Relationship of Complications During Pregnancy and Low Birth Weight in Indonesia: An Ecological Study

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Abstract

Low birth weight is classified as one of the children's health problems in Indonesia. Theauthorsconducted a study to analyze the environmental factors associated with Indonesia's low birth weight. Thestudy conducted an ecological analysis using secondary data from the Ministry of Health of the Republic of Indonesia report in 2018. The study takes all provinces in Indonesia as samples.Besidesthe proportion of low birth weight, there were 3 other variables analyzed, the proportion of hypertension in pregnancy, the proportion of birth canal bleeding, and the proportion of amniotic fluid discharge. Data were analyzed using cross-tabulation.The results show that all three variables tend to affect the proportion of low birth weight and the previous studies. The study concluded that the three independent variables analyzed tend to correlate with the proportion of low birth weight in Indonesia.

Keywords: *low birth weight, hypertension in pregnancy,birth canal bleeding, discharge of amniotic fluid, ecological study*

Background

Low Birth Weight is defined by the World Health Organization (WHO) as weight at birth less than 2500 grams (5.5 lb.). Low birth weightis a significant public health problem globally and is associated with its range of short- and long-term consequences(1).More common in developing than developed country(2).Across the world, neonatal mortality is 20 times more likely for low birth weight babies thannewborn babies (>2500 grams). The incidence of low birth weight is 16% worldwide, and Asia accounts for 75% worldwide(3).

Thepercentage of low birth weight in Indonesia itself based on the 2018 Basic Health Research Report from 2013 to 2018 is 6.2%. Several provinces are above this value, including Central Sulawesi province (8.9%),North Maluku province (8.7%), andGorontalo province(8.6%). Meanwhile, some provinces that are below this value are Jambi province (2.6%), North Sumatera province (4.2%) andWestSumatera province (4.6%)(4).

Low birth weight is associated with a more than 70% infant mortality rate(5). Apart from mortality rate, low birth weight is also closely associatedwith fetal and neonatal morbidity, inhibited growth and cognitive development, and chronic diseases later in life. Birth weight should preferably be measured within the first hour of life for live births before significant postnatal weight loss has occurred. The shorter the gestation, the smaller the baby and the higher the risk of death, morbidity, and disability. It has been shown that the mortality rate can vary 100-fold across the spectrum of birth weight and rises continuously with decreasing weight(2).

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Neonates with low birth weight may be grossly handicapped at birth under their weight—the condition associated with the relative immaturity of vital organs and decreased immunological responsein some cases. Intrauterine growth restriction and preterm birth are often associated with low birth weight. The situation increases neonatal complications, including respiratory distress syndrome (RDS), necrotizing enterocolitis, cerebral palsy, early neonatal, and infant mortality[5].

Premature birth is one of the most common factors causing low birth weight, but many other factors have contributed to the increase of Indonesia's low birth weight. Environmental factors include the mother's education and knowledge, as well as socioeconomic status[6][7][8]. Mother-related factors such as mother's age at pregnancy[9], excessive weight gain during pregnancy[10], hypertension in pregnancy[11], birth canal bleeding[12], discharge of amniotic fluid[13], smoking[14],and alcohol consumption during pregnancy[15], adherence to antenatal care (ANC), the regularity of iron tablets consumption, the distance between pregnancies and history of previous abortion. The baby's factors include multiple pregnancies, congenital diseases, and gender and race[6].

By understanding and knowing the factors related to low birth weight, we hoped that it could minimize the factors that can affect Indonesia's low birth weight. Research studies in Indonesia as a developing country always focus on environmental factors. The study's results are essential for health policymakers to the provincial and national levels to increase attention to Indonesia's low birth weight causes. The result help design appropriate interventions to prevent perinatal problems associated with LBW and help accelerate the Millennium Development Goal 4. Based onthis background, the authors researched the ecological factors related to Indonesia's low birth weight.

Materials and Methods

The authors designed the study using an ecological analysis approach. Ecological studies focus on comparisons between groups, not individuals. The data analyzed is aggregate data at a certain group or level, which in this study is the provincial level. Variables in ecological analysis can be in aggregate measurement, environmental measurement, or global measurement[16].

The study uses secondary data from the 2018 Indonesia Basic Health Survey. The reportwasissued officially by the Indonesian Ministry of Health of the Republic of Indonesia. The reportcan be downloaded on the pagehttps://www.kemkes.go.id/. The unit of analysis in this study is the province. A total of 34 provinces in Indonesia were used in the analysis of this study.

Table 1. Sources of ecological analysis data on factors associated with the low birth weight with disorders/complications experienced by mothers during pregnancy in Indonesia, 2018

Source	Variables	Note
The 2018 Indonesia Basic Health Survey	The Proportionof Low Birth Weight	The proportion that describes babies born weighing less than 2500 grams
	The Proportionof Hypertension in Pregnancy	The proportion of pregnant women whose blood pressure was greater than or equal to 140/90 mmHg when measured
	The Proportion of Birth Canal Bleeding	The proportion of bleeding from the birth canal before the time of delivery
	The Proportion of Discharge of Amniotic Fluid	The proportion of rupture of the amniotic sac before the time of delivery

The dependent variable in this study was the proportion of low birth weight. Apart from the proportion of low birth weight as the dependent variable, there were 3 independent variables analyzed in this study, namely the proportion of hypertension in pregnancy, the proportion of birth canal bleeding, and the proportion of discharge of amniotic fluid.

Data were analysed bivariate by using cross-tabulation to see the trend. The entire analysis process utilizes SPSS 22 software.

Ethical Approval

The study was conducted by utilizing secondary data from published reports. For this reason, ethical clearance is not required in the implementation of this study.

Results and Discussion

Table 2. Descriptive statistic all variables

Statistics	The Proportionof Low Birth Weight	The Proportion of Hypertension in Pregnancy	The Proportion of Birth Canal Bleeding	The Proportion of Discharge of Amniotic Fluid
N	34	34	34	34
Mean	6.2441	3.1324	2.3235	2.3912
Median	6.1000	3.0500	2.2000	2.4000
Mode	5.80a	2.90	2.10a	1.60
Std. Deviation	1.32692	0.99688	0.74389	1.14558
Variance	1.761	0.994	0.553	1.312
Range	6.30	4.50	3.40	4.90
Minimum	2.60	0.70	1.00	0.40
Maximum	8.90	5.20	4.40	5.30

Source: The 2018 Indonesia Basic Health Survey

Table 2 shows the descriptive statistics of the four variables analyzed in this study. The highest proportion of low birth weight was Central Sulawesi province (8.9%), while the lowest proportion was Jambi province (2.6%). Another variable that has the lowest variation in values is the proportion of birth canal bleeding.

Table 3. Cross-tabulation of the proportion of low birth weight and the proportion of hypertension in pregnancy in 2018

The Proportion of Hypertension in Pregnancy	The Proportion of Low Birth Weight					
	Low (2.60-5.80)		Middle (5.81-6.53)		High (6.54-8.90)	
	N	%	N	%	N	%
Low(0.70-2.70)	9	75.0	2	18.2	1	35.3
Middle (88.50-93.19)	2	16.7	5	45.5	4	32.4
High(2.71-3.63)	1	8.3	4	36.4	6	32.4
Total	12	100	11	100	11	100

Source: The 2018 Indonesia Basic Health Survey

Table3 shows the cross-tabulation results of the proportion of low birth weight and hypertension proportion in pregnancy. Table 3 shows the proportion of hypertension in pregnancy in the low category has a high percentage (75%) of the proportion of low birth weightin the low category.The proportion of hypertension in pregnancy in the low category has a smaller percentage (9.1%) of the proportionof low birth weight in the high category.

Table 4 shows the cross-tabulation results of the proportion of low birth weight and the proportion of birth canal bleeding. In table 4, based on the proportion of birth canal bleeding in the high category has a high percentage (54.5%) of the proportion of low birth weight for a high category. The percentage of the proportion of birth canal bleeding in the low category has a lower percentage (27.3%) than the proportion of low birth weight for the high category (32.4%).

Table4. Cross-tabulation of the proportion of low birth weight and the proportion of birth canal bleeding in 2018

The Proportion of Birth Canal Bleeding	The Proportion of Low Birth Weight					
	Low (2.60-5.80)		Middle (5.81-6.53)		High (6.54-8.90)	
	N	%	N	%	N	%
Low(1.00-2.06)	3	25.0	5	45.5	3	27.3
Middle(2.07-2.50)	7	58.3	4	36.4	2	18.2
High(2.51-4.40)	2	16.7	2	18.2	6	29.4
Total	12	100	11	100	11	100

Source: The 2018 Indonesia Basic Health Survey

Table 5 shows the cross-tabulation results of the proportion of low birth weight and the proportion of discharge of amniotic fluid. Table 5 indicates based on the proportion of discharge of amniotic fluid in the low category has a high percentage (50.0%) of the proportion of low birth weight in the low category. The proportion of amniotic fluid discharge in the low category has a low percentage (9.1%) of the proportion of low birth weight for the high category.

Table5. Cross-tabulation of the proportion of low birth weight and the proportion of discharge of amniotic fluid in 2018

The Proportion of Discharge of Amniotic Fluid	The Proportion of Low Birth Weight					
	Low (2.60-5.80)		Middle (5.81-6.53)		High (6.54-8.90)	
	N	%	N	%	N	%
Low(0.40-1.60)	6	50.0	5	45.5	1	9.1
Middle(1.61-2.73)	3	25.0	2	18.2	6	54.5
High(2.74-5.30)	3	25.0	4	36.4	4	36.4
Total	12	100	11	100	11	100

Source: The 2018 Indonesia Basic Health Survey

In Table 2, low birth weight as the dependent variable has a range of 6.30, with a minimum value of 2.60 and amaximum valueof 8.90. The independent variable with the highest range is the proportion of amniotic fluid discharge, namely 4.90. The proportion of amniotic fluid dischargehasa minimum value of 0.40 and a maximum value of 5.30.

The results of the analysis shown in table 3 are in line with several previous studies which have informed the effect of hypertension in pregnancy and low birth weight[17]. Hypertension in pregnancy increases the incidence of low birth weight by 3.89 times compared to pregnant women whose blood pressure is normal or normotensive. Even though prevention of hypertension in pregnancies is difficult, early detection of women at high risk of developing hypertension in pregnancy can be accompanied by intensive antenatal care and management could prevent this burden oflow birth weight[18].

Based on the analysis of table 4, it is in line with several previous studies which showed that there was an effect of birth canal bleeding with low birth weight. Birth canal bleeding causes an accelerated termination of the baby, so it is one of the common causes of low birth weight. Therefore, all pregnant women who experience birth canal bleeding heavier than spots are recommended to stay in the hospital until the bleeding has stopped. Such pregnancies are encouraged to receive further care to monitor the subsequent fetus growth[12][19].

Similar to the results of the analysis of the previous tables, the analysis results in table 5 are also in line with several previous studies that showed an effect between the discharge of amniotic fluid and low birth weight. One of them is in the risk factor study of low birth weight carried out in Qom, Iran, premature discharge of amniotic fluids was the most frequent risk factor for low birth weight[5][13].Low birth weight babies have a higher risk of developing Respiratory Distress Syndrome, sepsis, tachypnea, and other neonatal complications[20].

Conclusion

From the research above, the study concluded that the three variables analyzed tend to have a relationship with the proportion of low birth weight in Indonesia. The three variables are the proportion of hypertension in pregnancy, the proportion of birth canal bleeding, and

the proportion ofamniotic fluid discharge.

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Ethical Clearance: The study conducted using secondary data from published reports. Ethical clearance is therefore not required in the conduct of this study.

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