

# The correlation between family smoking habits and mosquito coils use with pneumonia incidences in toddlers

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## ABSTRACT

The incidences of pneumonia in infants Become the second highest cause mortality before reaching the age of 5 years and a health problem in Indonesia. The family of smoking and smoke from burning mosquito coils are the triggers for air pollution, which can lead to pneumonia in infants. The study aims to analyze the relationship between family smoking habits and the use of mosquito coils with the incidence of pneumonia in under-fives. The method of research applied analytic observational research using a case-control study approach. The number of samples in this study was 87 under-fives in the case group and 87 under-fives in the control group. Sampling was conducted by non-probability sampling. A questionnaire was used as a data collecting instrument. Data analysis used chi-square and multiple logistic regression. The results of this study showed that there was a relationship between family smoking habits and the use of mosquito coils with the incidence of pneumonia in infants. In addition, there were other variables that had a relationship with the incidence of pneumonia in under-fives namely smoking location (OR = 3,046; 95% CI: 1429-6492, p = 0.003), the number of cigarettes (OR = 7.105 ; 95% CI: 3079-16394, p = 0.000), and length of time with smokers (p = 0.000). On the other hand, the variables of father smoker status and the frequency of using mosquito coils were not related to the incidence of pneumonia in under-fives (p value > 0.05). It is concluded that family smoking habits, use of mosquito coils, the location of smoking, and number of cigarettes, and length of time together with smokers were risk factors associated with the incidence of pneumonia in toddlers.

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## 1. Introduction

Health is one very important aspect of building the human element that has good quality as expected and to give effect to various aspects of community life. There are still many health problems that occurred in Indonesia such as the one death of a child before the age of 5 years. Infants and children are the age group that malnutrition and care of the disease. 2015 WHO data showed the world's under-five mortality by 43 deaths per 1,000 live births (WHO, 2016).

One of the leading causes of death among children under five is pneumonia (WHO, 2016). Pneumonia is an inflammatory process in the alveoli of the lungs caused by microorganisms such as *Streptococcus pneumoniae*, *Streptococcus aureus*, *Haemophilus influenzae*, *Escherichia coli*, and *Pneumocystis jiroveci*. Pneumonia is a disease that is endemic and is one of the infectious diseases

that spread in most of the developing countries and become a very important issue (Tuhebw, D., Tumushabe, E., Leontsini, E., Wanyenze, 2014).

According to WHO (2016), the main causes of infant mortality are complications of pre-term birth (17%), pneumonia (15%), complications during labor and delivery (11%), diarrhea (9%), and malaria (7%), and contributed by malnutrition nearly half of all deaths of children under five. Pneumonia accounts for 15% of all deaths in children under 5 years or 5.9 million children under five die in one year due to pneumonia. In Indonesia, pneumonia occupying the second place as a cause of death in infants and young children after diarrhea (Kemenkes, 2018). The death rate from pneumonia in children under five in 2016 was 0.11%, while in 2015 amounted to 0.16%. The number of pneumonia in Indonesia in 2016 as many as 568,146 cases, which experienced 36% by children aged <1 year and 64% at age 1-4 years (Azmi et al., 2016). Based on data from the Health Profile of Yogyakarta Special Province (2017), the incidence of pneumonia in the province in 2016 as many as 3,160 cases, consists of 32.3% experienced by age <1 year, and 67.7% experienced by the age of 1-4 year (Kemenkes, 2018). Due to the high incidence of pneumonia in young children, pneumonia is often referred to as "the forgotten pandemic" or "the forgotten pandemic" (Yogyakarta Local Ministry of Health, 2015).

Smoking habits today seems to be a trend that occurs in teenagers and adults in Indonesia. In everyday life, many common people smoke both in public places and inside the house. This indicates that the low public awareness on the health of both himself and the health of others. the prevalence of smokers in Indonesia is more than a third of the population (36.3%) (Kemenkes, 2018). Research conducted previously stated that in Indonesia the number of children of passive smoking as many as 43 million children, 11.4 million were just 0-4 years (Yeimo, 2018). Children are very vulnerable to passive smoking because the respiratory frequency of children more than adults so that smoke can be inhaled more (Radic, Gvozdencovic, Pesic, Zivkovic, & Skodric-Trifunovic, 2011). Yogyakarta Province is a province that falls into the top 15 highest prevalence of smokers in Indonesia, which amounted to 31.6%. Of these, the majority (66.1%) were still smoking in the house, so it has a great opportunity to give bad impact to other family members (Eftekhar, Pourmasumi, Sabeti, & Mirhosseini, 2016). Harmful substances in cigarettes not only can cause health problems in people who smoke but also to the people around him. Passive smokers have a higher risk of developing respiratory infections, lung cancer, and heart disease ischemia, while in fetuses, infants and children have a greater risk of developing incident low birth weight babies, bronchitis, pneumonia, infection of the ear cavity and asthma (Harris, A., I. Muchtar, 2012).

Smoke pollution inside the home can also be derived from the habit of using anti-mosquito. The use of mosquito coils become a habit in Indonesian society. This is because the geographical condition of Indonesia is a tropical area and the location of the research is an area of endemic malaria and dengue fever (Kulon Progo). The use of mosquito coils as a means to avoid mosquito bites cause respiratory disorders. The presence of air pollution in the home environment will damage the lung's defence mechanisms that facilitate the emergence of respiratory distress (Alnur, 2016)

## 2. Research Methods

Ethical approval was gained from the Universitas Aisyiyah Yogyakarta, Research Ethical Board (Ref No: 696/ KEP-UNISA/X/2018). This research was an observational analytic approach case-control. Population of the study was women with under five experiencing pneumonia, control population target was women with under five with no pneumonia. Sample size of this study is 174, were divided into 87 samples in the case group and 87 samples in the control group. Technique sampling of this study was using non-probability sampling technique. The sample sizes was determined by using Lameshow formulae.

Women who are living within the public health centre working area were included. Women with learning disabilities were excluded because they are more likely to have difficulties on understanding the questions. Data were collected by using a questionnaire in which previously validity tested by using Pearson Product Moment, and reliability tested by using alpha Cronbach. There were two independent variables in this study i.e. family smoking habit and mosquito coils utilisation. Whilst the dependant variable of this study was pneumonia incidence. Data analysis using chi-square and multiple logistic regression. This research was conducted in a public health centre within Kulon Progo municipality.

### 3. Results And Discussion

#### 3.1. Smoking Habit relationship with Genesis Family Pneumonia in Toddlers

In the case group as many as 78 people (89.7%) family of children who have a smoking habit, whereas in the control group as many as 46 people (52.9%) family of children who have the habit of smoking.

**Table 1.** Relationship locations smoking, smoker status father, together with smokers, and the number of cigarettes with the incidence of pneumonia in infants

Variables	Pneumonia				The p-value	OR	CI 95%
	Pneumonia	%	Not Pneumonia	%			
Location smoking							
Inside the house	50	64.1	17	37	0,003	3.046	1.429 to 6.492
Outside the house	28	35.9	29	63			
Smoking status father							
Smoke	72	92.3	39	84.8	0.186	2,154	0.677 to 6.857
Do not smoke	6	7.7	7	15.2			
Togetherness with smokers							
Rarely	0	0	5	10.9	0,000	-	-
Sometimes	1	1.3	1	2.2			
Often	16	20.5	22	47.8			
Every day	61	78.2	18	39.1			
Number of cigarettes smoked / day							
light smokers ( $\leq 10$ cigarettes)	13	16.7	27	58.7	0,000	7.105	3.079 to 16.394
moderate smokers (11-20 bars)	65	83.3	19	41.3			
heavy smokers ( $\geq 20$ cigarettes)	-	-	-	-			

Based on the analysis on the variables smoking habits of family members showed no association ( $p = 0.000$ ) between smoking habits of family members with the incidence of pneumonia in children under five in the region of Puskesmas Sentolo 1 Kulon Progo. Toddlers who live with families who have a smoking habit 7.725 times the risk of pneumonia (OR = 7.725; 95% CI = 3.442 to 17.334). Their family members at home who has the habit of smoking is one factor that can increase the risk for respiratory diseases. This is due to indoor air pollution caused by the pollution from cigarette smoke may disrupt the respiratory tract defense mechanisms that will lead to pneumonia in infants.

The results are consistent with research conducted previously, which states that children who live with family members who smoked in the last 1 month are significantly more likely to develop pneumonia than children who live with family members who do not have the habit of smoking in the 1 last month with an OR of 4.4 times (Lin, P.-L., Huang, H.-L., Lu, K.-Y., Chen, T., Lin, W.-T. Lee, C.-H., & Hsu, 2010). Search number of cigarettes smoked by family at home toddlers also performed in this study. The results of this study indicate that there is a statistically significant relationship between the number of cigarettes smoked per day by the incidence of pneumonia in infants ( $p = 0.000$ ). Toddlers will be 7.105 times greater risk of suffering from pneumonia if staying with a family member who is a smoker who spent more than 10 cigarettes per day.

This result is also supported by research conducted previously that states that a child with a healthy immune system, in particular natural defense to protect the lungs against pathogenic agents who are weak have a high degree of vulnerability to pneumonia (Wardlaw, T., Johansson, E. & Hodge, 2008). Especially if the children concerned are in a state of malnutrition or exposure to adverse environmental factors such as air pollution and cigarette smoke exposure. Long time exposure, especially with regard to the element of air was polluted and inhaled by the respiratory tract, the longer it will increasingly accumulate, causing inflammation in the airways so vulnerable to attack by disease.

In the smoking status variable father did not find any correlation ( $p = 0.186$ ) between smoking status father toddlers with pneumonia in children under five. The lack of association between variables smoker status father of a toddler with the incidence of pneumonia in children under five in the region the public health centre because most toddlers either case group and the control group had a father

with smoking (percentage of the status of the father smoking in the case group and the control group equally -Same height).

Statistical test results in this study, 2,154 OR value can be concluded that children who had a father with smoking habits 2,154 times more likely to suffer from pneumonia compared to infants whose fathers nonsmokers. Results were in line with (Karki, S. Fitzpatrick AL, 2014) said in a Teaching Hospital in Nepal, that parents of toddlers who smoke have a risk four times greater for babies exposed to pneumonia.

Search on the location of smoke families showed that most respondents in the case group activity smoking in the house as many as 50 respondents (64.1%). The results are inversely proportional to the data in the control group there are only 17 respondents (37%) who have a habit of smoking in the house. Cigarette smoke present in the house will be a hedge against a family member's health, especially in children under five. Passive smokers are more susceptible to illness than active smokers. It is caused by toxins contained in cigarette smoke released by the smoker in the form of carbon monoxide and hydrogen cyanide can interfere with the transport of oxygen in the blood and interfere with the channel. Cigarette smoke coming from the family home is an ingredient of pollution in space or shelter toddler. Continuous exposure will have an impact on the incidence of respiratory distress (Harris, A., I. Muchtar, 2012)

Old toddler togetherness with family members who have the habit of smoking has a statistically significant relationship ( $p = 0.000$ ). The results of this study are similar to studies conducted in Taiwan showed that the length of time of exposure to tobacco smoke in children less than 2 hours or more than 3 hours in a week appeared at risk of causing interference wheezing (Lin, P.-L., Huang, H.-L., Lu, K.-Y., Chen, T., Lin, W.-T. Lee, C.-H., & Hsu, 2010). Likewise, the results of research conducted in Portugal, toddlers who are often exposed to cigarette smoke turned out to be almost 82% of them have problems with breathing (Pereira, E., Torres, L., Macedo, J. & Medeiros, 2010).

### 3.2. Mosquitoes Drug Use Fuels relationship with Genesis Pneumonia in Toddlers

In the case group were 53 people (60.9%) family of children who have a habit of using mosquito coils, while the control group of 27 people (31%) family of children who have a habit of using a mosquito coil.

**Table 2.** Relationship frequency of use of mosquito coils with the incidence of pneumonia in infants

Variables	Genesis Pneumonia		The p-value		OR	CI 95%
	Pneumonia	%	Not Pneumonia	%		
Frequency of Use						
≤3kali / week	25	31.3	14	17.5	0,692	1.206
≥4 times / week	28	35	13	16.3		0.477 to 3.050

In the variable use mosquito coils, the statistical analysis shows that there is a significant association between the use of mosquito coils with the incidence of pneumonia in children under five in the region of public health centre ( $p = 0.000$ ) which states that there is a significant association between the use of mosquito coils with ARI in 2012 with a p-value of 0.0003 (Kasumba et al., 2016).

According to (Liu, W., Zhang, J., Hashim, JH J.Hashim Jalaludim. J., Hashim, Z., & Goldstein, 2013), the habit of burning mosquito coil in the room which is usually done by households in Asia, Africa, and South America is to produce smoke that can effectively control mosquitoes. But the real smoke produced is identified as a volatile organic material containing ultrafine particles are smooth, which can be a risk of the incidence of respiratory infections and chronic pulmonary obstructive. Described burn a mosquito repellent coil is equivalent to 75-137 burning cigarette smoke containing solid particles.

In this study, showed that the influence of the frequency of the use of mosquito coils have 1.2 times the risk of infants suffering from pneumonia (OR = 1.206; 95% CI = 0.477 to 3050) but did not find a statistically significant relationship ( $p = 0.692$ ) between the frequency of use mosquito coils with pneumonia. The absence of a relationship between the frequency of the use of mosquito coils with the incidence of pneumonia in infants caused by analysis of data in the study showed that the number of survey respondents in both the case group and control group using mosquito coils with a frequency

≤3 times / week almost as numerous as the number of respondents who use mosquito coils with a frequency ≥4 times / week.

Most of the respondents admitted using mosquito coils only carried out when deemed lot of mosquitoes and require mosquito repellent while most respondents use mosquito coils become routine carried out at night to protect themselves from mosquito biting and is considered as an effort to prevent disease caused by the bite mosquito considering the area where research is endemic malaria and dengue fever. In addition, the use of mosquito usually not evenly across the room in the house and did not do a full day but only in certain places like the bedroom and do just the evenings.

These results are consistent with other research showed frequent use mosquito incense smoke for toddlers who are often protected at risk 2 times with pneumonia than those who rarely (Gainau, Rantetampang, Pongtiku, & Mallongi, 2019). The results of this study are supported by research (Liu, W., Zhang, J., Hashim, JH J.Hashim Jalaludim. J., Hashim, Z., & Goldstein, 2013) which states the burning mosquito coil is a combustion process that is created is not perfect (only effect smoldering) of the basic ingredients of biomass that have indications of character pollutant Utara other solid particles and smooth, PAH, VOC and aldehydes which have the ability irritant and suspected of having carcinogenic effects. Yag as much research conducted on the products of combustion of biomass such as wood stove in the kitchen,

#### 4. Conclusion

There is a statistically significant relationship between smoking family, the location of smoking, number of cigarettes in the suction, and the old together with smokers with the incidence of pneumonia in infants whereas paternal smoking status was not associated with the incidence of pneumonia in infants. A statistically significant relationship between the use of mosquito coils with pneumonia whereas no statistically significant relationship between the frequency of the use of mosquito coils with the incidence of pneumonia in infants.

#### 5. Suggestion

A cadre training program regarding the introduction of the symptoms of pneumonia and pneumonia prevention efforts so as to enhance public participation in the context of early detection and treatment seeking pneumonia toddlers to health care facilities or activities seeking care can be achieved.

#### References

- Alnur, R. (2016). *Relationships Family Smoking Habit house with pneumonia incidence in Toddlers*. Gadjah Mada University.
- Azmi, S., Aljunid, S. M., Maimaiti, N., Ali, A. A., Muhammad Nur, A., De Rosas-Valera, M., ... Roberts, C. (2016). Assessing the burden of pneumonia using administrative data from Malaysia, Indonesia, and the Philippines. *International Journal of Infectious Diseases*, 49, 87–93. <https://doi.org/10.1016/j.ijid.2016.05.021>
- Eftekhari, M., Pourmasumi, S., Sabeti, P., & Mirhosseini, F. (2016). Relation of Second Hand Smoker and Effect on Pregnancy Outcome and Newborns Parameters. *Women's Health & Gynecology*, 2(2), 022.
- Gainau, E., Rantetampang, A. L., Pongtiku, A., & Mallongi, A. (2019). Factors Influence of Acute Respiratory Infection Incidence to Child Under Five Years in Timika Jaya Health Primary Mimika District. *Journal of Science and Healthcare Research*, 4(1), 315–325.
- Harris, A., I. Muchtar, R. R. (2012). *Smoke as Pollutants in the room*. CDK189, 39, 1: 17-19. University of Indonesia.

- Karki, S. Fitzpatrick AL, S. S. (2014). Risk Factors for Pneumonia in Children under 5 Years in a Teaching Hospital in Nepal. *Kathmandu Univ Medical Journal (KUMJ)*.
- Kasumba, J., Hettick, B., French, A., Wickliffe, J. K., Lichtveld, M. Y., Hawkins, W. B., ... Klein, D. (2016). Analysis of Pesticides and Toxic Heavy Metals Contained in Mosquito Coils. *Bulletin of Environmental Contamination and Toxicology*, 97(5), 614–618. <https://doi.org/10.1007/s00128-016-1938-9>
- Kemenkes. (2018). *Data dan Informasi Profil Kesehatan Indonesia (Data and Information of Indonesian Health Profile)*.
- Lin, P.-L., Huang, H.-L., Lu, K.-Y., Chen, T., Lin, W.-T. Lee, C.-H., & Hsu, H.-M. (2010). Second-Hand Smoke Exposure and The Factors Associated with Avoidance Behavior Among the Mothers of Pre-School Children: A School-Based Cross-Sectional Study. *BMC Public Health*.
- Liu, W., Zhang, J., Hashim, JH J.Hashim Jalaludim. J., Hashim, Z., & Goldstein, B. (2013). Mosquito Coil Emissions and Health Implications. *Environ Health Perspect*, 1454–1460.
- Pereira, E., Torres, L., Macedo, J. & Medeiros, M. (2010). Environment Effects of Tobacco Smoke on Lower Respiratory System of Children under 5 Years Of Age. *Portuguese Revsaude Publica*.
- Radic, S. D., Gvozdenovic, B. S., Pesic, I. M., Zivkovic, Z. M., & Skodric-Trifunovic, V. (2011). Exposure to tobacco smoke among asthmatic children: Parents' smoking habits and level of education. *International Journal of Tuberculosis and Lung Disease*, 15(2), 276–280.
- Tuhebwe, D., Tumushabe, E., Leontsini, E., Wanyenze, R. (2014). Pneumonia Among Children Under Five in Uganda: Symptom Recognition and Actions Taken by caretakers. *African Health Sciences*, 14(4).
- Wardlaw, T., Johansson, E. & Hodge, M. (2008). *Pneumonia: The Forgotten Killer of Children, UNICEF, Division of Communication, 3 United Nations Plaza, New York 10017, USA or WHO Press, Avenue Appia 10.1211 Geneva 27*.
- WHO. (2016). Children: Reducing Mortality.
- Yeimo, Y. (2018). Environmental Factors Associated with Pneumonia in Children Under-Five in Nduga District, Papua. *Journal of Epidemiology and Public Health*, 3(3), 307–311. <https://doi.org/10.26911/jepublichealth.2018.03.03.01>
- Yogyakarta Local Ministry of Health. (2015). *Profil Kesehatan Daerah Istimewa Yogyakarta*. Yogyakarta.