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## Relationship of Exposure Cigarette Smoke in Pregnant Mothers to The Newborn weight

Ismar Agustin<sup>1</sup>, Sri Endriyani\*, Rehana<sup>2</sup>, Tri Utari<sup>3</sup>

\*Politeknik Kesehatan Palembang

Jl. Sukabangun 1 No.1159, Suka Bangun, Kec. Sukarami, Kota Palembang, Sumatera Selatan 30151

Email Corespondent: yani@poltekkespalembang.ac.id



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### Abstrak

**Background:** The infant mortality rate in Indonesia caused by the incidence of LBW is still a health problem that must be resolved. Exposure to cigarette smoke can affect low birth weight babies in mothers who are exposed to cigarette smoke.

**Objectives:** This study aims to determine the relationship between exposure to cigarette smoke in pregnancy and newborn body weight.

**Methods:** This research used analytic with a cross-sectional approach. From 100 population of pregnant mothers, 50 people were sampled in this study using the total sampling technique. The independent variable was exposure to cigarette smoke and the dependent variable was the weight of the newborn and the data were analyzed by using the *chi-square* test.

**Results:** The results of the statistical test showed that the variables that were statistically significantly related to the birth weight of newborns were age with *p value* <0.011, parity with *p value* <0.016, education with *p value* <0.01 and exposure to cigarette smoke, with *p value* <0.012.

**Conclusion:** There were a significant relationship between exposure to cigarette smoke and the weight of newborns at Bhayangkara Hospital Palembang in 2021. It is necessary to increase the socialization and health education for pregnant mothers and families about the impact of exposure to cigarette smoke on the growth and development of infants from an early age.

**Keywords:** low birth weight, pregnant, passive smoking

### Introduction

Currently, more than half of households are exposed to secondhand smoke every day, which is about 52%. Married men aged 15-45 years who smoked by 76.8%. Meanwhile, in South Sumatra, married women aged 15-49 years smoked 2.4 % of the 1,501 respondents. It is also known that mothers with smoking status gave birth to babies weighing less than 2500 grams as much as 5.3% of 100 respondents.<sup>1</sup> In pregnant women who smoke can cause pregnancy complications. One of the complications of pregnancy that causes fetal death is due to impaired oxygenation. According to Rikesdas SumSel the percentage of active smokers is 20.84%, smokers sometimes 3.99%. The

frequency of someone being around someone who smokes in a closed room every day is 28.07%, sometimes 41.16%, and never 30.76%. The group that is often exposed is women, namely 35.42% in Palembang City.<sup>2</sup>

The results of data from the Palembang City Health Service stated that smokers in 2008 were 10.17%, then in 2009 this year it increased by 13.17%, in 2010 it rose 5% to 18.17%, in 2011 the result was 24.17%, while in 2012 it was 34.17%, in 2013 it was 43.17%, and in 2014 there was an increase which is quite significant at 58.17%.<sup>3</sup> Categories of smokers are generally divided into two types, namely: active and passive smokers. An active smoker is someone who smokes and immediately inhales the smoke. A passive smoker is someone who does not smoke but is exposed to cigarette smoke by active smokers for  $\pm$  15 minutes in one day for one week.<sup>4</sup> The smoke exhaled by active smokers and inhaled by passive smokers is more dangerous, containing five times more carbon monoxide and four times containing tar and nicotine.<sup>5</sup>

The data obtained from the study show that pregnant women are the most exposed to cigarette smoke from husbands who smoke at home and are exposed to secondhand smoke from other family members, neighbours, and colleagues.<sup>6</sup> Pregnant women who smoke, both active and passive, will distribute toxic substances such as nicotine and carbon monoxide from cigarette smoke to the fetus they contain through the blood circulation.<sup>7</sup> The results showed that exposure to cigarette smoke during pregnancy had a significant effect ( $p = 0.002$ ) on the incidence of LBW with a risk of 4.2 times greater than that of mothers who were not exposed.<sup>7</sup> According to WHO, in the world, the incidence of LBW is 15.5%, which means that around 20.6 million babies are born every year. 96.5% of them are in developing countries. Based on data from the Palembang City People's Welfare Statistics in 2020, the number of LBW in Palembang is 11.28%. The number of infant deaths in Palembang City in 2018 was 24 cases of death consisting of 18 neonates (0 to 28 days) and 6 infants. (29 to 11 months) of 26,837 live births. The causes of neonatal death include low birth weight, asphyxia, congenital abnormalities, and others.<sup>5</sup>

Factors that cause LBW can come from maternal factors or fetal factors. Maternal factors that play a role include maternal age, maternal weight before pregnancy, maternal weight gain during pregnancy, history of parity, maternal chronic diseases, social and economic conditions, maternal activities, maternal occupation, and exposure to toxic substances. Fetal factors that also influence are sex and multiple pregnancies.<sup>5</sup> For this reason, this study aims to determine the relationship between exposure to cigarette smoke in pregnancy and newborn weight and other factors that also influence.

## Methods

The type of research used in this study is descriptive-analytic with approach cross-sectional. This study aims to determine the relationship between exposure to cigarette smoke in the history of pregnant women and the weight of the newborn. Measurements used questionnaires and data on a baby's weight at birth. The population in this study were postpartum mothers who gave birth to live babies at the IRNA obstetrics of Bhayangkara Hospital, amounting to 100 people per month. To determine the number of samples from the population used the calculation of the formula Slovin and obtained a sample of 50 respondents. The independent variable was exposure to cigarette smoke and the dependent variable was the weight of the newborn and the data were analyzed by using the *chi-square* test. For every mother who gave birth to a baby at Bhayangkara Hospital, researchers immediately asked for informed consent and carried out the data collection process by interviewing and filling out passive smoking questionnaires. The research has received ethical clearance from the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health of Palembang No.89/KEPK/Adm2/IV/2021.

## Results

The distribution of respondents demographic data by age, parity, pregnancy distance, occupation and education can be seen in table 1.

**Table 1.** Distribution of Respondents Characteristics

Variable	Category	Frequency	Percentage
Age	High-risk age	23	46 %
	Low-risk age	27	54 %
Parity	Primipara	27	54 %
	Multipara	23	46 %
Pregnancy Distance	Risky	7	14 %
	No risk	43	86 %
Education	Low Education	13	26 %
	Middle Education	25	50 %
	High Education	22	24%
Profession	Working	28	56 %
	Not Working	22	44 %

The results of this study indicate that the frequency of maternal age at low risk is more (54.0%), with primiparity parity (54.0%), the predominant maternal distance is not at risk (84.0%). On average, mothers have secondary education (50.0%), and mothers work more (56.0%).

**Table 2.** Distribution of Cigarette Smoke Exposure

Variable	Category	Frequency	Percentage
Cigarette Smoke Exposure	Exposed	30	60 %
	Not Exposed	20	40 %
		50	100

Based on table 2 above, most mothers are exposed to cigarette smoke more (60.0%), compared to mothers who are not exposed to cigarette smoke (40.0%).

**Table 3.** Distribution of Newborn Weight

Variable	Category	Frequency	Percentage
Newborn Weight	LBW	15	30 %
	NBW	35	70 %
		50	100

Based on the table.3 above, the majority of mothers who gave birth to LBW were more (70.0%), compared to mothers who gave birth to LBW (30.0%).

**Table 4.** Relationship Between Variables and Newborn Weight

	Variable	Newborn Weight	
		OR ((95% CI)	<i>p-value</i>
<i>Characteristic</i>	Age	5,271 (1,3-20,1)	0.011
	Parity	5,333 (1,2-22,3)	0.016
	Pregnancy Distance	0,345 (0,0-3,1)	0.659
	Education	5,521 (1,124,4)	0,041

Profession	3,266 (0,8-12,)	0,106
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Based on table 4 above, the results of the analysis of the relationship between age and LBW found that 11 (47.8%) mothers were at high risk of giving birth to LBW, while 4 (14.8%) aged mothers who were at low risk of giving birth to LBW. The statistical test shows a p-value of 0.011, so it can be concluded that there is a significant relationship between age and newborn weight. The results of the analysis of the relationship between parity and BBL showed that 12 (44.4%) primiparous mothers gave birth to LBW, while 3 (13.0%) multiparous mothers gave birth to LBW. The statistical test showed a p-value of 0.016, so it can be concluded that there is a significant relationship between parity and newborn weight.

The results of the analysis of the relationship between the distance between pregnancies and LBW were found that 1 (14.3%) pregnancy intervals were at risk of giving birth to LBW, while 14 (32.6%) were at risk of giving birth to LBW mothers. The statistical test showed a p-value of 0.695, which means that there was no significant relationship between gestational interval and newborn weight. The results of the analysis of the relationship between education and LBW found that mothers with low education 7 (53.8%) gave birth to LBW, 6 (24.0%) mothers with secondary education gave birth to LBW, and 2 (16.7%) mothers with higher education gave birth to LBW. The statistical test showed a p-value of 0.041, which means that there is a significant relationship between education and newborn weight. The results of the analysis of the relationship between work and LBW found that 11 (39.3%) working mothers gave birth to LBW, while 4 (18.2%) mothers who did not work gave birth to LBW. The statistical test showed a p-value of 0.106, which means that there is no significant relationship between work and newborn weight.

**Table 5.** Relationship Between Cigarette Smoke Exposure and Newborn Weight

Cigarette Smoke Exposure	Newborn Weight			Percentage	OR	P-value
	LBW	NBW	Total			
<b>Exposed</b>	13	17	30	60 %	6,882	0,012
<b>Not Exposed</b>	2	18	20	40 %		
			50	100%		

Based on table 5.5 above, the results of the analysis of the relationship between exposure to cigarette smoke and BBL found that 13 (43.3%) mothers who were exposed to cigarette smoke gave birth to LBW, while 2 (10.0%) mothers who were not exposed to cigarette smoke gave birth to LBW. The statistical test shows a p-value of 0.012, so it can be concluded that there is a significant relationship between exposure to cigarette smoke and the weight of newborns. From the results of the analysis, the value of OR = 6.882 means that exposure to cigarette smoke has a 6.88 times chance of giving birth to LBW compared to mothers who are not exposed to cigarette smoke.

**Discussion**

The results showed that the youngest respondent was 18 years old while the oldest was 46 years old. The results of the analysis of the relationship between age and LBW showed that 47.8% of mothers aged 21 years and under and 35 years old and above were at risk of giving birth to LBW, while the ideal age of mothers between 21-29 years was 14.8% giving birth to LBW and the remaining 37.4% giving birth normally. The results of the statistical test  $p = 0.011$  showed that there was a significant relationship between age and weight of the newborn with an OR value of 5.271 which means that mothers of high-risk age have a 5.27 times chance of giving birth to low birth weight babies compared to mothers of low-risk age at Bhayangkara Hospital Palembang. Pregnant women aged <21 years are at risk of giving birth to LBW babies because the mother's reproductive

organs are immature. This condition can cause a reduced blood supply to the uterus which can result in a lack of nutritional intake for the developing fetus. Meanwhile, in pregnant women aged > 35 years, the reproductive organs change and are more susceptible to diseases that can pose risks during childbirth. 8 Pregnant women at reproductive age (20-35 years) or high risk (> 35 years) have the same chance as giving birth to LBW babies, but pregnant women at the age of fewer than 20 years have a greater chance of giving birth to babies with low birth weight babies because there is still a lack of knowledge of mothers about pregnancy and childbirth.<sup>8</sup>

The results of this study are not in line with Hasrani, 2017 that maternal age < 20 years (OR = 0.964; 95% CI = 0.361-2.578) proved not to be a risk factor for the incidence of LBW.<sup>10</sup> Another study with similar results was Trihardiani, 2011 also stated that there is no relationship between age and the incidence of LBW with the value of the statistical test results  $p = 0.119$ .<sup>9</sup> Different things happen to pregnant women whose age is not ideal. Based on the data of this study, pregnant women of non-ideal age have a higher risk of LBW than mothers who are at the ideal age of 47.8%. This indicates that almost half of the respondents are at risk of experiencing LBW. This high number is caused by the lack of awareness of pregnant women about their environment. According to the results of this study, 44.4% of primiparous mothers gave birth to LBW. Meanwhile, for multiparous mothers, 13.0% gave birth to LBW. The results of the statistical test showed the results ( $p = 0.016$ ), there was a significant relationship between parity and weight of newborns at Bhayangkara Hospital Palembang in 2021. From the results of the analysis, it was found that the OR = 5.333, meaning that mothers with primiparous parity had a 5.33 times chance of giving birth to LBW compared to mothers with multiparity parity. Research data shows that primiparas have a high risk of LBW. Primipara which is the first experience also affects pregnant women. The readiness of the mother's body for fetal growth and development is influenced by the environment which is often neglected.

The results of this study are in line with Putri's research, 2019 that there is a relationship between parity and the incidence of LBW. The first parity with young age is at risk because the mother is not ready physically, reproductive organs and mentally, while parity >4 and old age physically the mother experiences a decrease in the physical ability for pregnancy and childbirth.<sup>8</sup> Pregnant women with parity more than equal to four times have the risk 5.3 times for LBW delivery compared to parity less than four times.<sup>9</sup> This study shows the results of the statistical test  $p = 0.695$ , which means that there is no significant relationship between the distance of pregnancy and the weight of newborns at Bhayangkara Hospital Palembang in 2021. This study is in line with Hasriyani's research, 2017 that the distance between pregnancies is statistically proven not to be a risk factor. for the incidence of LBW.<sup>10</sup> From the results of the study, it was found that birth spacing did not affect the incidence of LBW. Close birth spacing, < 2 years still requires time for recovery, both for physical health as well as for improving the condition of the uterus as well as having an impact on the health of the fetus and baby's weight at birth.<sup>9</sup> Based on research conducted by Reza, 2014 it is known that the parity variable and pregnancy distance are not related because 78.6% of pregnant women have made regular ANC visits and received services according to service quality standards.<sup>11</sup>

Regarding the education of the respondents, based on the analysis of the relationship between education and BBL, 53.8% of mothers with low education gave birth to LBW. Meanwhile, mothers with secondary education obtained 24.0% giving birth to LBW. For mothers with higher education, 16.7% gave birth to LBW. The results of the statistical test showed the results ( $p = 0.041$ ), which means that there is a significant relationship between education and the weight of newborns at Bhayangkara Hospital Palembang in 2021. These results are in line with Mayasari's research, 2017 which shows that the variables that have a significant effect on the level of 5% significance of the incidence of Low Birth Weight (LBW) in NTT in 2017 are the mother's education level.<sup>12</sup>

Education is one of the factors that influence a person's behavior. Education level is an underlying factor in decision-making. The higher the education of the mother, the more capable she is in making decisions that health services during pregnancy can prevent problems for the mother and fetus as early as possible, including preventing the incidence of LBW. The higher the education level

of the mother, the lower the tendency for the household to have a baby with low birth weight. This can happen because the mother's education is closely related to the mother's mindset. Mothers with higher education will more quickly and easily analyze the information they get, including information about pregnancy so that they can properly manage the intake and care that needs to be done during pregnancy.<sup>13</sup>

This research results showed that from 50 respondents, the results of the analysis of the relationship between work and BBL showed that 39.3% of working mothers gave birth to LBW. Meanwhile, mothers who did not work found 18.2% gave birth to LBW. The statistical test showed the results ( $p = 0.106$ ) which means that there is no significant relationship between work and the weight of newborns at Bhayangkara Hospital Palembang in 2021. Hasil ini sejalan dengan penelitian Trihardianidengan hasil  $p=0,569$  sehingga tidak ada hubungan antara status pekerjaan dengan kejadian BBLR.<sup>9</sup> These data indicate that pregnant women who have a job have a higher risk of LBW than pregnant women who do not work. Activities of pregnant women who work outdoors are more exposed to cigarette smoke. Even though there is no cigarette smoke in the work environment, the whole trip to work may have been polluted by cigarette smoke. Meanwhile, pregnant women who do not work have a lower risk. His daily life spent at home only be indirect protection against exposure to cigarette smoke. Despite having a high statistical difference, several other studies have shown that work does not have a direct influence on the incidence of LBW, so further research needs to be done.

Mothers who work with heavy and tiring work can affect the health of the mother and her pregnancy. Excessive fatigue is at risk of causing developmental disorders in the fetus.<sup>14</sup> Based on the results of research on the mother's occupation variable,  $p$ -value = 0.107, which means that there is a less significant relationship with the incidence of LBW. However, in reality, the work needs to get attention coupled with the role of a housewife. This condition can result in the physical and psychological exhaustion of the mother. Fatigue can also reduce appetite, as a result, nutrition for the fetus can be disrupted which in turn has an impact on growth and development.<sup>15</sup> Regarding exposure to cigarette smoke, the results of statistical tests showed results ( $p = 0.012$ ), it can be concluded that there is a significant relationship between exposure to cigarette smoke and the weight of newborns with a risk of 6.88 times greater for LBW births than mothers who were not exposed. cigarette smoke. cigarette smoke.

This study is in line with the statistical test of Putri, 2018 which showed the results of the  $p$ -value = 0.000, meaning that there was a significant relationship between exposure to cigarette smoke and low birth weight.<sup>8</sup> In line with Damarawati's research in 2015, there is a significant relationship between exposure to cigarette smoke in pregnant women and the birth weight of babies with  $p = 0.030$ , and mothers with LBW babies are 4 times more likely to be exposed to cigarette smoke than mothers with non-LBW babies.<sup>16</sup> The results of research by Rasyid, 2012 showed that exposure to cigarette smoke during pregnancy had a significant effect ( $p = 0.002$ ) on the incidence of LBW with a risk of 4.2 times greater than that of mothers who were not exposed.<sup>7</sup> %.Based on Astuty's research, 2016 it is known that husbands who smoke in the house tend to increase the risk of being exposed to cigarette smoke by pregnant women, especially in the second trimester, the period of perfecting the body's organs so that if exposed to cigarette smoke it can cause disturbances in pregnancy such as 60%.<sup>17</sup>

## Conclusion

Exposure to cigarette smoke affects the weight of newborns at Bhayangkara Hospital, Palembang. Several factors also have an influence on the birth of babies with LBW, namely age, parity, and education. These results are expected to be a concern for all parties connected with pregnant women, be it husbands, families, and health workers to be able to provide support for the achievement of normal birth weight babies. For the next research, it is expected to be able to research external factors such as the work environment and air pollution on the incidence of BBLR both quantitatively and qualitatively.

### Conflict of Interest Declaration

This research is free from conflicts of interest both personal and organizational.

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