



Risk Factor Analysis of Acute Respiratory Infection on Children Under Five Years Old in Tanjung Pering Village Ogan Ilir

Elvi Sunarsih^{a*}, Imelda G. Purba^b

^{a,b}*Public Health Faculty, Sriwijaya University, Indonesia, Occupational Health and Safety*

^a*Environmental Health Department*

^a*Email: elvisunarsih@gmail.com*

Abstract

Acute respiratory infection (ARI) is a main cause of morbidity and mortality disease infection on children under five years old especially for developing country. Tanjung Pering Village is a village in Ogan Ilir Regency where still many houses which is not fulfilled the health requirement. The unfulfilled health requirement of physical house environment and indoor air pollution were expected become the risk factor of acute respiratory infection on children under five years old in Tanjung Pering Village. The purpose of this research was to analyze the risk factor of acute respiratory infection on children under five years old in Tanjung Pering Village Ogan Ilir Regency 2014. This research used cross-sectional design. The research was conduct in Tanjung Pering Village Ogan Ilir Regency. Population of this study were all children under five years old who lived in Tanjung Pering Village 2014. Whereas the sample were 60 toddlers which was taken using simple random sampling technique. Data analysis was performed with univariate and bivariate analysis. Statistical test used chi-square test for bivariate analysis. Bivariate analysis result showed that variable which associated statstically with acute respiratory infection incidence on children under five years old were the type of wall (p-value = 0,023) and the type of floor (p-value = 0,045).

* Corresponding author.

E-mail address: elvisunarsih@gmail.com.

Whereas nutritional status (p-value = 1,000); exclusive breastfeeding (p-value = 0,673); bedroom density (p-value = 0,312); ventilation condition in the morning/afternoon (p-value = 0,526); the type of roof (p-value = 1,000); the type of cooking fuel (p-value = 1,000); smoking habit in the house (p-value = 0,262); and immunization status (p-value = 0,389) had not associated statistically with acute respiratory infection incidence on children under five years old. It is concluded that the type of wall and the type of floor have significant correlation with acute respiratory infection incidence on children under five years old in this research. Suggestion for this research are cleaning house and floor routinely everyday, repair the hole/broken walls and floors and also improve the community's knowledge through counseling activity.

Keywords: Acute respiratory infection; children under five years; the physical house environment; indoor air pollution; risk factor

1. Introduction

Acute Respiratory Infection (ARI) is a respiratory disease infection which become main cause of morbidity and mortality disease infection on children under five years old especially for low and intermediate percapita income country [1]. Acute respiratory infection on children under five years old was expected 0,28 episode per children/year in developing country and 0,05 episode per children/year in developed country. It showed that there were 156 million new episodes per children/year where 151 million episodes (96,7%) were happen in developing country. Major cases were happen in India (43 million), China (21 million), Pakistan (10 million), and each Bangladesh, Indonesia, and Nigeria were 6 million episodes [2].

Children under five years old is susceptible age group to infected by ARI and even causing the death. Study in [3] found the immunization system of children's under five years old has still not forming well and also laryngeal branch which relative short and narrow will be tighten the respiratory tube. The susceptible of children's under five years old immune system are influence some factors such as malnutrition, incomplete immunization and unexclusive breastfeeding. The physical house condition which is not fulfilled the health requirement can be the trigger of ARI infection on children under five years old. The physical house condition itself consist of dwelling density, wall type, roof type, floor type, the presence of indoor air pollution and unmate's behavior [4]. Ogan Ilir Regency is one of regency with increasing case number every year. In 2012, ARI case number were 33.524 [5]. Tanjung Pering Village is a village which located in Ogan Ilir Regency where the physical house environment which is not fulfilled the health requirement and indoor air pollution caused by unmate's behavior were expected becoming risk factor of acute respiratory infection on children under five years old in Tanjung Pering Village.

The number of ARI risk factors related with physical house condition will be increase the morbidity rate which caused by ARI on children under five years old. This problem will be decreasing the society's health status. So the question for this research, what are the risk factor of acute respiratory infection on children under five years old in Tanjung Pering Village Ogan Ilir Regency 2014?

2. Material and Method

Research method used cross-sectional design. This research was conducted in Tanjung Pering Village Ogan Ilir Regency. Population of this study were all children under five years old who lived in Tanjung Pering Village 2014. Whereas the sample were 60 toddlers which was taken using simple random sampling technique. Data analysis was performed with univariate and bivariate analysis. Statistical test used chi-square test for bivariate analysis.

3. Results

Results of this study are presented in tables 1 & 2. Table 1 shows that majority childrens under five years old were male with proportion 51,7%. The age of children under five years old was ≤ 24 months with proportion 58,3% and > 24 months with proportion 41,7%. Majority nutritional status of childrens under five years old in this research had lack of nutrition with proportion 53,3%. Besides, in this research most of childrens under five years old had given exclusive breastfeeding with proportion 86,7%. Immunization to children under five years old had also be good, where almost of children under five years old had already given immunization with proportion 96,7%. Majority of physical house environment had unfulfill the health requirement with proportion 68,3% and in the morning/afternoon almost respondents opened their ventilation with proportion 95%.

Based on observation showed that the proportion of wall type, roof type, and floor type in succession were 35%; 11,7%; dan 31,7%. Almost of respondents used fulfilled health requirement cooking fuel type with proportion 96%. The result showed that majority respondents there were smoking family's member with proportion 78,3%.

Based on table 2; there are two variables which statstically association, that were wall type (0,023) and floor type (0,045).

4. Discussion

4.1 Relationship Between Nutritional Status with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 1,000$ which mean there was not statistically association between nutritional status with ARI incidence on children under 5 years old. Theoritically, the lack of nutritional status on children under 5 years old can be risk factor, it is related with decreasing immune system which caused by protein deficiency on children. [6] stated that malnutrition on children under five years old more susceptible to infection disease like ARI. Besides, deficiency of nutritional status will causing decreaseof respiratory muscle work while it's doing secretion or cleaning air in the lungs [7].

This research in line with Windarini's and Sumasari's research [8] where there was not significant association between nutritional status with ARI incidence on children under 5 years old ($p\text{-value} = 0,233$). There was not significant association between nutritional status with ARI incidence on children under 5 years old in this research because the quantity of children under five years old which had good nutritional status (46,7%). Besides majority children under five years old had got exclusive breastfeeding (86,7%) and had already

immunization (96,7%). So it's concluded that nutritional status variable had not significant association to ARI incidence on children under 5 years old.

Table 1: Univariate Analysis

Variables	n	%
ARI Incidence on Children Under 5 Years Old		
ARI	47	78,3
Non – ARI	13	21,7
Sex		
Male	31	51,7
Female	29	48,3
Toddler's Age (Month)		
≤ 24 Months	35	58,3
>24 Months	25	41,7
Nutritional Status		
Lack	32	53,3
Good	28	46,7
Exclusive Breastfeeding		
Non-Exclusive	8	13,3
Exclusive	52	86,7
Bedroom Density		
Unqualified	41	68,3
Qualified	19	31,7
Ventilation Condition in the morning/afternoon		
Closed	3	5
Opened	57	95
Wall Type		
Unqualified	21	35
Qualified	39	65
Roof Type		
Unqualified	7	11,7
Qualified	53	88,3
Floor Type		
Unqualified	19	31,7
Qualified	41	68,3
Cooking Fuel Type		
Unqualified	3	5
Qualified	57	95
Smoking Habit in The House		

Presence	47	78,3
None	13	21,7
Immunization Status		
No	2	3,3
Yes	58	96,7

Table 2. Bivariate Analysis

Variables	P-value	RP	CI
Nutritional Status	1,000	0,994	0,762-1,298
Exclusive Breastfeeding	0,673	1,138	0,842-1,537
Bedroom Density	0,312	1,212	0,867-1,695
Ventilation Condition in The Morning/Afternoon	0,526	0,844	0,375-1,901
Wall Type	0,023	1,376	1,093-1,731
Roof Type	1,000	1,108	0,792-1,550
Floor Type	0,045	1,339	1,071-1,675
Cooking Fuel Type	1,000	1,295	1,125-1,492
Smoking Habit in The House	0,262	0,807	0,641-1,015
Immunization Status	0,389	0,630	0,157-2,536

4.2 Relationship Between Exclusive Breastfeeding with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,673$ which mean there was not statistically association between exclusive breastfeeding with ARI incidence on children under 5 years old. Theoretically, exclusive breastfeeding will increasing children's immune system to ARI, it's related with the contents of immune system in mother's milk which consist of glicoprotein, glicolipid, and oligosacharide which had analog function with some bacteria on mucose so it may blocked pathogen bacteria adhesion. This research was similiar with Chalabi's research [9] where there was not significant association between exclusive breastfeeding with ARI incidence on children under 5 years old ($p\text{-value} = 0,07$). But, this research was not similiar with [10] where there was significant association between exclusive breastfeeding with ARI incidence on children under 5 years old ($p\text{-value} = 0,0001$). There was not significant association between exclusive breastfeeding with ARI incidence on children under 5 years old in this research because the high proportion of exclusive breastfeeding (86,7%). Besides, exclusive breastfeeding may give protection effect to ARI incidence for the first year, whereas together along with getting older, the immunoglobulin content in mother's milk will decreasing so the protection effect of

mother's milk to ARI was not significant.

4.3 Relationship Between Bedroom Density with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,312$ which mean there was not statistically association between bedroom density with ARI incidence on children under 5 years old. This research was not in line with Dewi's research [11] where there was significant association between bedroom density with ARI incidence on children under 5 years old ($p\text{-value} = 0,017$). Theoretically, bedroom density which is not fulfilled the health requirement will increasing exposure from other risk factors like smoke cigarette from other smoking family's member. So for a long time, it will increasing the impair of respiratory tube system [12]. Besides, the width of bedroom which is not fulfilled the health requirement, will have oxygen lacking impact in bedroom and will increase the air humidity. There was not significant association between bedroom density with ARI incidence on children under 5 years old in this research caused by the ratio of house ventilation had fulfilled the health requirement (minimal 10% from floor space). Besides, respondents always open the house ventilation (windows/doors) in the morning/afternoon. So, the bedroom density was not associated to ARI incidence on children under 5 years old.

4.4 Relationship Between Ventilation Condition In The Morning/Afternoon with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,526$ which mean there was not statistically association between ventilation condition in the morning/afternoon with ARI incidence on children under 5 years old. Theoretically, ventilation condition is risk factor to ARI incidence on children under 5 years old. It's related with ventilation function as air circulation and natural lighting facilities which may killed the microorganism. There was not significant association between ventilation condition in the morning/afternoon with ARI incidence on children under 5 years old in this research because almost respondents had ventilation width which fulfilled the health requirement (minimal 10% from floor space). Besides, majority respondents always open the ventilation every morning/afternoon. So, ventilation condition was not associated to ARI incidence on children under 5 years old in this research.

4.5 Relationship Between Wall Type with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,023$ which mean there was statistically association between wall type with ARI incidence on children under 5 years old. This research in line with Dewi's research (2014) [13] with $p\text{-value} = 0,000$ and $OR=8,273$. Observation result showed the proportion of respondent's wall type which unfulfilled the health requirement had still high enough (35%). The unqualified wall material such as unplaster wall or wooden wall or boarded wall will produce smooth dust particle, which the particle can be irritation trigger in respiratory tube. So, wall type was associated to ARI incidence on children under 5 years old in this research

4.6 Relationship Between Roof Type with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 1,000$ which mean there was not statistically association between roof type with ARI incidence on children under 5 years old. This research was similiar with research in [14] where there was not significant association between roof type with ARI incidence on children under 5 years old ($p\text{-value} = 0,164$). There was not significant association between roof type with ARI incidence on children under 5 years old in this research caused by the high proportion of house with qualified roof type (88,3%). Whereas the roof type which unfulfilled the health requirement such as made by sago palm (rumbia) which will produce smooth dust particle that can be a trigger for respiratory tube impairment on children under five years old.

4.7 Relationship Between Floor Type with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,045$ which mean there was statistically association between floor type with ARI incidence on children under 5 years old. This research in line with research of [15] with $p\text{-value} = 0,000$ and OR = 4,986. Observation result in research location showed that some house which used unqualified floor material like unfloortile and used boardfloor or wooden floor in improper condition like holed floor and unwaterproof. As we know, children under five years old often playing on the floor, so the probability for children to expose dust from the floor is bigger, if the floor is not fulfilled the health requirement. It's conclude that unqualified floor type was a risk factor of ARI incidence on children under 5 years old.

4.8 Relationship Between Cooking Fuel Type with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 1,000$ which mean there was not statistically association between cooking fuel type with ARI incidence on children under 5 years old. This research was similiar with study in [16] with $p\text{-value} = 0,07$ so there was not significant association between exclusive breastfeeding with ARI incidence on children under 5 years old ($p\text{-value} = 0,07$). But, this research was not similiar with Nurhidayati's dan Nurfitriah's research (2009)¹⁵ with $p\text{-value} = 0,012$, so there was significant association between cooking fuel type with ARI incidence on children under 5 years old. The use of unqualified cooking fuel type such as wood, charcoal, and kerosen produce particulate, sulphur oxide, nitrogen oxide, CO, fluoride, aldehyde, and hidrocarbon [17]. The particulates and gases will expose children under five years old continually, so it will disrupt the children's under five years old respiratory and immune system, this is becoming a trigger for ARI incidence. There was not significant association between cooking fuel type with ARI incidence on children under 5 years old in this research caused by almost of respondents had already use cooking fuel type which fulfilled the health requirement, LPG. So, the cooking fuel type was not a risk factor to ARI incidence on children under 5 years old.

4.9 Relationship Between Smoking Habit with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,262$ which mean there was not statistically association between smoking habit with ARI incidence on children under 5 years old. This research was similiar research with [18] with $p\text{-value} = 0,409$. Smoking habit in the house will causing pollution to passive smoker and environs especially for children under 5 years old. Children's under 5 years old lungs is more susceptible to ETS effect so it will increasing ARI incidence on them.ETS contains more than 4000 toxic compund (nitrosomones, CO, NO, and

other particulates) which decrease cilia function and impair ciliated epithel cell, so it will decrease the immune system either local immune system or humoral immune system [19]. There was not significant association between smoking habit in the house with ARI incidence on children under 5 years old in this research caused by the question of questionnaire just only ask the presence of smoking habit in the house. Whereas the total of cigarettes which consume in a day was not counted.

4.10 Relationship Immunization Status with ARI Incidence on Children Under 5 Years Old

Statistical test resulted $p\text{-value} = 0,389$ which mean there was not statistically association between immunization status with ARI incidence on children under 5 years old. This research was similiar with Ranantha finding [10] with $p\text{-value} = 0,610$. Theoretically, immunization is protective factor on children under five years old to infected by infection disease. There was not significant association between immunization status with ARI incidence on children under 5 years old in this research caused by majority children's under five years old had already given immunization (96,7%). Interview result with some respondents in research location showed that they bring their children routinely to immunized. It showed that respondents had high self awareness about immunization completely to prevent the disease and increase the children's immune system.

5. Conclusion

5.1 There was statistically association between wall type variable ($p\text{-value} = 0,023$) and floor type variable ($p\text{-value} = 0,045$) with ARI incidence on children under 5 years old in Tanjung Pering Village 2014

5.2 There was not statistically association between nutritional status ($p\text{-value} = 1,000$); exclusive breastfeeding ($p\text{-value} = 0,673$); bedroom density ($p\text{-value} = 0,312$); ventilation condition in the morning/afternoon ($p\text{-value} = 0,526$); roof type ($p\text{-value} = 1,000$); cooking fuel type ($p\text{-value} = 1,000$); smoking habit in the house ($p\text{-value} = 0,262$); and immunization status ($p\text{-value} = 0,389$) with ARI incidence on children under 5 years old in Tanjung Pering Village 2014.

References

- [1] WHO. 2007. *Pencegahan dan Pengendalian Infeksi Saluran Pernapasan Akut (ISPA) yang Cenderung Menjadi Epidemik dan Pandemi di Fasilitas Pelayanan Kesehatan*. Geneva. Dari: http://www.who.int/csr/resources/publications/WHO_CDS_EPR_2007_8bahasa.pdf. (7 Februari 2015)
- [2] Kemenkes RI. 2011. *Pedoman Pengendalian Infeksi Saluran Pernafasan Akut*. Dirjen P2PL. Jakarta.
- [3] Hemagiri *et al.* 'Risk factors for Severe Pneumonia in Under Five Children A Hospital Based Study', *International Journal of Research in Health Science*, [online], Vol. 2, pp. 47-57, 2014. Dari: <http://www.ijrhs.com>. [19 Juni 2014].
- [4] Depkes RI. 1999. Keputusan Menteri Kesehatan Republik Indonesia No.829/MENKES/SK/VII/1999 tentang *Persyaratan Kesehatan Pemukiman*. Jakarta.

- [5] Dinkes Kabupaten Ogan Ilir. 2012. *Profil Dinas Kesehatan Kabupaten Ogan Ilir Tahun 2012*. Dinkes, Ogan Ilir.
- [6] Notoatmodjo, 2007. *Promosi Kesehatan Teori dan Aplikasi*. Jakarta: Rineka Cipta.
- [7] UNICEF. 2012. *Pneumonia and Diarrhoea: Tackling The Deadliest Diseases for The World's Poorest Children*. UNICEF, New York.
- [8] Windarini dan Sumasari. 2009, *Hubungan Pemberian ASI Eksklusif dengan Kejadian ISPA pada Bayi Tahun 2009*, [online]. Dari: <http://poltekkes-denpasar.ac.id>. (9 Desember 2014).
- [9] Chalabi. 2013, 'Acute Respiratory Infection and Malnutrition Among Children Below Five Years of Age in Erbil Governorate', *Eastern Mediterranean Health Journal*, [online], Vol. 19, No.1. Dari: applications.emro.who.int/emhj/v19/01/EMHJ_2013_19_1_0066_0070.pdf. (9 Desember 2014).
- [10] Ranantha, Ranny. 2012, *Hubungan antara Karakteristik Balita dengan Kejadian ISPA pada Balita di Desa Gandon Kecamatan Kaloran Kabupaten Temanggung*. Fakultas Kesehatan Universitas Dian Nuswantoro, Semarang.
- [11] Dewi, Angelina Candra. 2012, 'Hubungan Kondisi Lingkungan Fisik Rumah dengan Kejadian ISPA pada Balita di Wilayah Kerja Puskesmas Gayamsari Kota Semarang', *Jurnal Kesehatan Masyarakat*, [online], Vol.1, No. 2. Dari: <http://download.portalgaruda.org>. (9 Desember 2014).
- [12] Baker *et al.* *Household Crowding and Health*, 2004, [online]. Dari: <http://www.healthyhousing.org.nz>. [9 September 2014].
- [13] Dewi, Sherly Candra. 2014, *Hubungan Kondisi Fisik Rumah dengan Kejadian ISPA pada Balita*. Poltekkes Kemenkes Semarang.
- [14] Saputra, Fery Surahman. 2011, *Hubungan Lingkungan Fisik Rumah dengan Kejadian ISPA pada Balita di Kelurahan Jabungan Kecamatan Banyumanik Semarang*. [Skripsi]. Fakultas Kesehatan Masyarakat Universitas Diponegoro, Semarang.
- [15] Nurhidayati dan Nurfitriah. 2009, *Lingkungan Fisik Rumah dengan Kejadian Penyakit ISPA pada Balita di Wilayah Kerja Puskesmas Karangnongko Kabupaten Klaten Tahun 2009*. Program Studi Keperawatan STIKES Muhammadiyah, Klaten.
- [16] Gertrudis. 2010, *Hubungan antara Kadar Partikulat (PM₁₀) Udara Rumah Tinggal dengan Kejadian ISPA pada Balita di Sekitar Pabrik Semen PT Indocement, Citeureup Tahun 2010*, [Tesis]. Fakultas Kesehatan Masyarakat Universitas Indonesia, Jakarta.
- [17] Smith *et al.* 2003, 'Indoor Air Pollution From Household Use of Solid Fuels', *Bulletin of the World Health Organization*, [online], vol. 2, pp. 1435-1494. Dari: <http://www.who.int>. [20 Juli 2014].

[18] Fillacano, Rahmayatul. 2013, *Hubungan Lingkungan dalam Rumah terhadap ISPA pada Balita di Kelurahan Ciputat Kota Tangerang Selatan Tahun 2013*, [Skripsi]. Program Studi Kesehatan Masyarakat Fakultas Kedokteran dan Ilmu Kesehatan Universitas Islam Negeri SyaifHidayatullah, Jakarta.

[19] Sunyataningkamto *et al.* 'The Role of Indoor Air Pollution and Other Factors in The Incidence of Pneumonia in Under-Five Children', *Pediatrica Indonesia*, [online], Vol. 44, No. 1-2, 2004. Dari: <http://indonesia.digitaljournals.org>. [19 Juni 2014].