

# The Risk of Pneumonia among Toddlers in Lambatee, Aceh

## Risiko Kejadian Pneumonia pada Anak Bawah Lima Tahun di Lambatee, Aceh

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### Abstract

Pneumonia is one of very important global health problems among toddlers, especially in developing countries. Nowadays, pneumonia is one of largest causes of child mortality, especially in newborn period. In Aceh Province, pneumonia disease is the eighth of 25 biggest diseases found at primary health care with 112 cases, while pneumonia among outpatient sufferers in Aceh reached 434 cases (29.03%). This study aimed to determine factors related to incidence of pneumonia toddlers in Lambatee Village, Darul Kamal Subdistrict, Aceh Besar District. This study was analytical descriptive using cross-sectional design. Samples of study were mothers and toddlers amounted to 48 people. Data were collected on August 3<sup>rd</sup> – 14<sup>th</sup>, 2015 by interview, observation. Multivariate analysis used logistic regression. Results of study showed that the factor physical condition of house sanitation influenced to trend among toddlers suffering from pneumonia with p value  $0.01 < 0.05$ , the highest OR score 6.431 and 95% CI = 1.559 - 26.532. In conclusion, physical condition of house sanitation had six times risk of causing trend of pneumonia incidence among toddlers in Lambatee Village, Darul Kamal Subdistrict, Aceh Besar District.

**Keywords:** Incidence, physical sanitation, housing, pneumonia, toddlers

### Abstrak

Pneumonia merupakan salah satu masalah kesehatan global yang sangat penting pada anak bawah lima tahun (balita), khususnya pada negara-negara berkembang. Saat ini, pneumonia merupakan salah satu kasus penyebab kematian pada anak terbesar, terutama pada periode baru lahir. Di Provinsi Aceh, penyakit pneumonia merupakan penyakit urutan ke-8 dari 25 penyakit terbesar yang ditemukan di puskesmas dengan jumlah 1.112 kasus. Sedangkan besarnya kasus pneumonia pada penderita rawat jalan di Aceh mencapai 434 kasus (29,03%). Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan kejadian pneumonia pada balita. Penelitian bersifat analitik dengan desain potong lintang. Sampel penelitian adalah ibu dan balita yang berjumlah 48 orang. Pengumpulan data dilaksanakan tanggal 3 – 14 Agustus 2015 dengan wawancara dan observasi. Analisis multivariat menggunakan regresi logistik. Hasil penelitian menunjukkan bahwa faktor kondisi sanitasi rumah secara fisik berpengaruh terhadap kecenderungan balita menderita penyakit pneumonia dengan nilai  $p < 0,01 < 0,05$ , dengan nilai OR tertinggi 6,431 dan CI 95% = 1.559 - 26.532. Disimpulkan bahwa kondisi sanitasi rumah secara fisik memiliki peluang enam kali menyebabkan terjadinya pneumonia pada balita di Desa Lambatee, Kecamatan Darul Kamal, Kabupaten Aceh Besar.

**Kata kunci:** Insiden, kondisi fisik rumah, sanitasi, pneumonia, balita

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## Introduction

Pneumonia is one of very important global health problems among toddlers, especially in developing countries. This disease is because of *pneumococcus* virus that mostly attacks those aged older than 65 years and children who suffer from the decrease of body immune.<sup>1</sup> Nowadays, pneumonia is one of largest causes of child mortality, especially in newborn period.<sup>2</sup> So that, World Health Organization (WHO) in cooperation with United Nations Children's Fund (UNICEF) make The Integrated Management of Childhood Illness (IMCI). The aim of this activity is to decrease number of child death and illness due to diseases including pneumonia.<sup>3</sup> Number of child death due to pneumonia reached 30% in 1993, so the fourth Millennium Development Goals (MDG4) was to decrease number of pneumonia illness by two-third of the total from 1990 to 2015.<sup>4</sup>

Directorate General of Transmitted Disease Eradication and Environmental Health at Health Ministry of the Republic of Indonesia estimated that mortality due to pneumonia as the major cause of Acute Respiratory Infection (ARI) in Indonesia in the late 2000 was as many as five cases between 1,000 infants and toddlers. This means that 150,000 infants and toddlers died every year due to pneumonia, or 12,500 victims per month or 416 cases in a day or 17 per hour or an infant and a toddler every five minutes.<sup>5</sup> In Aceh Province, ARI pneumonia disease is the eighth of 25 major diseases found at primary health care as many as 1,112 cases. Meanwhile, Upper Respiratory Infection (URI) pneumonia disease among outpatients in Aceh reached 434 cases (29.03%).<sup>6</sup>

Darul Kamal Subdistrict is one of areas in Aceh Besar consisting of 14 villages, namely Biluy, Blangkiree, Empetring, Lhang, Lamsod, Lambatee, Lambaro Biluy, Lambeut, Lamkunyut, Lamtadok, Manedeah, Neusok, Turam, Teubaluy. Pneumonia case in Darul Kamal Subdistrict occurs from year to year, even though preventive actions have been performed. Based on data of pneumonia disease as obtained from Darul Kamal Aceh Besar Primary Health Care on January 22<sup>nd</sup>, 2015, there were 47 toddlers by 11.80% case in Lamkunyut Village in 2012, 40 toddlers by 8.38% case in Lambatee Village in 2013 and pneumonia case more increased in 2014 that reached 13.39% of 77 toddlers in the Village.<sup>7</sup>

Based on results of observation, there was data showing that Lambatee Village is a village located in the wide plain consisting of paddy fields and coconut plantation, so many villagers work as farmers that own cattles, such as cows, buffaloes and goats. As villagers in general, the location of stockyards is near to the house, such as at the house backyard and side yard, even there is any stockyard that integrate with the walls. Such condition of stockyard near to the house would affect the hygiene of house en-

vironment, especially physical condition of house environment that would be unhealthy, particularly in rainy season. The villagers' house walls are mostly made of woods or bricks that have not been plastered. These villagers still use woods and coconut fibre for cooking. The interesting part is that when the harvest season is over, the villagers always burn straws, so the condition of village is full of smog. Study proved that smoke of firewood in the kitchen had the same effects with the smoke around the house environment to women and children, especially toddlers.<sup>8,9</sup>

Pneumonia incidence among toddlers is influenced by many factors, such as socio-economic status, behavior, physical condition of house, drinking water source, condition of kitchen ventilation, household wastewater disposing system.<sup>3</sup> WHO identified that environmental factors which could increase the child vulnerability of pneumonia was air pollution in the room because of cooking and warming with fuel such as woods or waste, and because of living in crowded house and smoker parents.<sup>10</sup> Therefore, based on such phenomenon, it needed a study to find risks affecting on the incidence of pneumonia disease among toddlers, so proper interventions to solve the incidence could be determined. This study aimed to determine factors related to incidence of pneumonia toddlers in Lambatee Village, Darul Kamal Subdistrict, Aceh Besar District.

## Method

This study was analytical descriptive using cross-sectional design. Subjects of study were mothers having toddlers and primary health care workers. The total of toddlers' mothers that became samples were 48 people. The total of sample was determined using Slovin formula with 95% precision value or 0.05. Samples were taken using proportional random sampling method in four hamlets around Lambatee Village. Independent variables in this study were cattle ownership, distance between house and stockyard, hygiene of house environment and physical condition of house sanitation and the dependent variable was incidence of pneumonia in toddlers. Data were collected on August 3<sup>rd</sup> – 14<sup>th</sup>, 2015 by interview, observation to secondary data concerning incidence of pneumonia in toddlers as well as observation on the distance between house and stockyard, physical condition of house sanitation and hygiene of house environment. In this study, there was no intervention to subjects of study. Steps of data processing were editing, coding, transferring and tabulating. Data analysis used analysis of univariate, bivariate with chi square, and multivariate with logistic regression, using a significant level of 0.05 (5%) to determine the risk of the independent variables on the dependent variable and the estimation of the risk (odds ratio) of pneumonia incidence among toddlers.

## Results

Data of respondents' characteristics were based on age of mother, age of toddler, maternal education, maternal occupation, cattle ownership, the distance between house and stockyard, physical condition of house sanitation and hygiene of house environment.

Based on Table 1, mothers of toddlers who became respondents were mostly aged 18 – 40 years, as many as 45 people (93.8%) with 31 (66.7%) suffering from pneumonia. Then toddlers were mostly aged > 3 – 5 years as many as 35 toddlers with number of pneumonia sufferers was 23 toddlers (62.9%). According to maternal education, mothers were mostly graduated from senior high school as many as 29 (60.4%) with number of toddlers suffering from pneumonia was 21 toddlers (69.9%). Then based on maternal occupation, most of mothers were housewives as many as 33 (68.8%) with number of toddlers suffering from pneumonia was 22 (64.6%). For the cattle ownership, most of mothers had cattles that were 33 mothers (68.8%) with number of toddlers suffering from pneumonia was 22 (66.7%). Distance of house and stockyard was mostly more than 10 meter as amounted to 40 mothers (83.3%) with number of toddlers suffering from pneumonia was 28 (70%). Hygiene of house environment was mostly bad as many

as 27 people (56.25%) with number of toddlers suffering from pneumonia was 16 (59.26%). Then for physical condition of house sanitation, as many as 33 people (66.67%) were at bad category with number of toddlers suffering from pneumonia was 26 (81.25%).

The relation between the independent variables with the dependent variable as the results was presented in the following table (Table 2).

Based on Table 2, there was p value of each independent variable as follows: cattle ownership = 0.125, distance between house and stockyard = 0.120, hygiene of house environment = 0.032, physical condition of house sanitation = 0.004. Of the four variables, the cattle ownership and distance between house and stockyard had p value > 0.05, therefore these two variables were unqualified for multivariate analysis. Meanwhile, the variable hygiene of house environment as well as physical condition of house sanitation were qualified for multivariate test because of p value < 0.05. The result was presented in Table 3.

Based on Table 3, after test of variable physical condition of house sanitation and hygiene of house environment was conducted, there was a value that variable physical condition of house sanitation had influence to incidence of pneumonia among toddlers (p value 0.010 <

**Table 1. Characteristics of Respondents and Pneumonia Incidence among Toddlers**

Characteristics	Category	n	%	Pneumonia			
				Exist	%	None	%
Age of mother	18 – 40 years old	45	93.75	31	66.67	14	33.33
	41 – 60 years old	3	6.25	2	66.67	1	33.33
Age of toddler	< 2 years old	10	20.83	8	80.00	2	20.00
	2-3 years old	3	6.25	2	66.67	1	33.33
	> 3-5 years old	35	72.92	23	62.86	12	37.14
Maternal education	Elementary school	2	4.17	2	100	0	0.00
	Junior high school	8	16.67	4	50.00	4	50.00
	Senior high school	29	60.42	21	68.97	8	31.03
	Diploma 3	9	18.75	6	66.67	3	33.33
Maternal occupation	Housewife	33	68.75	22	63.64	11	36.36
	Civil servant	6	12.50	4	66.67	2	33.33
	Employee	9	18.75	7	77.78	2	22.22
Cattle ownership	Exist	33	68.75	22	66.67	11	33.33
	None	15	31.25	11	73.33	4	26.67
Distance between house and stockyard	< 10 Meter	8	16.67	5	62.50	3	37.50
	> 10 Meter	40	83.33	28	70.00	12	30.00
Hygiene of house environment	Good	21	43.75	17	80.95	4	19.05
	Bad	27	56.25	16	59.26	11	40.74
Physical condition of house sanitation	Good	16	33.33	7	43.75	9	56.25
	Bad	32	66.67	26	81.25	6	18.75

**Table 2. Relations Pneumonia on Toddlers**

Risk Factor	B	S.E	p Value	Exp (B)	95% CI
Physical condition of house sanitation	2.466	0.847	0.004	11.778	2.240 - 61.94
Hygiene of house environment	-2.352	1.096	0.032	0.095	0.011 - 0.816
Cattle ownership	-1.810	1.181	0.125	0.164	0.016 - 1.657
Distance between house and stockyard	-1.641	1.055	0.120	0.194	0.024 - 1.534

Table 3. Analysis with Logistic Regression Test

Risk Factor	B	S.E	p Value	Exp (B)	95% CI
Physical condition of house sanitation	1.861	0.723	0.010	6.431	1.559 - 26.532
Hygiene of house environment	-1.276	0.755	0.091	0.279	0.064 - 1.226

0.05), the highest Exp (B)/OR score 6.431 and 95% CI = 1.559 – 26.532, which means that bad physical condition of house sanitation had 6 times risk of causing incidence of pneumonia on toddlers.

### Discussion

This study found that the factor physical condition of house sanitation had a relation with pneumonia disease incidence among toddlers. This proved that physical condition of house, such as humid floors, dusty walls, the use of firewoods for cooking and cigarette smoke inside house became risk factors for toddlers suffering from pneumonia. Study conducted by Dherani,<sup>11</sup> found that pneumonia incidence among children had 1.8 times risk higher on children exposed to smoke of solid fuel like firewoods than children who were not exposed to.

Study conducted by Thorsson,<sup>8</sup> found that the high biomass smoke exposure and smoke of firewood outside opened room could arise health risk/pneumonia quite high among women and children in household. Even study conducted by Gittins,<sup>12</sup> showed that effects of air pollution because of smoke played a role to the deaths among toddlers suffering from pneumonia. Study of Yuwono,<sup>13</sup> concerned on physical environment of house factors related to pneumonia incidence among toddlers in work area of Kawunganten Primary Health Care, Cilacap District. He found that there was a significant relation between physical environment of house factors, such as types of floor, condition of walls, width of ventilation, residence density level, humidity level, the use of wood fuel and the smoking habit of family members with pneumonia incidence among toddlers.

Study of Sugihartono and Nurjazuli,<sup>14</sup> concerned on Risk Factor Analysis of Pneumonia Incidence on Under-Five-Year-Old Children in The Working Area of Public Health Center, Sidorejo, Pagar Alam City. This study found that type of house floor was 10 times higher, presence of smoking family members was 8 times higher of causing pneumonia incidence among toddler. Another study that found relation between house sanitation and pneumonia incidence among toddlers was the study conducted by Pramudiyani and Prameswari in 2010.<sup>15</sup> If this study was compared to other related studies above, there were similarities or relation found, particularly from observed subjects and objects as well as obtained results. The difference was found in the depth of observed aspects that highlighted physical condition of child’s bed-

room namely mosquito repellent. Generally, pneumonia incidence among toddlers in Indonesia was due to condition of physical house environment other than social, demographic and economic factors.<sup>16</sup>

However, if it was observed deeper, this physical condition of house sanitation problem was tightly related to behaviors, so environment-based disease transmission like pneumonia occurred. This means that if people could change bad behaviors, such as not smoking inside house, not carrying toddlers when going to cook in the kitchen, maintaining floor to be not humid, keep the floors clean without dust especially for wood-made walls; thus, incidence of this disease could be prevented. Then Kasnodihardjo,<sup>17</sup> in study titled “Description of Environment Sanitation, Maternal Behavior and Child Health in 2009” also found relation between behavior and transmission of environment-based disease among toddlers. This study found that it was only 19.2% families of toddlers suffering from pneumonia were not smoking inside the house, which means that there was possibility about 80.8% having smoking habit inside house.

Another similar study also proved that toddlers who lived in the house with family members that had smoking habit had 2.24 times higher risk of suffering from pneumonia than toddlers who did not live in the house with family members that had smoking habit.<sup>18</sup> This study and related studies above proved that the factor unhealthy environment of house as a result of bad behavior could be the risk factor affecting toddlers suffer from pneumonia. This was in accordance with publication of WHO that environmental factors which could increase child vulnerability to pneumonia were air pollution in the room because of cooking, warming by using fuel such as woods or waste, living in a crowded house as well as smoker parents.<sup>10</sup> To solve such problem, the most effective strategy was by education to people in order to increase their care or awareness of health, especially family. Most of maternal’ education level in Lambatee Village were senior high school level (60.42%), but had the most dominant number of toddlers suffering from pneumonia (68.97%). By such education level, mothers in the Village had got a knowledge of healthy and hygienic lifestyle, yet due to behavior of other family members especially smoker husbands.

Furthermore, socio-economic condition also influenced house condition like cooking which used firewoods and coconut fibre, so physical condition of house envi-

ronment had not met health requirement. This condition was also influenced by location of the village around paddy field and plantation area, therefore in particular season, the village was full of smoke because of straw burning after harvest of rice. This study also found that most of toddlers (62.86%) aged > 3 – 5 years suffered from pneumonia, which means that those toddlers had been long exposed to the risk factor up to the age of more than three years still suffered from pneumonia. So that, physical condition of house environment should be repaired by management of house ventilation, health counseling and improvement of health worker's capacity in handling of pneumonia among toddlers in order to prevent transmission through air to healthy toddlers.<sup>1,2</sup>

Then for condition in relation to smoke around the house environment or outdoor, it needed special actions or strategies, such as managing straw burning that should be limited between sunset to reduce pollution level.<sup>8</sup>

### Conclusion

This study shows that physical condition of house sanitation has six times risk of trend of pneumonia incidence among toddlers, which means that bad condition of house sanitation will contribute to the pneumonia incidence among toddlers six times if compared to good condition of house sanitation.

### Recommendation

Village officials should empower communities to repair physical condition of house sanitation, then there should be separation of house with kitchen using firewoods. Moreover, village officials should always provide education to change people's behavior, such as smoking inside house.

### References

1. Onyango D, Kikvi G, Amukoye E, Omolo J. Risk factors of severe pneumonia among children aged 2-59 months in western Kenya: a case control study. *The Pan African Medical Journal*. 2012;13:45.
2. Campbell H, el Arifeen S, Hazir T, O'Kelly J, Bryce J, Rudan I, et al. Measuring coverage in MNCH: challenges in monitoring the proportion of young children with pneumonia who receive antibiotic treatment. *PLoS Med*. 2013;10 (5):1–6.
3. Kosai H, Tamaki R, Saito M, Tohma K, Alday PP, Tan AG, et al. Incidence and risk factors of childhood pneumonia-like episodes in Biliran Island, Philippines—a community-based study. *PLoS One* [serial in internet]. 2015 [cited 10 Aug 2016]; 10 (5): e0125009. Available from: <http://dx.plos.org/10.1371/journal.pone.0125009>
4. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. *Bulletin of World Health Organization*. 2008; 86 (5): 408–16.
5. Direktorat Jendral Pencegahan dan Pengendalian Penyakit dan Lingkungan Kemenkes Republik Indonesia. Pedoman pengendalian infeksi pernafasan akut. Jakarta: Kementerian Kesehatan Republik Indonesia; 2011.
6. Dinas Kesehatan Provinsi Aceh. Profil kesehatan Aceh. Banda Aceh: Dinas Kesehatan Provinsi Aceh; 2014.
7. Puskesmas Darul Kamal. Profil kesehatan puskesmas. Aceh Besar: Puskesmas Darul Kamal; 2014.
8. Thorsson S, Holmer B, Andjelic A, Lindén J, Cimerman S, Barregard L. Carbon monoxide concentrations in outdoor wood-fired kitchens in Ouagadougou, Burkina Faso - implications for women's and children's health. *Environmental Monitoring and Assessment*. 2014; 186(7): 4479–92.
9. Gouveia N, Fletcher T. Respiratory diseases in children and outdoor air pollution in São Paulo, Brazil: a time series analysis. *Occupational and environmental medicine* [serial on internet]. 2000 [cited 2016 Jan 6]; 57(7): 477–83. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1739993&tool=pmcentrez&rendertype=abstract>
10. World Health Organization [homepage in internet]. Pneumonia. 2015 [cited 2016 Apr 18]. Available from: <http://www.who.int/mediacentre/factsheets/fs531/en/>
11. Dherani M, Pope D, Mascarenhas M, Smith KR, Weber M, Bruce N. Indoor air pollution from unprocessed solid fuel use and pneumonia risk in children aged under five years: A systematic review and meta-analysis. *Bulletin of World Health Organization*. 2008; 86 (5): 390–4.
12. Gittins M, McNamee R, Carder M, Beverland I, Agius RM. Has the short-term effect of black smoke exposure on pneumonia mortality been underestimated because hospitalisation is ignored: findings from a case-crossover study. *Environmental Health* [serial on internet]. 2013 [cited 2016 Feb 5]; 12 (1): 97. Available from: <http://www.ehjournal.net/content/12/1/97>
13. Yuwono TA. Faktor – faktor lingkungan fisik rumah yang berhubungan dengan kejadian pneumonia pada anak balita di wilayah kerja puskesmas [postgraduate thesis]. Semarang: Program pascasarjana Universitas Diponegoro Semarang; 2008.
14. Sugihartono, Nurjazuli. Analisis faktor risiko kejadian pneumonia pada balita di wilayah kerja Puskesmas Sidorejo Kota Pagar Alam: risk factor analysis of pneumonia incidence on under-five-year-old children in the working area of public health center , Sidorejo, Pagar Alam City. *Jurnal Kesehatan Lingkungan Indonesia*. 2012;11(1):82–6.
15. Pramudiyani NA, Prameswari GN. Hubungan antara sanitasi rumah dan perilaku dengan Kejadian pneumonia balita. *Jurnal Kesehatan Masyarakat*. 2011; 6(2): 71–8.
16. Anwar A, Dharmayanti I. Pneumonia pada anak balita di Indonesia. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2014; 8 (8): 359–65.
17. Kasnodihardjo, Elsi E. Deskripsi sanitasi lingkungan, perilaku ibu, dan kesehatan anak. *Kesmas: Jurnal Kesehatan Masyarakat Nasional*. 2013; 7(9): 415–20.
18. Hartati S. Analisis faktor resiko yang berhubungan dengan kejadian pneumonia pada anak balita Di RSUD Pasar Rebo Jakarta [postgraduate thesis]. Depok: Fakultas Ilmu Keperawatan Universitas Indonesia; 2011.