

## ORIGINAL RESEARCH

# CORRELATION OF EXCLUSIVE BREASTFEEDING AND CIGARETTE SMOKE EXPOSURE WITH PNEUMONIA IN CHILDREN UNDER TWO YEARS

*Hubungan Pemberian ASI Eksklusif, Paparan Asap Rokok dengan Kejadian Pneumonia pada Anak dibawah Dua Tahun*

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### ABSTRACT

**Background:** Pneumonia is one of the leading causes of death for children and is caused by pneumococcus, staphylococcus, and streptococcus bacteria. Exclusive breastfeeding and exposure to cigarette smoke are risk factors for pneumonia in children less than two years old. **Purpose:** The aim of this research was to analyze the relationship between exclusive breastfeeding or exposure to cigarette smoke and pneumonia in children aged less than two years at Public Health Center (PHC) of Wates, Kediri District. **Methods:** This research employed analytic observational research using a case–control research design. The number of research samples used was 60, consisting of 30 case respondents and 30 control respondents. The samples were taken in the PHC of Wates, Kediri District’s working area in July 2019. The determination of the samples was carried out through simple random sampling. The data were analyzed using chi-square analysis. **Results:** The research variables related to pneumonia in children less than two years old at PHC of Wates, Kediri District were exclusive breastfeeding with Odds Ratio (OR) = 3.50 (95% Confidence Interval (CI) = 1.20–10.19), the age of the mothers of the two-year-old infants with OR = 0.19 (95% CI = 0.04–0.78), and the education of the mothers of children less than two years old with OR = 3.14 (95% CI = 1.07–9.27). **Conclusion:** Exclusive breastfeeding, maternal age, and mothers’ level of education are some of the risk factors for pneumonia. The suggestion from this research is to hold socialization in the form of pneumonia prevention, education on exclusive breastfeeding for mothers who have children under two years of age, and the dangers of smoking for children's health.

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## ABSTRAK

**Latar Belakang :** *Pneumonia b* merupakan salah satu penyebab utama kematian bagi anak yang disebabkan oleh bakteri *Pneumococcus*, *Staphylococcus*, dan *Streptococcus*. ASI Eksklusif dan paparan asap rokok merupakan faktor risiko kejadian pneumonia pada anak usia kurang dari 2 tahun. **Tujuan:** Penelitian ini bertujuan untuk menganalisis hubungan antara pemberian ASI Eksklusif dan paparan asap rokok dengan kejadian pneumonia anak usia kurang dari 2 tahun di Puskesmas Wates, Kabupaten Kediri. **Metode:** Penelitian ini menggunakan jenis penelitian observasional analitik dengan desain penelitian case control. Jumlah sampel penelitian ini adalah 60 responden yaitu 30 kasus dan 30 kontrol. Pengambilan sampel ini dilakukan di wilayah kerja Puskesmas Wates, Kabupaten Kediri pada bulan Juli 2019. Penentuan dilakukan dengan simple random sampling. Data dianalisis dengan menggunakan analisis chi-square. **Hasil:** Variabel diteliti yang memiliki hubungan dengan kejadian pneumonia anak usia kurang dari 2 tahun di Puskesmas Wates, Kabupaten Kediri adalah pemberian ASI Eksklusif dengan menghasilkan  $OR=3,500$  ( $95\%CI=1,20-10,19$ ), usia ibu anak usia kurang dari 2 tahun dengan menghasilkan  $OR=0,19$  ( $95\%CI=0,04-0,78$ ), serta pendidikan ibu anak usia kurang dari 2 tahun dengan menghasilkan  $OR=3,143$  ( $95\%CI=1,066-9,267$ ). **Kesimpulan:** Pemberian ASI Eksklusif, usia ibu, dan pendidikan ibu adalah faktor risiko terjadinya pneumonia. Saran dari penelitian ini adalah diadakan sosialisasi berupa pencegahan penyakit pneumonia, edukasi pemberian ASI Eksklusif bagi ibu yang memiliki anak usia kurang dari 2 tahun, serta bahaya rokok bagi kesehatan anak.

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## INTRODUCTION

Pneumonia is the leading cause of mortality in children under the age of five throughout the world, with an estimated 1.30 million deaths in 2011, which the majority happened in developing countries (Donà, Luise, Dalt, & Giaquinto, 2017). Pneumonia is inflammation of the lungs caused by pneumococcus, staphylococcus, and streptococcus bacteria. The symptoms of pneumonia include fever accompanied by coughing with phlegm and rapid breathing, with the frequency of the breaths reaching  $\geq 60$  times per minute in children aged  $< 2$  months,  $\geq 50$  times per minute at the ages of 2–11 months, and  $\geq 40$  times per minute at the age range of 12 months to five years. This is followed by other symptoms such as chest tightness, headache, loss of appetite, shortness of breath, and restlessness (Solihati, Suhartono, & Winarni, 2017). People who are susceptible to pneumonia are children younger than age 2, elderly people who are older than age 65, and those who have

health problems such as malnutrition or immunological disorders (Ministry of Health RI, 2017).

There was an increase in the coverage of pneumonia incidents in children under five in Indonesia from 2008 to 2016. In 2014, there was no significant growth at only about 20%–30%. In 2015, the percentage increased to 63.45%, and it became 65.27% in 2016 (Ministry of Health RI, 2017). The age group 1–4 years had the highest period prevalence of pneumonia (Pusvitasary, Firdaus, & Ramdan, 2017).

East Java was the province in Indonesia with the second highest coverage of pneumonia in under-fives at 2016, which were 65,139 cases. The province with the highest coverage was West Java (126,936), and the other provinces were Central Java (52,033), Jakarta City (43,500), and Banten (30,402) (Ministry of Health RI, 2017). Kediri District was found to be one of the districts with a high incidence of pneumonia among the 38

districts/cities in East Java. The coverage of pneumonia incidents was found to be more than 50% at 2016. There were about 2,705 cases (21.42%) in 2014, about 3,241 cases (58.30%) in 2015, about 3,841 cases (69.88%) in 2016, and about 3,707 cases (68.23%) in 2017. The number decreased in 2018 to 3,103 cases (57.74%), and, in February 2016, the cases found were up to 494 (9.19%). The data in East Java showed that the coverage of infants who exclusively received breast milk in 2016 was 74%, having increased each year from 61.50% in 2011 (East Java Provincial Health Office, 2018).

Risk factors for pneumonia include exclusive breastfeeding, exposure to cigarette smoke, low birth weight, low vitamin D levels, and nutritional status. This study focused on exclusive breastfeeding and exposure to cigarette smoke, as breast milk can protect children from the risk of infection and be a passive protector against pathogens. Children who are exposed to cigarette smoke from elders will be more likely to develop asthma, chronic cough, and pneumonia (Ramezani, Aemmi, & Moghadam, 2015).

Exclusive breastfeeding is one of the risk factors of pneumonia in children. East Java province itself has an exclusive breastfeeding coverage of 74%, though the distribution is uneven; there are still regencies/cities that do not meet the target. Kediri Regency is one of the cities exceeding the target of coverage of exclusive breastfeeding (East Java Provincial Health Office, 2018), but the case of pneumonia incidence remains. Therefore this study is conducted.

According to Frini, Rahman, & Herman (2018) there is a relationship between exclusive breastfeeding history and the incidence of pneumonia in infants with Odds Ratio (OR) score 3.03. This means that under-fives who do not get exclusive breastfeeding have a risk of pneumonia 3.03 times higher than under-fives who get exclusive breastfeeding. Another similar study in Klaten suggested that the resulting OR score 3.09 means that infants who are not given exclusive breastfeeding are 3.09 times more at risk of developing pneumonia than under-fives who get exclusive breastfeeding (Choyron, 2015). Another study by (Puspitasari & Syahrul, 2015) in Surabaya showed that infants who are not given exclusive breastfeeding have a 7.00 times higher risk of pneumonia compared to infants who get exclusive breastfeeding.

Cigarettes are one of the risks of pneumonia incidence in children aged less than two years old. Pneumonia is one of the respiratory diseases

caused by third-hand smoke that occurs in infants and under-fives (Trisiyah & Wahjuni, 2018). Research conducted by Alnur, Ismail, & Padmawati (2015) in Bantul District showed that toddlers with cigarette smoke exposure have a 2.18 times higher risk of pneumonia compared to infants who are not exposed to cigarette smoke. This study aimed to analyze the relationship of exclusive breastfeeding and cigarette smoke exposure with pneumonia incidence in children aged less than two years old in Public Health Center (PHC) of Wates, Kediri District.

## METHODS

This research used a type of analytical observational research with case-control design study. The independent variables in this study included the characteristics of children under two years old (including age [months], sex, infant low birth weight, immunization status, exclusive breastfeeding), maternal characteristics (including age, level of education, knowledge, occupation), exposure to cigarette smoke (the presence of smoking family members, smoking amount, smoking location, and whether the smoking family members were close to the children aged less than two years). The dependent variable in this study was the incidence of pneumonia in children under two years old.

The population in this research was children aged less than two years in the PHC of Wates, Kediri District's working area. The case group was all children aged less than two years who were diagnosed with pneumonia based on the administrative data of PHC of Wates from January to July 2019. The control group was children aged less than two years who were not diagnosed with pneumonia based on the administrative data of PHC of Wates from January to July 2019. The respondents of this study were mothers with children aged less than two years.

The samples of this study were children aged less than two years residing in the work area based on the administrative data of PHC of Wates from January to July 2019. This study used 1:1 comparison; the case group obtained 30 samples, and the control group obtained 30 samples, so there were 60 total samples. This study used simple random sampling techniques.

This research used secondary data from the Health Department of Kediri District and administrative data on the pneumonia incidence in PHC of Wates. The primary data were obtained through respondent interviews using a

questionnaire. The research respondents were mothers with children aged less than two years with pneumonia as well as parents with children aged less than two years without pneumonia. This study obtained ethical clearance from the National Ethics Commission of Health Faculty of Dentistry Universitas Airlangga with certificate number 216/HRECC FODM/V/2019.

The data were analyzed and interpreted to test the hypothesis by a computer program with univariable and bivariable analyses. A chi-square test was used to see the correlation between the independent variables and dependent variables.

## RESULTS

### Correlation of Children's Characteristics with Pneumonia Incidence in Children Aged Less than Two Years

The incidence of pneumonia in children aged 12 to less than 24 months was higher than that of children aged 0 to less than 12 months in the case and control groups. The results of the statistical test in Table 1 showed that infants aged 0 to less than 12 months were 0.45 times more at risk of developing pneumonia than infants aged 12 to less than 24 months. There was no relationship between age and the incidence of pneumonia in children aged less than two years. The case group was predominantly female, while the control group was predominantly male. The statistical test results shown in Table 1 indicated that there was no relationship between sex and the incidence of pneumonia in children under two years of age at PHC of Wates, Kediri District with an OR score of 0.51 (95% CI = 0.18–1.42).

The case group as well as the control group had primarily completed their immunization status. The statistical test results in Table 1 showed that there was no relationship between the immunization status and the incidence of pneumonia with an OR score of 0.46, meaning that children under two years old who did not have a complete immunization status had a 0.46 greater risk of pneumonia compared to children with a complete immunization status.

The majority of children under two years of age diagnosed with pneumonia were not given exclusive breastfeeding. The reason for the mothers not exclusively breastfeeding their children was because they were working. This study also found that some mothers had given companion food at the age of six months, early in life. Another reason for the mothers giving complementary food was because of lacking or

ceasing breast milk production. The statistical test results shown in Table 1 showed that there was a meaningful relationship between exclusive breastfeeding and the incidence of pneumonia in children under the age of two years at PHC of Wates, Kediri District with an OR score of 3.50, meaning that infants who were not given exclusive breastfeeding had a 3.50 times higher risk of pneumonia compared with those given exclusive breastfeeding (Table 1).

### Correlations of Mothers' Characteristics with the Incidence of Pneumonia in Children Aged Less than Two Years

The majority of mothers in both groups were over 25 years old. Based on the statistical test results, there was a relationship between the age of the mothers and the incidence of pneumonia in children under two years of age at PHC of Wates, Kediri District with an OR score of 0.19, meaning that a mother who was younger than or 25 years old had a 0.19 times lower risk of having a child with an incidence of pneumonia compared to a mother who was over 25 years old (Table 1).

The majority of mothers in the case group had low education, whereas the majority of mothers in the control group had higher education. The statistical test results showed a meaningful relationship between the education of mothers and the pneumonia incidence in children aged less than two years at the PHC of Wates, Kediri District. The cross-tabulation results between the education of the mothers and the pneumonia incidence in children aged less than two years acquired an OR score of 3.14, meaning that mothers whose education was low had a 3.14 times higher risk of having children with pneumonia compared to highly educated mothers (Table 1).

The result of the statistical test was that there was no relationship between the knowledge of the mothers and the pneumonia incidence in children aged less than two years at PHC of Wates, Kediri District with an OR score of 1.408, meaning that mothers with little and adequate knowledge were 1.408 times more at risk than mothers with fair knowledge of the incidence of pneumonia in children under two years of age at PHC of Wates, Kediri District (Table 1).

### Exposure to Cigarette Smoke and the Incidence of Pneumonia in Children Aged Less than Two Years

The majority of respondents answered that there were less than two family members who smoked; the father was the most common answer.

The statistical test results showed that there was no relationship between the existence of family members who smoked and the pneumonia incidence in children aged less than two years at PHC of Wates, Kediri District with an OR score of 0.61, meaning that the existence of family members who smoked caused a 0.61 times higher risk of pneumonia developing in children aged less than two years compared with no family members smoking (Table 1).

This research showed that there was no relationship between the number of family members who smoked and the incidence of pneumonia in children aged less than two years at the PHC of Wates, Kediri District. The statistical test obtained results of 2.27, meaning that if the

number of family members who smoked was more than or equal to two people, there was a 2.27 times greater risk of the occurrence of pneumonia in children aged less than two years compared to the number of family members who smoked being less than two people (Table 1).

There was no correlation between the location of family members smoking and the pneumonia incidence in children aged less than two years in PHC of Wates, Kediri District with a result of 2.03; that meant that family members smoking inside or outside the house caused a 2.03 times greater risk of the occurrence of pneumonia incidence in children aged less than two years compared with family members who smoked only outside of the house (Table 1).

**Table 1**  
Cross-tabulation between dependent variables and independent variables

Variable	Pneumonia		Non-pneumonia		Total		OR	CI
	n	%	n	%	n	%		
<b>Age of Respondents (Months)</b>								
0-<12	7	23.30	12	40.00	30	100.00	0.45	0.14 – 1.39
12-<24	23	76.70	18	60.00	30	100.00		
<b>Sex</b>								
Male	12	40.00	17	56.70	30	100.00	0.51	0.18 – 1.42
Female	18	60.00	13	43.30	30	100.00		
<b>Immunization Status</b>								
Incomplete	2	6.70	4	13.30	30	100.00	0.46	0.07 – 2.75
Complete	28	93.30	26	86.70	30	100.00		
<b>Exclusive Breastfeeding</b>								
No Exclusive Breastfeeding	18	60.00	9	30.00	30	100.00	3.50	1.20 – 10.19
Exclusive Breastfeeding	12	40.00	21	70.00	30	100.00		
<b>Age of Mothers (Years)</b>								
≤25	3	10.00	11	35.70	30	100.00	0.19	0.04 – 0.78
>25	27	90.00	19	63.30	30	100.00		
<b>Level of Education</b>								
Low	16	53.30	8	26.70	30	100.00	3.14	1.06 – 9.26
High	14	46.70	22	73.30	30	100.00		
<b>Level of Knowledge</b>								
Low and Adequate	23	76.70	21	70.00	30	100.00	1.40	0.44 – 4.45
Fair	7	23.30	9	30.00	30	100.00		
<b>Family Member who Smokes?</b>								
Yes	24	80.00	26	86.70	30	100.00	0.61	0.15 – 2.45
None	6	20.00	4	13.30	30	100.00		
<b>Amount of Family Member who Smoke? (People)</b>								
≥ 2	2	8.30	1	3.80	24	100.00	2.27	0.19 – 26.81
< 2	22	91.70	25	96.20	26	100.00		
<b>Smoking Location</b>								
Inside and outside	12	46.20	8	29.60	26	100.00	2.03	0.65-6.30
Outside	14	53.80	19	70.40	27	100.00		

## DISCUSSION

### Correlation of Children's Characteristics with Pneumonia Incidence in Children Aged Less than Two Years

This current study shows no relationship between the age of children and pneumonia incidence in children aged less than two years in PHC of Wates, Kediri District. Age had an OR score of 0.45, meaning that children aged 0 to less than 12 months had a 0.45 risk of developing pneumonia compared with children aged 12 to less than 24 months. This was because pneumonia is prone to occur in children under the age of five years due to the vulnerability of their immune system. Children under two years of age are more susceptible to pneumonia than children in other age groups. Other research results in Pakistan mentioned that children aged two have a greater risk of pneumonia than children aged five. Age range 2–6 months is a significant risk factor for pneumonia (Gritly et al., 2018).

Pneumonia can develop at all age levels, especially under the age of five due to children's body resistance. It is thought to be associated with the immune system (Retna & Fajri, 2015). This is in line with research conducted by Fitriyah (2019) in PHC of Pasirian, which stated that there is a relationship between age in children aged less than two years and the incidence of pneumonia.

The statistical test results on sex showed that there was no relationship between sex and the incidence of pneumonia in children aged less than two years at PHC of Wates, Kediri District. This was in line with research by Aldriana (2015) stating that there is no relationship between sex and the incidence of pneumonia but that males are 1.50 times more likely to develop pneumonia than females. The effect of the statistics has no relationship with the incidence of pneumonia.

Immunization is a way to actively increase a person's immunity to a disease (Sari & Vitawati, 2016). This current study showed that immunization status had no relationship with the incidence of pneumonia in children aged less than two years at PHC of Wates, Kediri District. This is not in line with research in Padang city which states that there is a relationship between immunization status and the incidence of pneumonia in children. This difference occurs because almost all respondents have complete immunization status (Rigustia, Zeffira, & Vani, 2019).

### Correlation of Mothers' Characteristics with the Incidence of Pneumonia in Children Aged Less than Two Years

This current study showed that there was a relationship between the age of mothers and the incidence of pneumonia in children aged less than two years at PHC of Wates, Kediri District (95% CI = 0.04–0.78). This was in line with research by Larasati (2018) stating that there is a relationship between the age of mothers and the incidence of pneumonia. The higher a mother's education, the better her understanding of the disease in her child.

This current study also showed that there was a significant relationship between the education of mothers and the incidence of pneumonia in children aged less than two years at PHC of Wates, Kediri District (95% CI = 1.06–9.26). This was in line with research conducted by Syani, Budiyo, & Raharjo (2015) stating that there was a relationship between mothers' level of education and the incidence of pneumonia in PHC of Yosomulyo, Metro City. In that study showed the OR score obtained was 3.1, which meant that mothers with a low level of education have a 3.14 times greater risk of their child (<2 years) developing pneumonia compared to mothers who have a high level of education. This was in line with research by Rigustia, Zeffira, & Vani (2019) that also stated that mothers with low education have a 0.95 times greater risk of having children with pneumonia than mothers who have higher education. A mother's education will affect the quality of care given to their child (Mustikarani, Rahardjo, Qadridjati, & Prasetya, 2019). The level of mothers' education can affect the way they give proper treatment to their children and the various diseases in their children contract at an early age (Syani, Budiyo, & Raharjo, 2015).

Knowledge is one of the predisposing factors that determine a person's health behavior (Martini & Astuti, 2017). The results showed that there was no relationship between knowledge and the incidence of pneumonia in children aged less than two years of age at PHC of Wates, Kediri District (95% CI = 0.44–4.45). This was in line with research conducted by Larasati (2018) stating that there is no relationship between mothers' knowledge and the occurrence of pneumonia.

### Correlation of Exclusive Breastfeeding with the Incidence of Pneumonia in Children Aged Less than Two Years

The importance of providing exclusive breastfeeding is because breast milk contains many nutrients for the growth of infants and can help

prevent the occurrence of various diseases. Exclusive breastfeeding should be given for at least six months of infants' early lives, and mothers are obligated to provide the best source so that their babies get a sufficient amount of nutrition for their optimal growth (Patria, 2016).

The results of this research showed that there was a relationship between exclusive breastfeeding and the incidence of pneumonia in children aged less than two years at PHC of Wates, Kediri District (95% CI = 1.20–10,19). The OR score obtained was 3.50, meaning that children aged less than two years who were not given exclusive breastfeeding had a 3.50 times greater risk of developing pneumonia compared to children who were given exclusive breastfeeding. This was in line with research conducted by Rigustia, Zeffira, & Vani (2019) stating that exclusive breastfeeding is one of the dominant factors of pneumonia with an OR score of 7.40, meaning that children who are not given exclusive breastfeeding have a 7.40 times greater risk of developing pneumonia compared to children given exclusive breastfeeding.

## CONCLUSION

The majority of children aged less than two years old, in the age range of 0–6 months, were received exclusive breastfeeding. If children less than two years did not get exclusive breastfeeding, it was because their mother was a working mother. Most mothers exclusively breastfed their children. The majority of mothers were above 25 years old in both the case and control groups, with a high level of education in the control group and a low level of education in the case group. Most mothers did not work (housewives) and had little knowledge about exclusive breastfeeding and pneumonia. The majority of respondents had family members who smoked, with the number of family members who smoked usually less than two people. Most family members smoked outside the house.

Variables that had relationships with the incidence of pneumonia in children aged less than two years in PHC of Wates, Kediri District were exclusive breastfeeding, the mothers' age, and the mothers' level of education. Variables that had no relationship with the incidence of pneumonia in children aged less than two years old in PHC of Wates, Kediri District were the age of the children, sex, children's immunization status, mothers' knowledge, the existence of family members who smoke, the number of family members who

smoke, and the smoking location of family members who smoke.

## CONFLICT OF INTEREST

The authors declare that no conflict of interest in this study.

## AUTHOR CONTRIBUTION

All authors participate actively in this article and are responsible for the content of writing, including in preparation, draft writing, research design selection, analysis, and revision of the article. DVA: preparation, writing original draft, research design selection, editing, and revision of the article. FS: software, analysis, editing, and revision of the article.

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## REFERENCES

- Aldriana, N. (2015). Faktor-faktor yang berhubungan dengan pneumonia pada balita di wilayah kerja Puskesmas Rambah Samo 1 tahun 2014. *Maternity and Neonatal*, 6(1), 262–266.
- Alnur, R. D., Ismail, D., & Padmawati, R. S. (2015). Kebiasaan merokok keluarga serumah dengan kejadian pneumonia pada balita di kabupaten Bantul tahun 2015. *Berita Kedokteran Masyarakat*, 33(2), 119–124.
- Choyron, V. A. G. (2015). Hubungan pemberian ASI eksklusif dengan kejadian pneumonia pada balita di wilayah kerja Puskesmas Pedan Klaten. *Undergraduated Thesis*. Faculty of Public Health. Universitas Muhammadiyah Surakarta.
- Donà, D., Luise, D., Dalt, L. Da, & Giaquinto, C. (2017). Treatment of community-acquired pneumonia: are all countries treating children in the same way? a literature review. *International Journal of Pediatrics*, 1–13.
- East Java Provincial Health Office. (2018). *Profile of East Java Provincial health office in 2017*.

Surabaya City.

- Fitriyah, E. N. (2019). Hubungan usia, jenis kelamin, status imunisasi dan gizi dengan kejadian pneumonia pada baduta. *Jurnal Biometrika dan Kependudukan*, 8(1), 42–51. <https://doi.org/10.20473/jbk.v8i1.2019.42-51>
- 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.
- Gritly, S. M. O., Elamin, M. O., Rahimtullah, H., Ali, A. Y. H., Dhiblaw, A., Mohamed, E. A., & Adetunji, H. A. (2018). Risk factors of pneumonia among children under 5 years at a pediatric hospital in Sudan. *International Journal of Medical Research & Health Sciences*, 7(4), 60–68.
- Larasati, F. (2018). Hubungan pola asuh ibu, kelengkapan imunisasi, dan paparan asap rokok dengan kejadian pneumonia anak 0-4 tahun (studi case control di wilayah kerja Puskesmas Bulak Banteng). *Undergraduated Thesis*. Faculty of Public Health. Universitas Airlangga
- Martini, N. K., & Astuti, N. P. (2017). Faktor-faktor pendorong ibu dalam memberikan ASI eksklusif di UPT Puskesmas II Denpasar Barat. *Jurnal Kesehatan Terpadu*, 1(1).
- Ministry of Health RI. (2017). *Indonesia health profile 2016*. Jakarta: Ministry of Health RI.
- Mustikarani, Y. A., Rahardjo, S. S., Qadridjati, I., & Prasetya, H. (2019). Contextual effect village on the risk of pneumonia in children under five in Magetan, East Java. *Journal of Epidemiology and Public Health*, 4(2), 117–126.
- Patria, M. A. (2016). Faktor risiko pneumonia pada balita di Indonesia: narrative review penelitian akademik bidang kesehatan masyarakat. *KesMas: Jurnal Kesehatan Masyarakat*, 10(2), 57–62.
- Puspitasari, D. E., & Syahrul, F. (2015). Faktor risiko pneumonia pada balita berdasarkan status imunisasi campak dan status ASI eksklusif. *Jurnal Berkala Epidemiologi*, 3(1), 69–81.
- Pusvitasary, N. A., Firdaus, A. R., & Ramdan, I. M. (2017). Faktor-faktor yang berhubungan dengan kejadian pneumonia pada balita di wilayah kerja Puskesmas Wonorejo Samarinda tahun 2017. *Kesmas Uwigama*, 3(2), 76–87.
- 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(6), 1173–1181.
- Retna, R., & Fajri, U. N. (2015). Gambaran karakteristik kejadian pneumonia pada balita di Puskesmas Wanadadi I Kabupaten Banjarnegara tahun 2014. *Medsains*, 1(1), 18–22.
- Rigustia, R., Zeffira, L., & Vani, A. (2019). Faktor risiko yang berhubungan dengan kejadian pneumonia pada balita di Puskesmas Ikur Koto Kota Padang. *Health & Medical Journal*, 1(1), 22–29.
- Sari, P., & Vitawati. (2016). Hubungan pemberian imunisasi DPT dan campak terhadap kejadian pneumonia pada anak usia 10 bulan - 5 tahun di Puskesmas Sangurara Kota Palu tahun 2015. *Medika Tadulako*, 3(1), 42–51.
- Solihati, E. N., Suhartono, & Winarni, S. (2017). Studi epidemiologi deskriptif kejadian pneumonia pada balita di wilayah kerja Puskesmas Langensari II Kota Banjar Jawa Barat tahun 2017. *Jurnal Kesehatan Masyarakat (e-Journal)*, 5(5), 618–629.
- Syani, F. El, Budiyono, & Raharjo, M. (2015). Hubungan faktor risiko lingkungan terhadap kejadian penyakit pneumonia balita dengan pendekatan analisis spasial di Kecamatan Semarang Utara. *Jurnal Kesehatan Masyarakat*, 3(3), 732–744.
- Trisiyah, C. D., & Wahjuni, C. U. (2018). Hubungan kondisi lingkungan rumah dengan kejadian pneumonia pada balita di wilayah kerja Puskesmas Taman Kabupaten Sidoarjo. *The Indonesian Journal of Public Health*, 13(1), 119–129. <https://doi.org/10.20473/ijph.v113il.2018.119-129>