
THE EFFECT OF EXCLUSIVE BREASTFEEDING ON TODDLERS' PNEUMONIA CASES IN SURABAYA**Sasi Riyadinil Ula¹, Retno Adriyani²**¹Department of Environmental Health, Public Health Faculty, Universitas Airlangga, sasiriyadinilula@gmail.com²Department of Environmental Health, Public Health Faculty, Universitas Airlangga, retnoadriyani@fkm.unair.ac.id

Correspondence Address: Department of Environmental Health, Public Health Faculty, Universitas Airlangga, Dr. Ir. H. Soekarno Street, Mulyorejo, Surabaya City, East Java, Postal Code 60115

ARTICLE INFO*Article History:*Received December, 12th, 2018Revised form December, 19th, 2018Accepted January, 15th, 2019Published online April, 24th, 2019

Keywords:exclusive breastfeeding;
toddlers' characteristics;
pneumonia;
toddlers

ABSTRACT

Background: Pneumonia is one of the most common causes of illness in infants. Exclusive breastfeeding is one of the many factors associated with pneumonia cases in toddlers. The discovery of pneumonia cases in toddlers in East Java increased from 2013 to 2016, the highest case finding in Surabaya precisely at the Sememi health service center (PUSKESMAS) about 281 toddlers. **Purpose:** To analyze the effect of exclusive breastfeeding and other factors on pneumonia cases in infants in PUSKESMAS Sememi, Benowo Subdistrict, Surabaya. **Methods:** This study is an observational analytic study with a case-control approach. The control sample and the cases are consisting of 35 samples from the total population counting 61 toddlers. In this study, the sampling technique was a simple random sampling. The study was conducted in Sememi health service center, Benowo Subdistrict, Surabaya from February to November 2018. The variables studied included the characteristics of children (age and gender) and other factors namely exclusive breastfeeding, nutritional status, birth weight, immunization status, administration of vitamin A and history of asthma. Data were analyzed descriptively and analytically using binary logistic regression statistical tests. **Results:** There was a significant influence between exclusive breastfeeding ($p= 0.00$; $OR= 4.18$; $95\% CI= 1.54<OR<11.34$) for pneumonia cases in toddlers. Other factors including low birth weight, nutritional status, immunization status, administration of vitamin A, asthma history does not affect pneumonia cases in toddlers. **Conclusion:** Exclusive breastfeeding can prevent pneumonia cases in toddlers.

©2018 Jurnal Berkala Epidemiologi. Penerbit Universitas Airlangga.
Jurnal ini dapat diakses secara terbuka dan memiliki lisensi CC-BY-SA
(<https://creativecommons.org/licenses/by-sa/4.0/>)

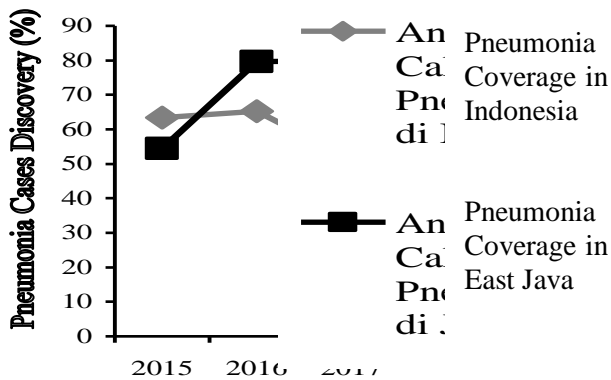
INTRODUCTION

Pneumonia is the most common cause of morbidity that occurs in toddlers. Pneumonia is reported to cause death as much as 16% of the total deaths of toddlers. This disease causes 920,136 toddlers or more than 2,500 per day or it

is estimated that there are two toddlers who die every minute in 2015 (WHO, 2016). According to the 2013 Basic Health Research, the period prevalence and pneumonia prevalences are about 1.80% and 4.50%, while the ISPA Sub-directorate Routine Report demonstrated that the pneumonia incidence reaches 20.54 (Kemenkes RI, 2017).

In 2014 the coverage rate for the discovery of pneumonia among the toddlers in Indonesia did not experience significant growth, ranging from 20% - 30%. The reported pneumonia coverage in Indonesia and East Java from 2015 to 2017 can be seen in Figure 1. The death rate from pneumonia in toddlers in 2016 was 0.22% while in 2017 it was 0.34%. In 2017 the death rate from pneumonia in the age group 1-4 years was 0.23% while in the infant group it is 0.56% (Kemenkes RI, 2018).

Pneumonia attacks a wide range of vulnerable populations such as children under two years and elderly with age more than 65 years, and people who suffer from malnutrition and immune system disorders. One of the best ways to optimize and control the pneumonia incidence is by performing a simultaneous report toward the toddlers who suffer from pneumonia (Kemenkes RI, 2017).



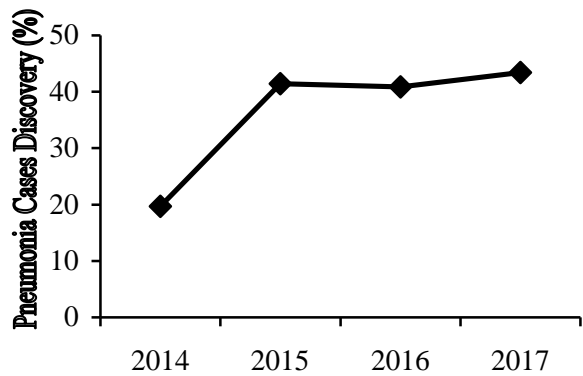
Source : Kemenkes RI, 2018

Figure 1. Pneumonia Coverage at Toddlers in Indonesia and East Java

Data from the Indonesian Health Profile in 2017 states that the coverage of pediatric pneumonia in East Java Province reached 52.67% of 80% as the minimum target. This finding indicates that East Java Province failed to reach the target. About 92,975 or 52.67% of toddlers in East Java Province were suffered from pneumonia. Reports of this number include 567 toddlers died because of pneumonia. Case fatality rate of pediatric pneumonia reached 0.82% for children under one year, 0.51% for children aged 1-4 years, and 0.61% for children aged 0-4 years (Kemenkes RI, 2017).

The increase of pneumonia cases in East Java, supported by the discovery of cases of pneumonia in Surabaya in 2014 to 2017 that can be seen in Figure 2. That figure showed that in Surabaya, there was an increase of pneumonia at 2015 and 2017.

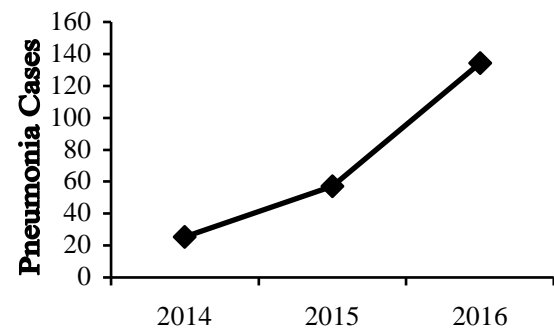
Pediatric pneumonia cases in Surabaya were counting about 4,127 incidences from 38 districts or cities (Kemenkes RI, 2017). Based on the data from Ministry of Health, Surabaya City, the highest pediatric pneumonia in 2016 was found in Benowo subdistrict, especially in Sememi health service center counting for 281 cases (Dinkes Kota Surabaya, 2017). From the same source, the data showed the increasing trends of pediatric pneumonia case from 2014 to 2016. Therefore, the deep study in Sememi health service center area is necessary (Figure 3).



Source : Dinkes Kota Surabaya, 2017

Figure 2. Pneumonia Cases at Toddler in Surabaya

Many factors can promote pediatric pneumonia in toddlers. One of them is mostly determined by the intrinsic conditions. Exclusive breastfeeding is one of the nutrition sources for the infant. The immune system in toddlers is determined by nutrition intake to them. Exclusive breastfeeding plays an important role in maintaining the immune system in toddler because the content in breast milk can protect the toddlers' body from pneumonia or various diseases that cause illness and death (Lamberti et al., 2013).



Source : Dinkes Kota Surabaya, 2017

Figure 3. Pneumonia Cases at Toddler in Sememi Health Service Center

This study aims to analyze the effect of exclusive breastfeeding and other factors toward the pediatric pneumonia incidences in Sememi health service center, Benowo Subdistrict, Surabaya

METHODS

This study is an observational analytic study with a case-control approach. This study was conducted in Sememi health service center, Benowo Subdistrict, Surabaya from February to November 2018.

The population of this study is 281 toddlers who suffered from pneumonia (aged 12-59 months) in Sememi health service center, Benowo Subdistrict, Surabaya from May to July 2018. The control population in this study were all healthy toddlers without pneumonia (aged 12-59 months) symptom in Sememi health service center, Benowo Subdistrict, Surabaya. The control population is reached the 4420 toddlers. The control group was determined by random sampling near to the house of toddlers who suffered from pneumonia. The determination of the sample size is based on the hypothesis test for two population proportions so that the value of 35 in each group is obtained with a ratio of 1:1, therefore the sample size used in this study is 70 toddlers.

The sampling technique in this study used the simple random sampling method. The data collection instrument in this study is the questionnaire. Interviews were conducted by researchers with questionnaire guidelines to parents or guardians of respondents. Data analysis techniques through descriptive and analytical analysis using a binary logistic regression statistical test.

The variables studied included the characteristics of toddlers (age and gender) and other factors, namely exclusive breastfeeding, nutritional status, birth weight, immunization status, administration of vitamin A, and the clinical history of asthma. In this study, the toddlers were grouped based on the age, namely 12-34 months old, 25-36 months old, 37-48 months old, and 49-60 months old. Accordingly, infants with birth weight less than 2,500 g are considered as the low birth weight. Measurements of nutritional status are classified into four, namely, malnutrition when toddlers weight $-3SD$, bad nutrition if the range is $-3SD$ to less than $-2SD$, good nutrition if the range is heavy $-2SD$ to

$2SD$, and over nutrition if the range is more than $2SD$. Immunization status was obtained through interviews with respondents' parents/guardians. Toddlers are considered to have complete immunization status if they have received Hepatitis B, BCG, Polio 1-4, DPT-HB-Hib 1-3, IPV, and measles vaccines. The exclusive breastfeeding is defined as the condition of toddlers who are given breastfed from birth to six months without additional formula milk. In this study, vitamin A is given to the toddlers in the last six months. The clinical history of asthma in toddlers is determined by their family. If the family members have asthma, then the toddler will be noted to have asthma history.

RESULTS

Toddlers' Characteristics

The majority of toddlers' age in the Sememi health service center, Surabaya were 12-24 months (6.61%) at the time of this study. Furthermore, the gender distribution is male with a percentage of about 6.61%. The population size of the female is almost the same as the male population. The distribution of toddlers in Sememi health service center can be seen in Table 1

The Effect of Exclusive Breastfeeding Toward The Pediatric Pneumonia Incidence

Based on the data, about 6.43% of toddlers actively receive exclusive breastfeeding. Moreover, the distribution number of toddlers who did not consume the exclusive breastfeeding is not different. About 34 toddlers (6.07) not receive exclusive breastfeeding. The statistical test showed $p\text{-value} = 0.00$ ($p < 0.05$). This results indicated that there was an effect of exclusive breastfeeding toward pediatric pneumonia. The OR value also indicates toddlers that have exclusive breastfeeding may not have pneumonia 4.18 times compared to toddlers who are not receive exclusive breastfeeding.

The Effect of Other Factors on Pediatric Pneumonia Incidences

Based on the observation, the majority of toddlers in sememi health center have normal birth weight (11.25%). The results showed that there was no effect on the birth weight toward the pneumonia cases ($p = 0.27$).

The distribution of toddlers who have complete the immunization in the pneumonia case is about 12.32%. However, the results showed no

significant effect on immunization status toward pneumonia ($p = 1.00$).

About 10.36% of toddlers have a good nutritional status. The results showed that there was no effect of nutritional status toward the pneumonia incidence ($p = 0.99$). Moreover, the number of toddlers who received vitamin A is about 11.43%. However, this number also showed there is no significant relation between the provision of vitamin A with pneumonia cases in toddlers ($p=0.99$).

The toddlers with asthma history in pneumonia cases are about 11.96%. The statistical results showed that there is no relation between asthma history to the pneumonia cases ($p=0.99$). The distribution of other factors in toddlers in the Sememi health service center, Surabaya can be seen in Table 2.

DISCUSSION

Toddlers' Characteristics

The average age of toddlers in this study range from 12-24 months old. This study is in line with Nantanda, Tumwine, Ndeezi, & Ostergaard (2013), research that noted the majority of pneumonia occurs in children under the 12-24 months old.

In the Sememi health service center showed the male is dominant gender among the toddlers. Based on a study in Nigeria, the male children are susceptible to pneumonia (Ibraheem, Abdulkadir, Gobir, & Johnson, 2018).

The results showed no influence between the ages of toddlers toward the pediatric pneumonia cases. The results of this study are in line with the research of Oktaviani & Maesaroh (2017) which shows that there is no influence between the ages on the incidence of pediatric pneumonia. The

results showed that the majority age of the toddlers were 1-2 years. Research conducted by Huong et al (2014) showed that young age is susceptible to pneumonia infection. This condition occurs because the condition of the airways track and the immune system in toddlers is under developing stage. Decreased appetite also affects overall development (Somantri, 2015). There is no influence between the ages of toddlers toward the pneumonia incidences.

In this study, the relation between gender type and the pneumonia incidence is not significant. The results of this study are also in line with the research conducted by Frini, Rahman, & Herman (2018) which shows that there is no significant influence between the toddlers' gender to the incidence of pediatric pneumonia.

The Effect of Exclusive Breastfeeding Toward The Pediatric Pneumonia Incidence

The influence of exclusive breastfeeding on pediatric pneumonia incidence have significant value. The OR value indicates that toddlers who have not to receive exclusive breastfeeding may have pneumonia infection 4.18 times compared to toddlers who are having exclusively breastfeeding. The results of this study are in line with the research conducted by Rasyid (2013) which shows that there is an influence between the history of exclusive breastfeeding in toddlers to the pediatric pneumonia incidences. The statistical test shows the OR value= 1.14, which means that toddlers who did not receive exclusive breastfeeding are likely to suffer from pneumonia 2.80 times than the toddlers who receive exclusive breastfeeding. The exclusive breastfeeding promotes the immune system because the IgA antibodies contained in breast milk protects the toddlers from infection (Ásbjörnsdóttir et al., 2014).

Table 1

Pneumonia Cases Distribution based on Toddlers Characteristic in Sememi Health Service Center

Toddlers Characteristic	Pneumonia				Total	
	Yes		No		n	%
	n	%	n	%		
Age (Month)						
12-24	19	6,79	18	6,43	37	6,61
25-36	11	3,94	13	4,64	24	4,29
37-48	5	1,79	3	1,07	8	1,43
49-60	0	0	1	0,36	1	0,18
Sex						
Woman	16	5,71	17	6,07	33	5,89
Man	19	6,79	18	6,43	37	6,61
Total	35	50,00	35	50,00	70	100,00

Table 2

Pneumonia Cases Distribution based on Toddlers' Other Factors in Sememi Health Service Center

Toddlers' Other Factors	Pneumonia				Total		<i>p-value</i>	OR
	Yes		No		n	%		
	n	%	n	%				
Exclusive Breastfeeding								
Yes	11	3,93	23	8,21	34	6,07	0,00	4,18
No	24	8,57	12	4,29	36	6,43		
Birth Weight								
Low	5	1,79	2	0,71	7	1,25	0,24	0,36
Normal	30	10,71	33	11,79	63	11,25		
Immunization Status								
Complete	34	12,14	35	12,50	69	12,32	1,00	0,00
Uncomplete	1	0,36	0	0,00	1	0,18		
Nutritional Status								
Bad	3	1,07	0	0,00	3	0,53		
Less	4	1,43	4	1,43	8	1,43	0,99	0,00
Good	28	10	30	10,71	58	10,36		
More	0	0	1	0,36	1	0,18		
Vitamin A								
Yes	29	10,36	35	12,50	64	11,43	0,99	0,00
No	6	2,14	0	0,00	6	1,07		
Asthma History								
Yes	3	1,07	0	0,00	3	0,53	0,99	0,00
No	32	11,43	35	12,50	67	11,96		
Total	35	50,00	35	50,00	70	100,00		

According to research conducted in China, IgA and IgM antibodies as indicators for positive infection of pneumonia. The results showed that some of the toddlers did not express IgM antibodies to detect the presence of pneumonia during the initial stages of infection. Some patients also have IgM antibody levels after several months of being infected with pneumonia. This causes difficulties in detecting pneumonia, whereas IgA antibodies are reported to be more sensitive in diagnosing pneumonia than IgM (Lee et al., 2017).

Higher risk of pneumonia occurs in children who did not receive exclusive breastfeeding. This condition due to the decreasing level of the immune system. Breast milk tends to have different immunomodulatory effects, besides biological and antimicrobial functions, breast milk can actively regulate the maturation of the neonatal immune system (Thapa et al., 2016).

The Effect of Other Factors on Pediatric Pneumonia Incidences

Several factors include nutritional status, birth weight, immunization status, administration of vitamin A, and the clinical history of asthma are probably alter the pneumonia incidence in toddlers. Based on the results, the toddlers in

Sememi health service center have a good nutritional status. In this study, the good nutrition intake to the toddlers does not have a significant influence against the pneumonia cases (Adawiyah & Duarsa, 2016). The results of this study were in line with Supriatin (2013) which showed that there is no effect of nutritional status toward the pediatric pneumonia cases. Moreover, research in India demonstrated that malnutrition is a driving factor in the occurrence of pneumonia in toddlers at Jamshedpur Hospital, India. Multivariate analysis shows that malnutrition is the dominant factor causing pneumonia in infants (Srivastava, Mishra, & Roy, 2015). The results of research conducted by Efni, Machmud, & Pertiwi (2016) showed that there was an influence between nutritional statuses on the incidence of pneumonia in toddlers.

There is no significant effect of infants' birth weight toward pneumonia cases. The results of this study are in line with the research conducted by Iskandar, Tanuwijaya, & Yanuarti (2015) which revealed that there is no influence between the birth weights with the incidence of pneumonia in toddlers. Ramezani, Aemmi, & Moghadam (2015) also explained that toddlers who have less than 70% of body weight according to their age were

eight times more likely to infect with pneumonia compared to the toddlers who have normal weight. There was no influence between birth weight and pneumonia cases probably due to the frequency of normal birth weight in this study. Based on our observation, both toddlers, non-infected or infected to pneumonia have normal birth weight.

The immunization status of toddlers in this study showed no significant effect on the pneumonia cases. The results of this study are in line with the research conducted by Lestari, Kresnowati, & Saptorini (2014) which showed that there is no effect of the immunization status of toddlers against the pneumonia cases. Sumiyati (2015) noticed that immunization is a way to reduce morbidity and mortality in infants and children. Pneumonia cases are generally followed by pertussis complications which can be avoided by DPT immunization. DPT immunization does not only directly provide immunity against pneumonia, but to prevent complications that can trigger pneumonia. This is in accordance with the research conducted by Fransiska, Rina, Sanggara, & Gustin (2015) which revealed that there is an influence between giving immunization status of toddlers to the incidence of ARI. The results showed that the distribution of complete immunization status in toddlers with non-infected or infected to pneumonia almost reached 100%. This condition might be the cause of no significant effect of immunization toward the pneumonia cases in toddlers (Kartiningrum, 2016).

Vitamin A administration to the toddlers has no effect on pediatric pneumonia cases. The results of this study are the same as Sary (2017) study which showed that giving vitamin A to toddlers do not affect in pneumonia cases. The results of the study showed that the majority of toddlers get vitamin A when visiting the POSYANDU (the center for pre- and postnatal health care and information for a woman and for children under five). There is no influence between giving vitamin A to toddlers because there may be other factors that are more dominant in influencing pneumonia cases in toddlers.

The results showed no influence between the clinical history of asthma in toddlers with the pediatric pneumonia incidence. The results of this study are in line with the research conducted by Juhn (2014) which shows that the majority of toddlers with pneumonia or non-pneumonia have no history of asthma. Toddlers who experienced asthma promotes the colonization of *Staphylococcus aureus* bacteria which is one of the causes of pneumonia. This is not in accordance

with the results of a study conducted by Triana (2017) which shows that there is an influence between the clinical history of asthma in toddlers toward the cases of pneumonia in children under five.

CONCLUSION

Exclusive breastfeeding can prevent pneumonia cases in toddlers. It is necessary to increase awareness regarding exclusive breastfeeding, promoting the counseling program about the benefit of breastfeeding in suppressing pneumonia cases in toddlers.

ACKNOWLEDGEMENT

Authors thank to the ministry of health, Surabaya city for the research permit issues in Sememi area. Also author thank to Sememi health service center for providing the data and helping the research process.

REFERENCES

- Adawiyah, R., & Duarsa, A.B.S. (2016). Faktor - faktor yang berpengaruh terhadap kejadian pneumonia pada balita di Puskesmas Susunan Kota Bandar Lampung Tahun 2012. *Jurnal Kedokteran Yarsi*, 24(1), 51–68.
- Ásbjörnsdóttir, K. H., Slyker, J. A., Weiss, N. S., Mbori-Ngacha, D., Maleche-Obimbo, E., Wamalwa, D., & John-Stewart, G. (2014). Breastfeeding is associated with decreased pneumonia incidence among HIV-exposed, uninfected Kenyan infants. *NIH Public Access*, 27(17), 2809–2815.
- Dinkes Kota Surabaya. (2017). *Profil kesehatan Kota Surabaya tahun 2016*. Dinas Kesehatan Kota Surabaya. Kota Surabaya.
- Efni, Y., Machmud, R., & Pertiwi, D. (2016). Faktor risiko yang berhubungan dengan kejadian pneumonia pada balita di Kelurahan Air Tawar Barat Padang. *Jurnal Kesehatan Andalas*, 5(2), 365-370.
- Fransiska, M., Rina, Sanggara, V. O., & Gustin, R. K. (2015). Hubungan status gizi, status imunisasi, dan ASI eksklusif dengan kejadian ISPA pada anak balita. *Jurnal Kesehatan Stikes Prima Nusantara Bukittinggi*, 6(2), 8-13.
- Frini, M., Rahman, N., & Herman. (2018). Faktor risiko kejadian pneumonia pada balita di wilayah kerja Puskesmas Kamonji Kota Palu.

- Preventif : Jurnal Kesehatan Masyarakat*, 9(1), 34-37.
- Huong, P. L. T., Hien, P. T., Lan, N. T. P., Binh, T. Q., Tuan, D. M., & Anh, D. D. (2014). First report on prevalence and risk factors of severe atypical pneumonia in Vietnamese children aged 1 – 15 Years. *BMC Public Health*, 14(1304), 1–8. <https://doi.org/doi:10.1186/1471-2458-14-1304>
- Ibraheem, R. M., Abdulkadir, M. B., Gobir, A. A., & Johnson, W. (2018). Socio-demographic and clinical factors predicting time to presentation for children with pneumonia in Ilorin, Nigeria. *Alexandria Journal of Medicine*, 54(3), 247–250. <https://doi.org/10.1016/j.ajme.2017.05.013>
- Iskandar, A., Tanuwijaya, S., & Yuniarti, L. (2015). Hubungan jenis kelamin dan usia anak satu tahun sampai lima tahun dengan kejadian infeksi saluran pernapasan akut (ISPA). *Global Medical and Health Communication*, 3(1), 1-6.
- Juhn, Y. (2014). Risks for infection in patients with asthma (or other atopic conditions): is asthma more than a chronic airway disease? *NIH Public Access*, 134(2), 247–257. <https://doi.org/10.1016/j.jaci.2014.04.024>. Risks
- Kartiningrum, E. D. (2016). Faktor yang mempengaruhi kejadian ISPA pada balita di Desa Kembang Sari Kecamatan Jatibanteng Kabupaten Situbondo. *Hospital Majapahit*, 8(2), 29–41.
- Kemendes RI. (2017). *Profil kesehatan Republik Indonesia tahun 2017*. Kementerian Kesehatan RI. Jakarta.
- Kemendes RI. (2018). *Profil kesehatan Republik Indonesia tahun 2017*. Kementerian Kesehatan RI. Jakarta.
- Lamberti, L. M., Zakarija-Grković, I., Walker, C. L. F., Theodoratou, E., Nair, H., Campbell, H., & Black, R. E. (2013). Breastfeeding for reducing the risk of pneumonia morbidity and mortality in children under two: a systematic literature review and meta-analysis. *BMC Public Health*, 13(Suppl 3), 1–8. <https://doi.org/10.1186/1471-2458-13-S3-S18>
- Lee, W., Huang, E., Tsai, C., Kuo, K., Huang, Y., Hsieh, K., ... & Yu, H. (2017). Role of serum mycoplasma pneumoniae iga, igm, and igg in the diagnosis of mycoplasma pneumoniae-related pneumonia in school-age children and adolescents. *Clinical and Vaccine Immunology*, 24(1), 1–11. <https://doi.org/https://doi.org/10.1128/CVI.00471-16>
- Lestari, N. P., Kresnowati, L., & Saptorini, K. K. (2014). Faktor risiko yang berhubungan dengan kejadian ISPA pada bayi dan balita di wilayah kerja Puskesmas Purwoyoso Semarang. *Visikes : Jurnal Kesehatan*, 13(1), 73-82.
- Nantanda, R., Tumwine, J. K., Ndeezi, G., & Ostergaard, M. S. (2013). Asthma and pneumonia among children less than five years with acute respiratory symptoms in Mulago Hospital, Uganda: evidence of under-diagnosis of asthma. *Plos One*, 8(11), 1–9. <https://doi.org/10.1371/journal.pone.0081562>
- Oktaviani, I., & Maesaroh, S. (2017). Faktor Faktor yang berhubungan dengan kejadian pneumonia pada balita di Puskesmas Kecamatan Teluknaga Kabupaten Tangerang. *Jurnal Komunikasi Kesehatan*, 8(1), 29-44.
- Ramezani, M., Aemmi, S. Z., & Moghadam, Z. E. (2015). Factors affecting the rate of pediatric pneumonia in developing countries : a review and literature study. *International Journal of Pediatrics*, 3(24), 1173-1181.
- Rasyid, Z. (2013). Faktor - faktor yang berhubungan dengan kejadian pneumonia anak balita di RSUD Bangkinang Kabupaten Kampar. *Jurnal Kesehatan Komunitas*, 2(3), 136-140.
- Sary, A. N. (2017). Analisis faktor risiko intrinsik yang berhubungan dengan pneumonia pada anak balita di Wilayah Kerja Puskesmas Andalas Kota Padang. *Jurnal Kesehatan Medika Sainatika*, 8(7), 58-68.
- Somantri, B. (2015). Hubungan status gizi dengan kejadian ISPA pada balita di Puskesmas Melong Asih Kota Cimaahi. *Jurnal Keperawatan Aisyiyah*, 2(1), 37–43.
- Srivastava, P., Mishra, A. K., & Roy, A. K. (2015). Predisposing factors of community acquired pneumonia in under five children. *Jurnal of Lung Diseases & Treatment*, 1(1), 10–13. <https://doi.org/10.4172/2472-1018.1000101>
- Sumiyati. (2015). Hubungan jenis kelamin dan status imunisasi DPT dengan pneumonia pada bayi usia 0-12 bulan. *Jurnal Kesehatan Metro Sai Wawai*, 8(2), 63-69.
- Supriatin, E. (2013). Hubungan Faktor faktor dengan kejadian ISPA pada balita di Puskesmas X Kota Bandung. *Jurnal Ilmu Keperawatan*, 1(1), 39-46.

- Thapa, P., Pandey, A. R., Dhungana, R. R., Bista, B., Thapa, B., & Mishra, S. R. (2016). Risk of ARI among non-exclusively breastfed under-five passive smoker children: a hospital-based cross-sectional study of Nepal. *Frontiers in Public Health*, 4(23), 1–7. <https://doi.org/10.3389/fpubh.2016.00023>
- Triana, H. (2017). Faktor risiko yang mempengaruhi kejadian pneumonia pada balita di Puskesmas Medan Krio Kabupaten Deli Serdang tahun 2017. *Jurnal Sains, Teknologi, Farmasi & Kesehatan*, 1(2), 165-174.
- WHO. (2016). *Pneumonia*. Geneva: World Health Organization Retrieved February 25, 2018, from <https://www.who.int/news-room/fact-sheets/detail/pneumonia>