence on the dependent variable. If the significance level  $< 0.05$  is accepted (the regression coefficient is significant), this means that the dependent variable has an influence. which is significant for the independent variable. The study was approved by the Institute of Health Sciences STRADA Indonesia Research Ethics and Review Committee (579/KEPK/LPPM/ VIII /2022) and written consent was obtained from those who met the inclusion criteria and voluntarily agreed to participate in the study.

## III. RESULTS

**Table 1 Table of Statistical Test Results for Factors that Influence the Incident of Low Birth Weight**

		Variables in the Equation					
		B	S.E	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	hypertension(1)	1,928	,871	4,897	1	,027	6,874
	nutrition(1)	-1,145	,806	2,020	1	,155	,318
	age(1)	,888	,873	1,034	1	,309	2,430
	parity(1)	-.568	,771	,544	1	,461	,566
	Constant	1,018	,881	1,337	1	,248	2,768

Statistical test analysis using the *logistic regression test* obtained that the variable hypertension during pregnancy obtained  $p$  value (0.027)  $< \alpha$  (0.05) which means there is an influence between hypertension during pregnancy and the incidence of LBW. From the maternal nutrition variable, the result was  $p$  value (0.155)  $> \alpha$  (0.05) which means there is no influence between maternal nutrition and the incidence of LBW. From the maternal age variable, the result is  $p$  value (0.309)  $> \alpha$  (0.05) which means there is no influence between maternal age and the incidence of LBW. From the parity variable mothers obtained  $p$  value (0.461)  $> \alpha$  (0.05) which means there is no influence between maternal parity and the incidence of LBW. Thus, it can be seen that the dominant variable is the hypertension factor with a  $p$  value of 0.027, so accept  $H_1$ , which means that there is an influence between the factors that

cause LBW on the incidence of LBW in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya.

#### IV. DISCUSSION

##### Effect of Hypertension During Pregnancy on LBW

The results of statistical analysis using the *logistic regression test* showed that the variable with the greatest strength was the hypertension factor with a p value of 0.027, so we accept H1, which means that there is an influence between the factors that cause LBW on the incidence of LBW. The results of this study are in line with research conducted by Julia (2016), obtained  $p = 0.00$  which can be concluded that there is a significant relationship between maternal hypertension and the incidence of low birth weight (LBW). Pregnancy hypertension also causes problems in pregnant women such as *intra uterine growth restriction (IUGR)* and hypoxia due to decreased uteroplacental perfusion (Liu, 2021). Pregnancy hypertension also results in failure to invade the migration of trophoblast cells that enter the myometrial arteries, causing the arterioli to not be influenced by the placental hormonal system to be able to cause fetal growth and development in the uterus, resulting in failure of nutrient transport which ultimately causes *intrauterine bleeding. growth restriction (IUGR)* (Tsujimoto, 2022).

Hypertension in pregnancy is a serious complication in the second – third trimester with symptoms such as edema, hypertension, proteinuria, seizures and even coma. With the occurrence of hypertension, uteroplacental circulation will be disrupted, the supply of nutrients and oxygen will be disrupted so that the fetus will experience impaired growth and the baby will be born with a low birth weight (Liu, 2021). There is a relationship between hypertension factors in pregnancy and the incidence of LBW in pregnant women. Due to the condition of the mother experiencing hypertension, there will be disturbances in blood circulation from the mother to the fetus due to systemic circulation disorders. This condition affects reduced nutrition for the fetus and causes delayed fetal growth. Mothers who suffer from hypertension will often feel pain, which can reduce their appetite. In the end, nutritional intake which should be twice as high as before pregnancy will also not be met. In the long term, it can result in a lack of nutritional intake for the fetus so that fetal growth is also hampered (Liu, 2021).

Non-pharmacological therapy can be used to treat hypertension, although it does not have a significant impact. Although strict bed rest can lower blood pressure, this is generally not recommended. Limiting physical activity and reducing stress is always recommended (Timsina, 2023). Limiting salt intake is not recommended except in patients who are previously known to have salt -sensitive hypertension hypertension), because pregnant women with hypertension have a lower plasma volume compared to normotensive women. If pharmacological treatment is needed, methyldopa can be an option, so during pregnancy it is hoped that pregnant women can control pregnancy hypertension with non-pharmacological and pharmacological therapy (Mahmood, 2019).

In addition to the steps above, health workers are expected to carry out early detection of risk factors for hypertension in pregnancy, so that they can provide promotive, preventive and curative health education to pregnant and giving birth mothers and can anticipate emergencies in mothers and babies and immediately make referrals. in order to help reduce maternal and infant morbidity and mortality (Getaneh, 2020). Apart from that, pregnant women and their families must be able to recognize the danger signs of pregnancy so that they can implement promotive and preventive steps with instructions from health workers to prevent pregnancy complications and reduce the risk of LBW births.

##### The Influence of Maternal Nutrition on the Occurrence of LBW

Chronic Energy Deficiency is caused by a lack of energy over a long period of time. CED in women in developing countries is a cumulative result of malnutrition from the fetus, infancy and childhood period and continues into adulthood. Specifically, the cause of CED in pregnant women is the result of an imbalance between intake to meet needs and energy expenditure. What often occurs is seasonal or chronic unavailability of food at the household level, disproportionate distribution within the household and the heavy workload of pregnant women (Tyagi, 2017).

In Indonesia, the normal LILA threshold is 23.5 cm, there is a risk of suffering from Chronic Energy Deficiency (CED) which can cause prematurity and the risk of Low Birth Weight (LBW) (Susilowati, 2022). Measuring the mother's upper arm circumference (LILA) during pregnancy is very important. The aim of measuring LILA is to determine early the nutritional status of pregnant women. If the LILA size is  $< 23.5$  cm then the possibility of pregnant women giving birth to LBW babies is greater. Meanwhile, for  $LILA > 23$  cm, the mother will give birth to a healthy, full-term baby with

normal weight. This is because every pregnant woman needs additional calories and nutrition every day because during pregnancy they have to supply energy for the growth and development of their fetus (Saputro, 2023). The health condition of the baby being born is greatly influenced by the mother's nutritional status during pregnancy. KEK in pregnant women needs to be aware of the possibility of the mother giving birth to a LBW baby, hampering the growth and development of the fetus' brain, thereby affecting the child's intelligence in the future and the possibility of being premature (Kabir, 2020).

In this study, the results showed that there was no influence of maternal nutrition on the incidence of LBW, possibly because there was no reduction in the transfer of food substances from the mother to the placenta so that fetal growth and placental growth could be optimal so that LBW did not occur. It is also possible that there are other factors that are more dominant in the incidence of LBW.

### **The Influence of Maternal Age on the Incidence of LBW**

Increasing age in women greatly influences the number of egg cells remaining, the age factor (above 35 years) also influences the ability of the uterus to accept the fetus or embryo. In this case, the uterus's ability to accept the fetus decreases. The aging factor will also cause embryos produced by women over 35 years of age to sometimes have difficulty attaching to the endometrium layer, this can increase the risk of abortion. In older mothers, even though they are experienced, their body condition and health have begun to decline so that it can affect the intrauterine system and can cause LBW births (Restrepo-Méndez, 2015). The mother's age is not the main factor in LBW births, but LBW births appear to be increasing in women beyond the age of 20 years to 35 (Schimmel, 2015). It can be concluded that pregnant women at reproductive age (20-35 years) or at high risk age (>35 years) have the same chance of giving birth to LBW babies, but if pregnant women at high risk always do ANC (Ante Natal Care) at least 4 times during pregnancy and maintaining nutritious food intake during pregnancy can prevent the birth of LBW babies. In this study, the results showed that there was no influence between maternal age and the incidence of LBW, possibly because there were other factors that were more dominant in the incidence of LBW (Kim, 2019).

### **The Influence of Maternal Parity on the Incidence of LBW**

This research is not in line with the research results of Ismi Trihardiani (2011), the results of statistical tests showed a significant relationship between parity and birth weight ( $p=0.043$ ). Research into the relationship between parity and the incidence of LBW found that there was no relationship between parity and the incidence of LBW (Schimmel, 2015). The results of this study do not match the theory where it is said that one of the causes of LBW from maternal factors is parity 1 or  $\geq 4$ . High parity will have an impact on the emergence of various health problems for both the mother and the baby being born. According to Sembiring (2019), parity is said to be high if a mother/woman gives birth to four or more children. Mothers with high parity are generally older so they are at risk of suffering from chronic diseases such as diabetes mellitus and others so they are also at risk of LBW. This condition ultimately has an impact on health which may arise from high parity so that frequent illness causes reduced appetite. In this situation, if it continues, the longer the nutritional intake for the fetus will decrease. High parity will have an impact on the emergence of various health problems for both the mother and the baby being born (Oh et al, 2019). By spacing pregnancies and family planning, it can reduce the risk of LBW mothers giving birth.

## **V. CONCLUSION**

Based on the results of analysis and research entitled Factors that influence the incidence of LBW in the Baby Room and NICU of Mother and Child Hospital Putri Surabaya, the researchers finally came to the following conclusions: There was an influence between hypertension during pregnancy and the incidence of LBW in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya, with a *p value of* (0.027). There was no influence between maternal nutrition and the incidence of LBW in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya, with a *p value of* (0.155). There was no influence between maternal age and the incidence of LBW in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya, resulting in a *p value of* (0.309). There was no influence between maternal parity and the incidence of LBW in the Baby Room and NICU at Mother and Child Hospital Putri Surabaya, the result was *p value* (0.461).



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