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THE RELATIONSHIP BETWEEN LOW BIRTH WEIGHT WITH PNEUMONIA TODDLERS IN WEST JAVA

Hubungan Bayi Berat Lahir Rendah dengan Pneumonia Pada Balita di Provinsi Jawa Barat

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ABSTRACT

Background: West Java Province is the region with the highest number of pneumonia toddlers and mortality in toddlers due to third highest number of mortality in Indonesia at 2017. One of the risk factors for pneumonia toddlers was low birth weight (LBW). **Purpose:** This study has purpose to analyze the correlation between low birth weight with pneumonia toddlers in West Java Province at 2017. **Methods:** Type of this study was an observational type study with correlation study design. This study used secondary data from publication Health Profile of West Java Province in 2017. The population was all toddlers who suffered pneumonia from 18 districts and 9 cities in West Java Province. The independent variable was the coverage of low birth weight babies, while the dependent variable was the coverage of the discovery of pneumonia in toddlers. The study used data analysis through Durbin Watson test and Pearson correlation test. **Results:** This study showed there was a significant correlation between low birth weight with pneumonia toddlers with p value= 0,01 (p < 0,05). Strength of correlation showed there were moderate relationship and positive direction (pearson correlation = 0,54). so that it can be interpreted that the higher the events of low birth weight babies, then the higher the events of pneumonia in toddlers, and vice versa. **Conclusion:** There was a significant correlation between low birth weight with pneumonia toddlers in West Java Province in 2017.

ABSTRAK

Latar Belakang: *Provinsi Jawa Barat merupakan wilayah dengan kejadian pneumonia balita tertinggi dan angka kematian peringkat ketiga tertinggi di Indonesia tahun 2017. Faktor risiko terjadinya pneumonia balita salah satunya adalah bayi berat lahir rendah.* ***Tujuan:*** *Penelitian memiliki tujuan untuk menganalisis hubungan antara bayi berat lahir rendah dengan kejadian pneumonia balita di Provinsi Jawa Barat tahun 2017.* ***Metode:*** *Jenis penelitian ini yaitu penelitian observasional dengan desain studi korelasi. Penelitian menggunakan data sekunder berdasarkan publikasi Profil Kesehatan*

Provinsi Jawa Barat tahun 2017. Populasi penelitian yaitu semua balita penderita pneumonia dari 18 kabupaten dan 9 kota di Provinsi Jawa Barat. Variabel independen adalah cakupan bayi berat lahir rendah, sedangkan variabel dependen adalah cakupan penemuan pneumonia pada balita. Penelitian menggunakan analisis data dengan uji durbin watson dan uji korelasi pearson. ***Hasil:*** *Penelitian menunjukkan bahwa terdapat hubungan secara signifikan antara bayi berat lahir rendah dengan pneumonia pada balita dengan nilai p = 0,01 (p < 0,05). Kuat korelasi menunjukkan bahwa kuat hubungan sedang dan arah hubungan positif (pearson correlation = 0,54), sehingga dapat diartikan bahwa semakin tinggi kejadian bayi berat lahir rendah maka semakin tinggi pula kejadian pneumonia pada balita, begitu pula sebaliknya.* ***Kesimpulan:*** *Terdapat hubungan antara bayi berat lahir rendah dengan kejadian pneumonia pada balita di Provinsi Jawa Barat tahun 2017.*

INTRODUCTION

One of the main causes of toddler mortality worldwide is pneumonia. Some of the main complaints of people with pneumonia include shortness of breath, fever, cyanosis, and seizures (Triana, 2017). Pneumonia incidence in the world reaches 16% of all deaths suffered by children under five years of age or toddlers with deaths of 920,136 under-fives in 2015. Estimates of deaths from pneumonia are more than 2,500 under-five deaths per day or every minute there are 2 children under the age of 2015 (UNICEF, 2016).

The Global Action Plan for the Prevention and Control of Pneumonia (GAPP) is a global action plan with the aim of preventing and controlling pneumonia and has been developed since 2007 by WHO and UNICEF. The design was carried out as a guide for raising awareness of pneumonia and increasing useful interventions. Death caused by pneumonia can be reduced by intervening effectively for children at risk. The discovery of pneumonia cases at the beginning of a toddler by health workers is expected to be able to deal with pneumonia cases more precisely (Ceria, 2016).

An increase in the estimated percentage of pneumonia from 10% to 35.50% causes the coverage of pneumonia discovery to increase from 2015 to 2017. The increase in completeness of reporting also led to an increase in the scope of pneumonia discovery in Indonesia. Determination of the scope of pneumonia discovery in infants was calculated based on the number of cases of children with pneumonia found and handled divided by the estimated cases of pneumonia in infants, with a target of 80%. National coverage of pneumonia discovery still does not meet the target of 51.19% and only two provinces have met the target, namely DKI Jakarta and North Kalimantan. The mortality rate caused by pneumonia in toddlers has increased in 2017 to 0.34% (Health Office of West Java Province, 2018).

West Java Province is the region with the highest incidence of pneumonia in infants and under-five mortality. This is because pneumonia is ranked the third highest based on all provinces in Indonesia in 2017. The coverage of pneumonia discovery in children under five in West Java Province is ranked fifth highest but has not met the target, only 67.38%. The coverage of pneumonia discovery in toddlers is influenced by the estimated number of sufferers in infants (Health Office of West Java Province, 2018).

Health profile data of West Java Province show that the number of pneumonia cases in toddlers in West Java Province in 2017 was 125,450 toddlers. Under-five mortality caused by pneumonia in West Java amounted to 202 children. The high number of cases and deaths from pneumonia in West Java Province can be caused by several risk factors (Health Office of West Java Province, 2018). Risk factors that affect pneumonia in infants include low birth weight (LBW), history of illness, exclusive breastfeeding, smoking habits and home ventilation (Triana, 2017).

Low birth weight (LBW) are babies with a birth weight of less than 2500 grams. Problems that often occur in toddlers with a history of LBW

are disorders of the respiratory system, such as pneumonia in infants. Babies with LBW have organs and immunity formation that is not perfect, so that the baby is more easily infected and suffering from several infectious diseases and other diseases, especially pneumonia (Sary, 2017). Previous research by Ceria (2016) stated that there was a significant relationship between LBW and the incidence of pneumonia in infants with a risk of 8.90 times greater. This study aims to analyze the relationship between low birth weight (LBW) and pneumonia in toddlers in West Java in 2017.

METHODS

This research is a research with analytic observational type using correlation study design. The unit of analysis in this study is aggregate data from each district / city in West Java Province. This study uses population units, namely all districts / cities in West Java Province, covering 18 districts and 9 cities. This study uses total sampling based on secondary data according to the publication in the Health Profile of West Java Province in 2017. The variables used in this study include the dependent variable, the scope of finding pneumonia in infants in percentages in each district / city in West Java Province in 2017 and independent variables namely the coverage of low birth weight (LBW) in the percentage of each district / city in West Java Province in 2017.

Statistical analysis using the autocorrelation test (*Durbin watson*) to determine the correlation between regions. This study also uses the *Kolmogorov-smirnov* test to determine the normality of data. The *Kolmogorov-smirnov* test results are normally distributed if the results of the significance value $p > 0.05$ are then carried out *Pearson correlation* test. *Pearson correlation* test results can show the strength of the relationship and the direction of the relationship between the dependent variable and the independent variable.

RESULTS

Overview of Pneumonia in Toddlers in West Java Province

Pneumonia in toddlers can occur in urban and rural areas. The number of pneumonia cases in toddlers in West Java Province in 2017 reached 125,450 toddlers, with the highest number of pneumonia occurrences as many as 14,087 cases in Bogor Regency and the lowest 0 cases in Kabupaten Bandung (Table 1). This means that no pneumonia in toddlers in the Bandung regency was found.

Data on the Health Profile of West Java Province in 2017 shows that there are 5 (five) districts / cities with the highest incidence of under-five pneumonia in 2017, namely Bogor Regency, Cirebon Regency, Bandung City, Indramayu Regency, and Garut Regency. Five districts / cities with the highest coverage of pneumonia discoveries for toddlers in 2017 are Cirebon City, Cirebon Regency, Indramayu Regency, Ciamis Regency, and Subang Regency (Figure 1; Figure 2).

The order of districts / cities based on the number of occurrences of under-five pneumonia is different from the coverage of finding underfive pneumonia. The difference in the sequence is because the scope of pneumonia discovery in toddlers is influenced by the number of estimates of patients and the number of patients found and treated. The more number of sufferers found and handled from the estimated number of patients, the greater the scope of the discovery of pneumonia in toddlers. The national coverage target of pneumonia pneumonia discovery is 80%. Figure 2 shows that Bandung Regency is the region with the lowest coverage of finding pneumonia pneumonia with a value of 0% or zero for pneumonia pneumonia patients so that it can be interpreted that pneumonia in toddlers in Bandung Regency is not found and treated. The city of Cirebon is an area with the highest coverage of pneumonia discovery among children under five and is the only region that has met the national coverage target of pneumonia discovery in toddlers in West Java Province (95.70%). This shows that almost all sufferers of the estimated number of pneumonia cases in toddlers in the city of Cirebon have been found and handled (Figure 1; Figure 2).

The coverage of pneumonia discovery in children under five in West Java province was 67.38%. Districts / cities that have coverage of pneumonia discoveries in children under five are covered by the discovery of pneumonia under five in West Java Province by four districts / cities, namely Ciamis Regency, Indramayu Regency, Cirebon Regency, and Cirebon City. This shows that 14.81% of the area in West Java Province has coverage of patients who are found and handled more than the coverage in West Java.

The incidence of pneumonia under five in West Java Province is greater in male infants than in females. The number of pneumonia cases in children under five was 60,315 toddlers (52%),

while women numbered 55,677 toddlers (48%). This shows that male toddlers are more prone to pneumonia (Table 1).

Table 1
Coverage of Pneumonia in Toddlers in West Java Province in 2017

Variable	Pneumonia cases (toddlers)	Pneumonia cases (%)
Number of events		
Lowest	0	0,00
Highest	14.087	95,70
Gender		
Male	60.315	27,09
Female	55.677	26,11
Total	125.450	28,78

Relationship between Low Birth Weight (LBW) with Pneumonia in Toddlers in West Java Province

The relationship between low birth weight (LBW) with pneumonia under five in West Java Province in 2017 can be seen based on the results of the *Durbin watson* autocorrelation test and Pearson correlation. The *Durbin watson* autocorrelation test can be used to determine the correlation between regions by looking at the results of dU and (4-dU). The results of the *Durbin wats*on test showed that there was no autocorrelation with a value of 1.47 <2.52 <2.53 (dU <d <4-dU). This shows that each district / city does not have the same value or the incidence of low birth weight (LBW) and pneumonia in each district / city in West Java Province does not correlate with each other.

The strength and direction of the relationship through *Pearson correla*tion test. The assumption for conducting *Pearson correlation* tests in the study is that errors are normally distributed. The normality test uses the *Kolmogorov-smirnov* test to find out that the error has a normal distribution. The results of the normality test show that the data are normally distributed with a p value = 0.20; p> 0.05 (Table 2).

Table 2
Normality Test for Low Birth Weight (LBW)

Category	*Standardized Residual*
LBW	
Asymp. Sig. (2-*tailed*)	0.20
Kolmogorov-Smirnov Z	0.92
N	27.00

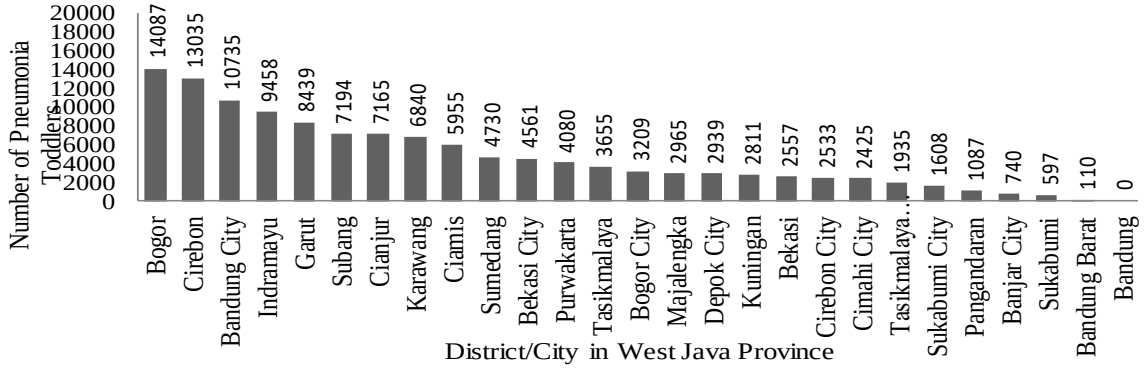

Figure 1. Number of Pneumonia Toddlers in West Java Province in 2017

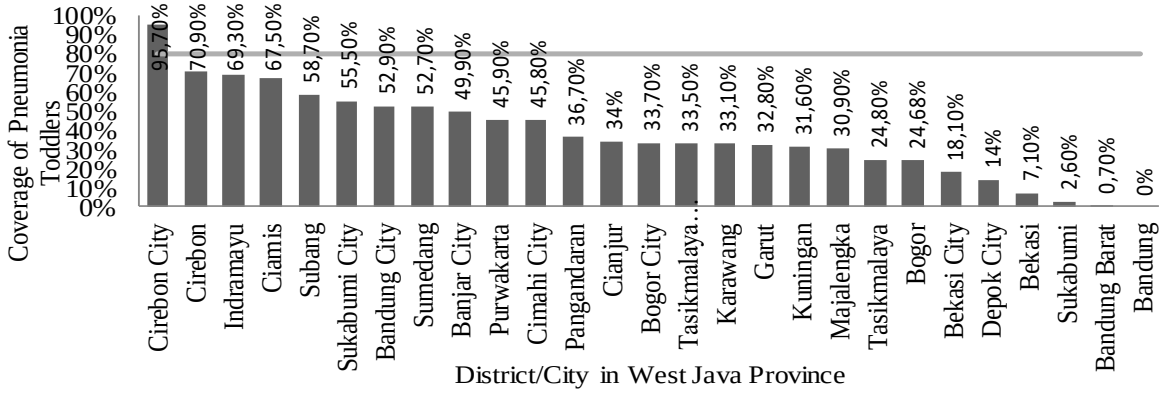

Figure 2. Coverage and Target Discovery of Pneumonia Toddlers in West Java Province in 2017

Pearson correlation test results between low birth weight (LBW) and toddlers pneumonia in each district / city in West Java Province in 2017 showed a significance value of p = 0.01 (p <α), meaning that there was a relationship between low birth weight (LBW) with the incidence of pneumonia under five in West Java Province in 2017. The results of the *Pearson correlation* test also showed that the strength of the correlation was moderate and the direction of linear correlation was positive (*Pearson correlation* = 0.54) (Table 3).

The direction of the relationship between low birth weight (LBW) and pneumonia toddlers in West Java Province in 2017 shows a diagonal shaped line up or has a linear relationship and the direction of correlation is positive, so that means that the higher the low birth weight baby then pneumonia toddlers will also increase, or vice versa (Figure 3).

Table 3
Pearson Correlation Test Results for Low Birth Weight (LBW) with Pneumonia on Toddlers in West Java Province at 2017

Pneumonia	Low Birth Weight (LBW)
Asymp. Sig. (*2-tailed*)	0.01
Pearson correlation	0.54
N	27.00

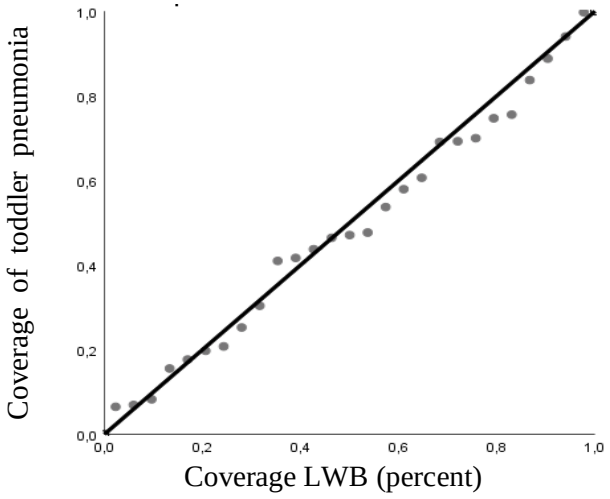

Figure 3. Direction of Relationship between Low Birth Weight (LBW) and Toddler Pneumonia in West Java at 2017.

DISCUSSION

Overview of Pneumonia in Toddlers in West Java Province

One of the main causes of death in infants is pneumonia. The high rate of morbidity and mortality due to pneumonia under five can be reduced by determining the target of the success of the discovery and management in patients with pneumonia. The discovery of cases of pneumonia early in infants by health workers is expected to increase the number of cases that receive appropriate management (Ceria, 2016).

The national coverage target of pneumonia discovery in toddlers under five is 80%. Estimated coverage of the incidence of pneumonia in children under five in West Java province is 4.62%. This causes differences in the order of districts / cities based on the number of occurrences and coverage of the discovery of pneumonia in toddlers. The region with the highest incidence of pneumonia in infants is in West Java Province, namely Bogor Regency, while the region with the highest coverage of pneumonia discovery in infants is in West Java Province, namely Cirebon City. Toddlers living in rural areas have a greater risk of pneumonia compared to toddlers in urban area (Anwar & Dharmayanti, 2014).

Bogor Regency is the region with the highest incidence of pneumonia in infants in West Java Province in 2017, but if viewed from the scope of the discovery of pneumonia in infants, Bogor Regency occupies the lowest seventh position. This is caused by the number of toddlers in Bogor Regency, the most from other districts / cities in West Java Province, which are as many as 570,710 toddlers, thus affecting the estimated number of pneumonia sufferers in infants as many as 57,071 children under five (Health Office of West Java Province, 2018).

Cirebon city is the region that has the highest coverage of pneumonia pneumonia discoveries in West Java Province in 2017. This is influenced by the number of toddlers who are less than other districts / cities, thus affecting the estimated number of pneumonia sufferers in children under five. The number of toddlers in Cirebon City is smaller but the population density is quite high. The high level of population density in an area can lead to higher interactions between humans and the environment, thus affecting the quality of the environment, for example, air, water and sanitation are getting worse. This is in line with research by Aulina, Rahardjo, & Nurjazuli (2017) in Bergas District, which showed that the majority of

pneumonia events occurred in areas with a densely populated population density (53,80%).

The coverage of pneumonia discovery in toddler is influenced by several factors from health workers. Several factors related to the coverage of the discovery of under-five pneumonia include health worker characteristics such as age, length of work, and respiratory tract infection control activities in the form of increasing human resource capacity of health workers (Aryani, 2018).

The results showed that the incidence of toddler pneumonia in male toddlers was greater than that of women. This research is in line with previous research by Garina, Putri, & Yuniarti (2016) which stated that the incidence of pneumonia in children under five was dominated by male toddlers as much as 59%. The incidence of pneumonia is more common in male than female. Male toddlers have a 1.35 times greater risk of suffering from pneumonia than female toddlers (Frini, Rahman, & Herman, 2018). This is caused by male toddlers being more easily infected with germs because they play with the environment more often, especially in dirty environments than female toddlers who tend to play indoors (Sumiyati, 2015).

Other causes of male have a greater risk of pneumonia than female, namely male have body cells that develop more slowly than cells in the female body. Female who have more X chromosomes have more *MicroRNA* in their bodies. *MicroRNA* contained in the X chromosome has a function to prevent cancer and maintain endurance. The *MicroRNA* function shows that male have an immune or immune system that is more susceptible to certain types of diseases than female (Sumiyati, 2015).

The Factors that indirectly influence the incidence of under-five pneumonia are characteristics of a toddler's mother. Mothers of children under five with a low level of education have a risk of 4.27 times greater having children under five who have pneumonia than mothers of children under five with a higher education level. The low level of maternal education has resulted in poor care and care for toddlers. This results in toddlers being easily exposed to germs when playing outside the home (Susanti & Rasyid, 2015).

Relationship between Low Birth Weight (LBW) and Pneumonia on Toddlers in West Java Province

Pneumonia in toddlers is an infectious disease that is contagious and is influenced by a history of conditions at birth. Pearson correlation test results showed that there was a relationship between LBW and pneumonia in toddlers. The strength of the correlation is moderate and the direction of positive linear correlation, meaning that the higher the incidence of low birth weight (LBW), the higher the incidence of pneumonia in toddlers in West Java Province in 2017.

This research is in line with previous research by Ceria (2016) which states that there is a correlation between low birth weight (LBW) and toddler pneumonia ($p = 0.04$; OR = 8.90; 95% CI = 0.96 - 82.96) This shows that toddlers with a history of LBW have a risk of 8.90 times greater suffering from pneumonia when under five than children under five with normal birth weight. Research by Aldriana (2015) also states that there is a relationship between LBW and toddlers pneumonia. Babies who have a history of low birth weight have a greater risk of morbidity than babies born with normal birth weight (Sary, 2017).

Babies with low birth weight have a higher risk of death compared to babies born with normal weight. LBW has an 8 times greater risk of perinatal death than babies born under normal birth weight conditions. Problems caused in toddlers with a history of low birth weight are caused by unstable body conditions (Kusparlina, 2016). The first month of birth greatly affects the growth and development of the baby. In the incidence of LBW there is an inadequate formation of an active immune agent, so that it is easily infected with diseases, especially pneumonia and other respiratory tract infections. Babies born with low birth weight have imperfect organs including the respiratory tract (Sary, 2017). The results of the study were not in line with the research of Garina, Putri, & Yuniarti (2016) which showed that there was no association between LBW and toddlers pneumonia. This is because several other conditions can also affect the incidence of pneumonia in toddlers, such as the risk factors studied in the study. The incidence of toddler pneumonia is also influenced by vitamin A supplementation. Vitamin A supplementation given to children aged 6-59 months is included in a government program that has a function to increase immunity or prevent the respiratory tract from various infections including pneumonia (Linda, 2018). Complete immunization status can work optimally as a body resistance in protecting the body against various types of diseases including pneumonia (Kahfi, Kandou, & Rattu, 2017).

Babies with low birth weight are at risk of experiencing disruption in the growth process than babies with normal birth weight. Cunningham (2014) argues that the incidence of LBW is caused by several risk factors, one of which is affected by health problems in the mother during pregnancy, causing delays in fetal growth. Hb levels of pregnant mother have a relationship with the incidence of LBW. Pregnant mother with Hb levels <11 gr% have a 2.29 times greater risk of LBW than pregnant mother with Hb levels ≥11 gr% (Rohani, Fauzie, & Marsiana, 2014). Babies with a history of low birth weight are at risk of dying during infancy, children, and adolescents through several inherited disorders. LBW events can be reduced through maternal actions, one of which is not smoking during pregnancy, so that infant mortality can also be reduced (Watkins, Kotecha, & Kotecha, 2016).

LBW events are also influenced by the socio-economic level and education of the mother. Pregnant mother who have a low socioeconomic level have a risk of 4.93 times greater for giving birth to babies with low birth weight than pregnant mother who have a high socioeconomic level. Pregnant mother who have a lower level of education have a risk of 19.19 times greater for giving birth to babies with low birth weight than pregnant mother who have a higher level of education. The higher the level of education of the mother, can lead to more open thinking to get and understand every new information that is useful for themselves and their fetus, so that the insights obtained will be even wider (Rini & Trisna, 2015).

The National Medium Term Development Plan for 2015 - 2019 has the aim of increasing public health status. The indicator that will be achieved to realize an increase in community health status is by reducing the number of cases of low birth weight (LBW) from 2013 by 10.20% with a target in 2019 of 8%. LBW coverage in West Java Province in 2017 was 2.40%. This shows that the discovery of LBW in West Java Province in 2017 has met the indicators of the National Medium Term Development Plan (Health Office of West Java Province, 2018).

Prevention of LBW births is very necessary for pregnant women by avoiding the risk of LBW birth. Some conditions of pregnant mother who are at risk of causing LBW events include age at risk, risky at upper arm circumference, and exposure to cigarette smoke during pregnancy. Some of these conditions if they occur during pregnancy, then the possibility of giving birth to a baby with a low birth weight of 80%. Pregnant women need more iron, so it is necessary to take more Fe supplements than before becoming pregnant. Fe supplements can increase the level of hemoglobin in the blood which functions to bind and distribute oxygen to the cells of the body tissues of the mother and fetus. Pregnant women who took Fe <90 tablets during pregnancy had 8.25 times greater risk of having LBW birth than pregnant mother who took Fe supplements> 90 tablets (Iriyani, 2016).

Initial management of low birth weight (LBW) has been developed in several ways including adequate nutrition for toddlers, maintaining optimal baby temperature, and prevention of infectious diseases (including pneumonia). Immediate post-natal high protein nutritional needs are the most needed nutrients to optimize brain growth and development in LBW infants. These nutrients are obtained from Total Parental Nutrition (TPN) and breast milk (Septira & Anggraini, 2016). Exclusive breastfeeding can reduce the risk of infection, noctrizing enterocolitis, and allergies and has a positive effect on cognitive development. Health workers can socialize to mothers of babies, especially those who experience LBW, about the importance of exclusive breastfeeding. Prevention of LBW events is also preferred in order to reduce infant mortality and reduce the risk of developing disorders (Bonet et al., 2015).

CONCLUSION

There is a relationship between low birth weight (LBW) with the incidence of pneumonia in toddlers. The results of the strength of the medium correlation and the direction of the positive correlation, means that the higher incidence of low birth weight (LBW) can make the higher incidence of pneumonia in toddlers.

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