



Path Analysis of Factors Related to The Events of Low Born Weight Babies in Bangil Hospital

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ABSTRACT

Low birth weight (LBW) is one of the main factors influencing perinatal and neonatal mortality. According to UNICEF (United Nations International Children's Emergency Fund) in the Asian Region (2015) the number of LBW in Indonesia in 2011 was high, namely around 11.1%. The aim of the study was to analyze the risk factors for low birth weight at Bangil Hospital, Pasuruan Regency, East Java. Method: This type of research is *ex post facto* because this research does not make treatment or conditioning of variables with a case control approach. This research was conducted at the Bangil Regional Hospital, Pasuruan Regency and the time of data collection was in June 2016. The sample was selected by fixed disease sampling, using a ratio of 1: 3 between the case group and the control group with 120 subjects. The data collection technique used a questionnaire. Data were analyzed using STATA13 Path Analysis (Path analysis) and it is said to be significant if the *p* value is <0.05 . Results: There was a relationship between maternal hemoglobin levels ($b = -2.69$; 95% CI -4.59 to -0.79; $p = 0.006$), maternal LILA ≥ 23.5 cm ($b = -2.10$; 95% CI -3.82 to -0.38; $p = 0.017$), and ANC ≥ 4 times ($b = -2.70$; 95% CI -4.01 to -1.40; $p = <0.001$) with a logit reduction in the risk of delivering LBW babies. There was a relationship between maternal stress and the increased risk of giving birth to low birth weight babies ($b = 1.96$; 95% CI 0.36 to 3.57; $p = 0.016$). There is a relationship between family income ($b = 1.45$; 95% CI 0.09 to 2.81; $p = 0.036$) and maternal education ($b = 2.19$; 95% CI 0.88 to 3.49; $p = 0.001$) with an increased logit risk of having a hemoglobin level ≥ 11 grams%. There was a relationship between family income ($b = 1.60$; 95% CI 0.19 to 3.02; $p = 0.026$), education ($b = 1.78$; 95% CI 0.40 to 3.17; $p = 0.012$) with an increase in logit risk of having LILA nutritional

status ≥ 23.5 cm. There was an association between passive smoking and a decrease in risk of nutritional status LILA ≥ 23.5 cm ($b = -1.94$; 95% CI -3.61 to -0.26; $p = 0.023$). There is a relationship between family income ($b = 2.00$; 95% CI 0.76 to 3.25; $p = 0.002$) and education ($b = 1.66$; 95% CI 0.55 to 2.77; $p = 0.003$) with an increase in logit risk of doing ANC ≥ 4 times. There was a relationship between maternal education and the increased risk of having a family income \geq UMK ($b = 1.81$; 95% CI 0.73 to 2.88; $p = 0.001$). There was a correlation between maternal education and a decrease in the risk of exposure to cigarette smoke ($b = 1.06$; 95% CI -2.02 to -0.10; $p = 0.031$). Conclusion: There is a direct relationship between ANC, stress, Hb, nutritional status with the incidence of LBW. There is an indirect relationship between education, family income, smoking and the incidence of LBW.

Keywords: Low Birth Weight (LBW), Risk Factors.

I. INTRODUCTION

Low Birth Weight (LBW) is a baby born with a birth weight of less than 2,500 grams regardless of gestation. In general, the cause of LBW babies is multifactorial, both from maternal factors, placental factors, fetal factors and other factors. Low birth weight (LBW) is one of the main factors affecting perinatal and neonatal mortality (Nugroho et al, 2015).

The infant mortality rate in Indonesia according to the 2008-2012 Demographic and Health Survey is 32 deaths per 1,000 live births, the infant mortality rate occurs at the age of less than 1 month. Low Birth Weight (LBW) and asphyxia are the causes of high neonatal

mortality. Neonates with low birth weight have a risk of death 6.5 times greater than babies born with normal weight. Low birth weight has a higher risk of death than babies with normal weight at birth, especially deaths during the perinatal period. IDHS, 2012)

According to UNICEF (United Nations International Children's Emergency Fund) in the Asian Region (2015), the low birth weight rate in Indonesia in 2011 was high, namely around 11.1%, compared to neighboring countries with low birth weight rates such as Vietnam (5.3 %) and Thailand (6.6%). Then WHO noted that Indonesia is ranked ninth in the world with a percentage of LBW of more than 15.5% of baby births each year. The 2013 Riskesdas results stated that the percentage of children under five (0-59 months) with BLR was 10.2%. The highest percentage of LBW was in Central Sulawesi Province (16.8%) and the lowest was North Sumatra (7.2%) (Ministry of Health, Republic of Indonesia, 2014).

The factors that influence the risk of LBW incidence are the socio-demographic characteristics of the mother (age less than 20 years and age more than 34 years), black race, insufficient socioeconomic status, illegitimate marital status, low education level. Maternal medical risks before pregnancy also play a role in the incidence of LBW including parity, body weight and height, having given birth to LBW, birth spacing. The reproductive health status of the mother at risk for LBW including the mother's nutritional status, infections and diseases during pregnancy, pregnancy history and pregnancy complications). The status of antenatal services includes the frequency and quality of antenatal services, health workers where pregnant check-ups, gestational age at the first pregnancy examination can also be at risk of giving birth to LBW (Sistiarini, 2008).

The condition of the mother before and during pregnancy can affect the growth of the fetus that is being conceived. Low birth weight

babies are babies born weighing less than 2500 grams or 5.5 pounds. Factors that affect the weight of the baby at birth can be maternal factors, environmental factors, and fetal factors (Latifah, 2009). Every time pregnancy can develop into problems or experience complications or complications. Therefore, it is necessary to monitor the health of pregnant women during their pregnancy. Pregnant women class is a means to learn together about health for pregnant women, in the form of face-to-face groups which aims to increase the knowledge and skills of mothers regarding pregnancy, pregnancy care, childbirth, postnatal care, care for newborns, myths, infectious diseases. and birth certificates. So far, general counseling on maternal and child health is still carried out through individual consultations or on a case-by-case basis which is given when mothers check their wombs / at the deadline for posyandu activities.

II. SUBJECTS AND METHODS

This type of research is ex post facto because this study does not treat or condition variables, with a case control approach, namely an epidemiological study that studies the relationship between exposure (research factors) and disease, by comparing the case group and the control group based on their exposure status. According to Murti, 2013. The sampling technique used purposive sampling technique. The sample was selected using Fixed disease sampling with a ratio (1: 3) with case control as many as 30 subjects and control as many as 90 subjects Exogenous variables: mother's education, family income, smoking behavior (passive), psychological stress. Endogenous variables (dependent variable): ANC regularity, maternal nutritional status, hemoglobin (Hb) levels, LBW.



Bivariate data processing to determine the relationship between variables using chi-square and multivariate analysis with STATA13 Path Analysis (Path analysis) and it is said to be significant if the p value <0.05.

III. RESULTS

Characteristics of respondents in this study were maternal age, education, maternal occupation, maternal nutritional status (cm), HB levels (gram%), passive smoking, psychological stress, LBW. Of the 120 research subjects, it was found that maternal age at 20-35 years dominated the case and control groups, namely 57% and 63%, mothers who did not work in the case and control groups were more than 73% and 88%, mother's education in the group cases with low education as much as 57% and control with high education as much as 74%, family income in the case group of low UMK cases <Rp. 1,924,000 57% and control of high UMK \geq Rp. 1,924,000 as much as 71%, the nutritional status of mothers in the case and control groups LILA \geq 23.5 cm was 77% and 99%, the hemoglobin level in the Hb case group <11 g% was 53% and the control Hb \geq 11 gr% was 98%, Passive smokers in the case group were exposed to cigarette smoke as much as 70% and controls who were not exposed to cigarette smoke as much as 63%, psychological stress in the stressed case group was 73% and the non-stressed control group was 92%, infants in the case group were 25% and cases as much as 75%.

The results of the analysis used STATA13 Path Analysis (Path analysis) and it is said to be significant if the p value is <0.05.

The results of calculations using STATA 13 computer program software, there is a relationship between maternal hemoglobin levels and a reduced risk logit for delivering LBW babies, and this relationship is statistically significant. Mothers with hemoglobin levels \geq 11

grams% had a logit risk of 2.69 lower than those with hemoglobin levels <11 grams% (b = -2.69; 95% CI = -4.59 to -0.79; p = 0.006).

There was an association between maternal LILA and a reduced risk logit for delivering babies with LBW, and the association was statistically significant. Mothers with LILA \geq 23.5cm had a logit risk of 2.10 lower than mothers with LILA <23.5cm (b = -2.10; 95% CI = -3.82 to -0.38; p = 0.017).

There is a relationship between maternal stress and the increased risk logit for delivering LBW babies, and this relationship is statistically significant. Pregnant women who were stressed had a logit risk of 1.96 higher than mothers who were not stressed (b = 1.96; 95% CI = 0.36 to 3.57; p = 0.016).

There is an association between ANC and a reduced risk logit for delivering LBW babies, and this relationship is statistically significant. Mothers who did ANC \geq 4 times had a logit risk of 2.70 lower than mothers with ANC <4 times (b = -2.70; 95% CI = -4.01 to -1.40; p = <0.001).

There is a relationship between family income and an increase in logit to have a hemoglobin level of \geq 11 grams%, and this relationship is statistically significant. Mothers with family income \geq UMK had a logit risk of 1.45 higher than mothers with family income <UMK (b = 1.45; 95% CI = 0.09 to 2.81; p = 0.036).

There is a relationship between maternal education and an increase in logit to have a hemoglobin level of \geq 11 grams%, and this relationship is statistically significant. Mothers with \geq SMA education had a logit risk of 2.19 higher than mothers with education <SMA (b = 2.19; 95% CI = 0.88 to 3.49; p = 0.001).

There is a relationship between family income and a logit increase for having a nutritional status of LILA \geq 23.5cm, and this relationship is statistically significant. Mothers with income \geq UMK had a logit risk of 1.60

higher than mothers with income <UMK ($b = 1.60$; 95% CI = 0.19 to 3.02; $p = 0.026$).

There is a relationship between education and a logit increase in having a nutritional status of LILA ≥ 23.5 cm, and this relationship is statistically significant. Mothers with \geq SMA education had a logit risk of 1.78 higher than mothers with education <SMA ($b = 1.78$; 95% CI = 0.40 to 3.17; $p = 0.012$).

There is an association between passive smoking and a decrease in logit for having a nutritional status of LILA ≥ 23.5 cm, and this relationship is statistically significant. Mothers with passive smoking who were exposed to secondhand smoke had a lower logit risk of 1.94 to have a good nutritional status than mothers who were not exposed to secondhand smoke ($b = -1.94$; 95% CI = -3.61 to -0.26; $p = 0.023$).

There is a relationship between family income and an increase in logit for doing ANC ≥ 4 times, and this relationship is statistically significant. Mothers with family income \geq UMK had a logit risk of 2.00 higher than mothers with income <UMK ($b = 2.00$; 95% CI = 0.76 to 3.25; $p = 0.002$).

There is a relationship between education and an increase in logit for doing ANC ≥ 4 times, and this relationship is statistically significant. Mothers with \geq SMA education had a logit risk of 1.66 higher than mothers with education <SMA ($b = 1.66$; 95% CI = 0.55 to 2.77; $p = 0.003$).

There is a relationship between maternal education and a logit increase for having a family income \geq UMK, and this relationship is statistically significant. Mothers with \geq SMA education had a logit risk of 1.81 higher than mothers with education <SMA ($b = 1.81$; 95% CI = 0.73 to 2.88; $p = 0.001$).

There is a relationship between maternal education and a decrease in logit for exposure to cigarette smoke, and this relationship is statistically significant. Mothers with \geq SMA

education had a logit risk of 1.06 more education than mothers with education <SMA ($b = 1.06$; 95% CI = -2.02 to -0.10; $p = 0.031$).

IV. DISCUSSION

The association between maternal hemoglobin level and the decrease in logit risk for delivering babies with LBW, and the association was statistically significant ($b = -2.69$; 95% CI = -4.59 to -0.79; $p = 0.006$). This means that there is a relationship between Hb levels and the incidence of LBW babies. The results of this study are in line with research conducted by Aisyah Tarya Utari (2014) regarding the relationship between anemia in pregnant women and the incidence of low birth weight in RSUD Abdul Wahab Sjahranie Samarinda in 2013, which states that mothers with a history of anemia during pregnancy are one of the risk factors that have a major influence. against the incidence of LBW.

According to WHO (World Health Organization) (2009) anemia in pregnant women occurs when the hemoglobin (Hb) level in their blood is less than 11.0 g%. The blood volume of pregnant women increases by approximately up to 50% which causes the concentration of red blood cells to decrease. Hemoglobin is needed by the human body for various cell metabolism in transporting O₂ throughout the body. The condition of concern is the condition after giving birth.

According to Sulistiani (2014), the results of the study obtained an OR value of 8,719 (95% CI = 2.806 to 27,089). So that the OR value is significant or it can be concluded that the incidence of KEK has a risk of 8,719 times giving birth to LBW babies. The results of this study are in line with research conducted by Siva Candra Rukmana concerning the relationship between nutritional intake and nutritional status of third trimester pregnant women with birth weight of babies in the working area of



the Puskesmas The Semarang regency stated that there is a relationship between the level of energy adequacy, protein adequacy level, Fe intake / day, folate intake / day, upper arm circumference and hemoglobin levels with the birth weight of the baby.

The relationship between maternal stress and the increased logit risk for childbirth with LBW, and this relationship was statistically significant ($b = 1.96$; 95% CI = 0.36 to 3.57; $p = 0.016$). According to Mesarini (2013), that the physical and emotional tension that accompanying psychological stress causes discomfort to a person. This makes a person motivated to do something to reduce psychological stress, or it can be called a coping mechanism. Psychic stress conditions will have a wide influence on the body, including dizziness, headaches, chest palpitations, difficulty sleeping, changes in appetite.

The association between ANC and the reduction in logit risk for delivering babies with LBW, and the association was statistically significant ($b = -2.70$; 95% CI = -4.01 to -1.40; $p = <0.001$). The results of this study are in accordance with research conducted by Septiani (2013) which showed that the likelihood of LBW in mothers who had ANC visits 1-3 times during pregnancy was 1.26 times greater than mothers who had ANC visits ≥ 4 times during pregnancy (95% CI 1.09 to 1.4) The implementation of ANC has an important role in improving the health of mothers and children, because ANC visits are one of the sources to get Fe tablets and education about important nutritional needs during pregnancy, besides through antenatal visits for pregnant women It can increase awareness in maintaining fetal health and maternal health because during pregnancy checks, pregnant women get services such as tetanus toxoid vaccination, explanation of signs of complications, receiving iron pills (Fe) and blood pressure checks. All these health services

are very beneficial for the quality of the baby to be born and the health of the mother herself.

The relationship between maternal hemoglobin levels with family income and maternal education is an indirect relationship to the incidence of low birth weight babies. Several studies have examined family income with the incidence of LBW babies, such as in the Bhaskar (2015) study which examined risk factors for LBW infants in Nepal, found a significant relationship between family income (OR = 2.06, 95% CI: 1.19 -3.55) and mother. illiterate is more at risk of having LBW babies than mothers with education up to SLC or more (OR = 3.04, 95% CI: 1.54-5.98).

According to Arisman (2009), the weight of a newborn is determined by the nutritional status of the fetus. The nutritional status of the fetus is determined, among others, by the nutritional status of the mother at delivery and this condition is also influenced by the nutritional status of the mother at the time of conception. Maternal nutritional status at conception is influenced by; the socio-economic condition of the mother before pregnancy, the condition of the mother's health and nutrition, birth spacing, parity, and the age of the first pregnancy.

Socio-economy is one measure to describe the level of social difference, which includes income, employment and education level. Low socioeconomic levels cannot directly affect fetal development, but act as an intermediary for adverse risk factors at birth, such as maternal nutrition, maternal physical activity, lack of access to quality prenatal care and maternal psychosocial (Abusaad, 2010).

Education level, the National Language Center (2002) defines education as the process of changing and managing a person or group of people in an effort to mature humans through teaching and training efforts, processes, methods, actions to educate. According to the research of Ramadhan (2012) the results of statistical tests,

Chi-square are obtained $p = 0.004$ ($p \leq 0.05$), it can be concluded that there is a significant relationship between passive smoking pregnant women and the incidence of low birth weight (LBW).

Socio-economy is one measure to describe the level of social difference, which includes income, employment and education level. Low socioeconomic levels cannot directly affect fetal development, but act as an intermediary for adverse risk factors at birth, such as maternal nutrition, maternal physical activity, lack of access to quality prenatal care and maternal psychosocial (Abusaad, 2010).

There is a relationship between family income and an increase in logit for doing ANC ≥ 4 times, and this relationship is statistically significant. Mothers with family income \geq UMK had a logit risk of 2.00 higher than mothers with income $<$ UMK ($b = 2.00$; 95% CI = 0.76 to 3.25; $p = 0.002$).

There is a relationship between education and an increase in logit for doing ANC ≥ 4 times, and this relationship is statistically significant. Mothers with \geq SMA education had a logit risk of 1.66 higher than mothers with education $<$ high school ($b = 1.66$; 95% CI = 0.55 to 2.77; $p = 0.003$). That the relationship between ANC regularity and family income and maternal education is a significant relationship. indirectly to LBW babies.

It was concluded that the relationship between family income and maternal education was an indirect relationship with LBW babies. Because families with high education will theoretically have high income and have a low risk of baby LBW.

This is reinforced by research by Abusaad (2010) that socio-economy is one measure to describe the level of social difference, which includes income, employment and education level. Low socioeconomic level can not directly

affect fetal development, but as an intermediary for adverse risk factors at birth, such as maternal nutrition, physical activity of the mother, poor access to quality prenatal care and maternal psychosocial.

The risk of dying of babies who experience LBW is very high. A passive smoking pregnant mother can have a 20 percent higher risk of giving birth to a low weight baby than a mother who is not exposed to secondhand smoke. Cigarette smoke that is continuously inhaled by pregnant women, then the baby is very at risk of experiencing LBW. The toxic content in cigarette smoke can reduce oxygen and the fetus (carboxyhemoglobin levels in the blood of the mother and fetus. So this is what causes disruption in the development of children from womb to after birth (Saibatin, 2016).

There is a relationship between maternal education and a decrease in logit for exposure to cigarette smoke, and this relationship is statistically significant. The relationship between passive smoking and education is an indirect relationship to the incidence of LBW infants.

V. REFERENCES

- Abusaad K, (2010). Maternal Nutrition and birt outcomes. Oxford University Press.
- Adiningrum Y, Dwiyan, Lestari TE. (2013). Trimming Model Path Analysis to Determine the Factors That Affect Learning Motivation on Student Academic Achievement. Online Journal of the State University of Malang. 1-2.
- Arisman (2009). Textbook of nutrition science of food poisoning. Jakarta: EGC p. 3
- Depkes RI, (2004). Assessment of K I and K IV. Jakarta: Depkes RI
- Depkes RI. 2008. Antenatal Service Guide. Jakarta: Depkes RI



- Depkes RI. (2009). *Balanced Nutrition Towards a Healthy Life for Babies, Pregnant Women and Breastfeeding Mothers (Puskesmas Officer Guidelines)*. Jakarta: Depkes RI.
- Dinkes Pasuruhan (2015). *Data for low birth weight babies in 2014, 2015*
- Dinkes Prov Jatim (2015). *Data for low birth weight babies in 2010, 2011, 2015*
- Kemenkes RI, (2014). *Indonesia Health Profile 2013*. Jakarta
- Masoumeh Kordi, Soheila Mohamadirizi and Mohamad Taghi Shakeri (2013). The relationship between occupational stress and dysmenorrhea in midwives employed at public and private hospitals and health care centers in Iran (Mashhad) in the years 2010 and 2011. *Iranian Journal of Nursing and Midwifery Research*. 18 (4): 316-322.
- Latifah (2009). *The association of pregnancy in adolescence with the incidence of prematurity, low birth weight and asphyxia*. Public health sciences, Jenderal Sudirman University.
- Mufdlilah. (2009). *ANC Focus*. Nuha. Yogyakarta: Medika
- Murti, B. (2013). *Design And Sample Size For Quantitative And Qualitative Research In The Health Sector*. Yogyakarta: Gajah Mada University Press.
- Murti, B. (2016). *The Influence of Biopsychosocial Factors of Pregnant Women on the Health of Children in Later Days and Age of Adults*. Postgraduate Program of Public Health Sciences, Sebelas Maret University
- Prima Maulana Cahyo Nugroho, Lilia Dewiyanti, Afiana Rohmani (2013). The severity of asphyxia neonatorum in low birth weight babies (LBW). *Muhammadiyah Medical Journal* volume 2 number 1 in 2015
- Saibatin, (2016). This pregnant woman is the danger of being passive smokers. <http://www.saibatin.com/2016/01/ibu-hamil-ini-bahaya-jadi-perokok-pasif.html>. accessed on 12 June 2016
- Sistiarani, C (2008). *Maternal Factors And Quality Of Antenatal Services That Are Risks To Incidence Of Low Birth Weight (LBW)*. Thesis. Not published. Faculty of Public Health, Diponegoro University, Semarang.
- SDKI (2012). *National Population and Family Planning Agency*. Central statistical agency of the Ministry of Health
- Unicef Indonesia (2012). *Health of both mother and child*. <http://www.unicef.org/indonesia/id>. Retrieved 26 November 2015
- WHO (2004). *Maternal and Neonatal Health Services*. Jakarta: Media Aesclepius Press
- Yuliva, Djauhar Ismail, Diah Rumekti (2009). Relationship between mother's work status and birth weight at RSUP Dr. M. Djamil. *Community Medical News*. Volume 25 No. 2 pp. 96-108.