JPH RECODE March 2021; 4 (2) : 157-165
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RISK FACTORS ASSOCIATED WITH THE INCIDENCE OF ARI IN INFANTS AGES 0-2 YEARS IN ONE OF THE HIGHEST CONTRIBUTING AREAS FOR ARI, EAST JAVA

Factor Risiko yang Berhubungan dengan Kejadian ISPA pada Bayi Usia 0-2 Tahun di Salah Satu Daerah Penyumbang ISPA Tertinggi Provinsi Jawa Timur

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ARTICLE INFO

Article History:
Received:
November, 24th, 2020

Revised:
From December, 23th, 2020

Accepted: January, 19th, 2021

Published online:
March, 4th, 2021

ABSTRACT

Background*: ISPA (Pneumonia) is a disease that is the biggest cause of infant and under-five mortality in Indonesia. The main problem in the visit of children under five to health services in one of the areas that contributed to the highest cases of ARI in East Java, namely Tlatah Village, Purwosari, Bojonegoro is ISPA. Patients with ARI in infants aged 0-2 were 23 respondents (67.6%) from 42 populations. Factors that are thought to affect ARI in Tlatah village include: cigarette smoke, nutritional status, exclusive breastfeeding, and immunity.* ***Purpose****: Determining Risk Factors that have a relationship with the incidence of ARI in infants aged 0-2 years in one of the highest contributor areas for ARI cases, East Java.* ***Methods****: This type of research was a descriptive analytic using a cross sectional design. The research sample consisted of 34 respondents from 42 respondents who had babies aged 0-2 years.* ***Results****: The results of this research using chi square methode showed that there were relationship between cigarette smoke exposure of family members and the nutritional status of children with the incidence of ARI on toddler aged 0-2 years in Tlatah Village, Purwosari, Bojonegoro with value (p=0,000; RR=6.769; 95%CI=1.074-42.652) dan (p=0,000; RR=3.750; 95%CI=1.620-8.679).* ***Conclusion****: Therefore, it is expected that family members pay attention to the child's condition by not engaging in unhealthy behavior so that the child's health status increases.*

Keywords: *Risk Factors, ARI, Toddler Aged 0-2 Years, One of the Highest Contributing Areas in East Java*

ABSTRAK

Latar Belakang: ISPA (Pneumonia) merupakan penyakit yang menjadi sebab terbesar pada kematian bayi dan balita yang ada di Indonesia. Permasalahan pokok pada kunjungan balita pelayanan kesehatan di salah satu daerah penyumbang kasus ISPA tertinggi Provinsi Jawa Timur yaitu Desa Tlatah, Purwosari, Bojonegoro ialah ISPA. Penderita ISPA pada bayi umur 0-2 sebanyak 23 responden (67.6%) dari 42 populasi. Faktor yang diduga mempengaruhi penyakit ISPA di desa tlatah antara lain: paparan asap rokok, status gizi anak, ASI eksklusif, dan imuniasi campak. ***Purpose****:* Menentukan Faktor Risiko yang memiliki hubungan dengan Kejadian ISPA Pada Bayi Usia 0-2 Tahun Di Salah Satu Daerah Penyumbang Kasus ISPA tertinggi Provinsi Jawa Timur. **Metode:** penelitian dilaksanakan dengan rancangan *Cross Sectional* dan bersifat deskriptif analitik. Sebanyak 34 responden digunakan sebagai sampel penelitian, dari total 42 responden yang memiliki bayi berumur 0-2 tahun. **Hasil:** Penelitian yang dilakukan menggunakan uji chi square menghasilkan temuan bahwasanya terdapat hubungan antara paparan asap rokok anggota keluarga dan status gizi anak dengan kejadian ISPA pada bayi berumur 0-2 Tahun Di Desa Tlatah, Purwosari, Bojonegoro dengan nilai (p=0,000; RR=6.769; 95%CI=1.074-42.652) dan (p=0,000; RR=3.750; 95%CI=1.620-8.679). **Kesimpulan:** Oleh karena itu, diharapkan anggota keluarga memperhatikan kondisi anak dengan tidak melakukan perilaku tidak sehat sehingga derajat kesehatan anak meningkat.

Kata kunci: Faktor Risiko, ISPA, Bayi Usia 0-2 Tahun, Salah Satu Daerah Penyumbang ISPA Tertinggi Provinsi Jawa Timur

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INTRODUCTION

The number of recorded infectious disease patients and the death rate from infectious disease in the world are caused by Acute Respiratory Infections (ARI). ARI is responsible for 98% or almost 4 million deaths worldwide each year. ARI (Pneumonia) is the leading cause of children and infants mortality in Indonesia, it is proved by the result of the Household Health Survey that about 80-90% of total ARI mortality cases were due to Pneumonia Syahidi, Gayatri, and Bantas, 2016). According to East Java Health Profile, the five highest contributing areas for ARI incidents were Sidoarjo Regency, Mojokerto Regency, Gresik Regency, Blitar Regency, and Bojonegoro Regency. Bojonegoro Regency was the 5th highest contributor for ARI incidents of 87.51% in 2019 (East Java Health Office, 2019).

Childhood mortality (under 5 years old) in the world is due to several diseases, including pneumonia by 14%, diarrhea 14%, other infections at 9%, malaria 8%, and non-communicable disease 4%. The largest cause of infant death is pneumonia, although the cases have been decreasing until now (WHO, 2015). Leading causes of death for children under 5 years were pneumonia (36%), congenital disorder (13%), and diarrhea (10%) (Indonesian Ministry of Health, 2019). Infants and toddlers, the elderly, people who have impaired body immunity are at an increased risk of pneumonia than those who are at productive age and normal immunity (Chin, 2009).

The increasing number of pneumonia-associated mortality in infants triggered by several factors namely environment, individual factors, and behavior. Environmental factors such as crowded homes, air pollution around the house as well as indoor air pollution, and the physical condition of the house. Furthermore, individual factors such as child characteristics (age, birth weight) and nutritional factors (nutritional status, vitamin A supplementation, immunization status). Meanwhile, behavioral factors are prevention strategies against ARI in the household (Jalil, Yasnani, and Sety, 2018).

One of the environmental factors for the incidence of ARI is the history of smoking by family members. Smoking is an unhealthy behavior that has become a habit cultivated in Indonesian society up till now. In fact, smoking behavior and second-hand smoke exposure contribute to the risk of death for Indonesian society.

Statistic data (Basic Health Study, 2018) showed the smoker prevalence among 10-18 years has increased from 2013 to 2018 by 7.20% to 9.10%, it was still far from the 2019 National Medium Term Development Plan (RPJMN) target. However, cigarette consumption among males (> 15 years) in 2018 was still at a high proportion of 62.9%, it was the highest prevalence of cigarette consumption among males worldwide.

Second-hand smoke exposure from family members is regardless of the surrounding environment, health problems due to the cigarette smoke still affect active and passive smokers because they both inhale the smoke, including infants aged 0-2 years. Health problem that appeared as a result of second-hand smoke exposure is Acute Respiratory Infection (ARI). ARI can attack everyone, especially people with low immunity, such as toddlers.

Toddlers have a high risk of malnutrition thus they easily get sick (Soetjiningsih, 2014). Toddlers tend to get the infectious disease (Notoatmodjo, 2005). Infants under 5 years are vulnerable to ARI because of weak and undeveloped immunity. Children aged 0-2 years who are still doing activities inside the house are likely to have a great risk of ARI as a result of second-hand smoke exposure from families, mosquito coil smoke, and infections from the family itself. According to data (Institute for Health Metrics and Evaluation, 2017) as stated in ourworldindata.org that respiratory infections are the major cause of children's death (under 5 years), killing 808,920 children.

Nutritional status is a required factor in determining whether or not a toddler is at risk of a certain disease. The lower the nutritional status of the toddler, the higher their chance to get a disease, such as Pneumonia or ARI. It is in line with another research (Efni, Machmud and Pertiwi, 2016) stated that there was a significant correlation between nutritional status with the incidence of pneumonia. Additionally, immunizations help protect children by giving immunity against a particular disease and eliminate mortality as well as morbidity caused by disease. The more complete the immunization status, the more immune the child is to an illness. Hereafter,

exclusive breastfeeding helps reduce the risk of some diseases in children, such as pneumonia or ARI. Breast milk contains anti-infection substances to protect the baby's body against pathogens and stimulate the immune system.

According to Integrated Healthcare Center visit data in Tlatah Village, Purwosari District, Bojonegoro Regency, the incidence of ARI recorded as the highest cases compared to other diseases in 2019 by 253 cases with 54 cases in toddlers. Incidence of ARI reported as the number one case out of 11 other diseases in Tlatah Village, this village is one of the contributor areas for ARI cases in Bojonegoro Regency, East Java. Hence, based on the introduction written above, the researcher wanted to determine the risk factors associated with the incidence of ARI in infants aged 0-2 years in one of the highest areas for ARI in East Java. Thus, the researcher may use the result of this research to give suggestions to the family in improving the health status of their children and other family members. Family can be more aware of the conditions around their children to prevent children from the dangers of the disease.

METHOD

This was an analytical descriptive research aimed to determine the factors associated with the incidence of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI, East Java, specifically in Tlatah Village, Purwosari District, Bojonegoro Regency. This research used a cross-sectional design research. This research was conducted in the Purwosari Public Health Center work area specifically Tlatah Village where the incidence of ARI was reported as the number one case out of 11 other diseases. This research was conducted from December 2019 to January 2020. A total of 42 families who had a baby aged 0-2 years enrolled as the research population. As the population was homogenous then the sample was obtained by simple random sampling technique using balanced data to achieve a research sample of 34 respondents.

Data analyzed using the chi-square test which was processed using IBM SPSS statistic 21 software. The type of data used in this researchwas primary data obtained from the result of filling out the questionnaire that has been tested for validity and reliability. This research has passed the ethical review of the Faculty of Nursing, Universitas Airlangga with code number 1769-KEPK. The ethical test was conducted on September 10, 2019, in Kalitidu District and Purwosari District, Bojonegoro Regency.

RESULT

Tabel 1. Respondents Characteristic in One of the Highest Contributing Areas for ARI, East Java

Characteristics	n	%
Education		
Primary School	17	50.0
Junior High School	6	17.6
Senior High School	9	26.5
University Graduate	2	5.9
Total	34	100.0
Occupation		
Farmer	11	32.4
Farm Worker	7	20.6
Entrepreneur	5	14.7
Private Companies	3	8.8
Government Employees (PNS)	2	5.9
Others	6	17.6
Total	34	100.0
Children's Age		
0-1 Year	14	41.18
1-2 Years	20	58.82

Characteristics	n	%
Total	34	100.0
Children's Sex		
Male	16	55.9
Female	18	44.1
Total	34	100.0

Based on Table 1, children aged 0-2 years whose majority of their parents' latest formal education was primary school by 50%, while most of the parents' occupation was farmers by 32.4%. Most of the children were 1-2 years (58.2%), with the majority of the children recorded as male (55.9%).

Tabel 2. Frequency Distribution based on Risk Factors for the Incident of ARI in Infants Aged 0-2 Years in One of the Highest Contributing Areas for ARI, East Java

Variable	n	%
Second-Hand Smoke Exposure		
Exposed	26	76.5
Not Exposed	8	23.5
Total	34	100.0
Children's Nutritional Status		
Abnormal	19	55.9
Normal	15	44.1
Total	34	100.0
Exclusive Breastfeeding		
No	5	14.7
Yes	29	85.3
Total	34	100.0
Measles Immunization		
Complete	10	29.4
Incomplete	24	70.6
Total	34	100.0
ARI*		
Yes	23	67.6
No	11	32.4
Total	34	100.0

*ARI: Acute Respiratory Infection.

According to Table 1, respondents who had active smoker family members were 76.5%, and the ones who did not were 23.5%.

Children aged 0-2 who had a normal nutritional status were as much as 44.1%, this proportion was smaller compared to those who had an abnormal nutritional status of 55.9%. Children aged 0-2 years who were exclusively breastfed were 85.3%, while the ones who did not were 14.7%.

There were 70.6% of the children aged 0-2 years who had a complete immunization. This proportion was a lot greater than the children aged 0-2 years who did not completely immunized of 29.4%. Of the 34 respondents, 67.6% of children aged 0-2 years were ARI patients, while the ones who were not ARI patients were 32.4%. the conclusion from the frequency distribution presented in Table 1 was most of the respondents in Tlatah Village have been exposed to second-hand smoke from their family, had an abnormal nutritional status, exclusively breastfed, and received a complete immunization.

Tabel 3. Relationship between Independent Variable and the Incidence of ARI among Infants Aged 0-2 years in One of the Highest Contributing Area, East Java

Variable	ARI*						P Value	RR* (95% CI*)
	Yes		No		Total			
	n	%	n	%	n	%		
Second-Hand Smoke Exposure								
Exposed	22	64.7	4	11.8	26	76.5	0.000	6.769 (1.074-42.652)
Not Exposed	1	2.9	7	20.6	8	23.5		
Total	23	67.6	11	32.4	34	100.0		
Children Nutritional Status								
Abnormal	19	55.9	0	0	19	55.9	0.000	3.750 (1.620-8.679)
Normal	4	11.8	11	32.3	15	44.1		
Total	28	67.7	11	32.3	34	100.0		
Exclusive Breastfeeding								
No	5	14.7	0	0	5	14.7	0.150	1.611 (1.212-2.141)
Yes	18	52.9	11	32.4	29	85.3		
Total	23	67.6	11	32.4	34	100.0		
Measles Immunization								
No	6	17.6	4	11.8	10	29.4	0.692	0.847 (0.480-1.494)
Yes	17	50.0	7	20.6	24	70.6		
Total	23	67.6	11	32.4	34	100		

*ARI: Acute Respiratory Infection
*RR: Relative Risk
*CI: Confidence Interval

Research subjects who were exposed to send-hand smoke and had ARI were as much as 64.7%, while those who did not have ARI were 11.8%. Respondents who had no second-hand smoke exposure and had ARI were 2.9%, while those who did not have ARI were 20.6%.

Respondents who had an abnormal nutritional status and had ARI were 55.9% and none of them were ARI patients (0%). respondents who had a normal nutritional status, as well as ARI, were 11.8% while the ones who had no ARI were 32.3%.

The proportion of participants who were not exclusively breastfed and had ARI were 14.7% and none of them were ARI patients (0%). Respondents who were exclusively breastfed and had ARI were 52.9% and the ones who had no ARI were 32.4%.

Respondents who did not receive complete immunization and had ARI were 17.6%, while the ones who had no ARI were 11.8%. Respondents who were completely immunized and had ARI were about 50%, and those who had no ARI were 20.6%.

Of 4 tested variables, 2 variables had a significant correlation with the incidence of ARI, they were second-hand smoke exposure (p-value=0.000) and children's nutritional status (p-value=0.000). On the other hand, exclusive breastfeeding (p-value=0.150) and measles immunization (p-value=0.692) were not significantly correlated with the incidents of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village.

Based on the confidence interval (95%) of the RR value, it can be concluded that variable that was significantly associated with the incidence of ARI among infants aged 0-2 years in one of the highest contributing area for ARI incidents, East Java, which was Tlatal Village, was second-hand smoke exposure with the RR value=6.769, which means infants aged 0-2 years who were exposed to second-hand smoke had a 6.769 risk of getting ARI compared to the infants who had no second-hand smoke exposure from their family members.

DISCUSSION

The Incidence of ARI among Infants Aged 0-2 Years

Based on the result of this research , the majority of infants aged 0-2 years had ARI (67.6%) compared to those who had no ARI (32.4%). One of the causes of transmission rate and mortality rate from a communicable disease such as ARI were second-hand smoke exposure. Tobacco smoke produced by active

smoker family members is one of indoor pollution. The pollution is very toxic and harmful for the child as it escalates the risk of pain in one of the child's organs, such as the lungs. Continuous exposure triggers health problems for all the family members, like acute respiratory problems and lung disorders. Similar results were reported (Baladiah *et al.*, 2019), that infants under 5 years old who lived in the same household with active smoker family members were in a high possibility to inhale air contaminated with cigarette smoke, thus this condition had an impact on the incidence of ARI.

According to the result of this research, it was known that majority of the infants aged 0-2 years who had ARI were being recorded as male. A research by (Fibrila, 2015) stated that generally, the incidence of ARI caused by virus or bacteria were the same, however some stated that there was still a bit distinction that the majority of the cases were in male babies. Most of ARI incidences in this research were in infants aged 1-2 years. This result was similar to a research by (Putri and Adriyani, 2018) found that infants aged 1-2 years were more vulnerable to ARI. At the age of 1-2 years, the baby's respiratory organs have not yet perfectly developed and matured, hence it was at a high risk to get a disease, such as ARI. Accordingly, based on the description of this research data, if the smoking behavior of parents was getting havier, the bigger the child aged 0-2 years had the risk to ARI. In line with the research by (Karundeng, Runtu, and Mokoginta, 2019) proved that smoking behavior among adults associated with the incidence of ARI in children.

Relationship between Second-Hand Smoke Exposure and the Incidence of ARI among Infants Aged 0-2 Years

Based on the result of this research, it was proved that majority of infants aged 0-2 years were exposed to second-hand smoke from their family members. According to the data above it was found that most of the family members did their smoking habit near the baby. The mother and the baby became the passive smoker despite they did not smoke the cigarette directly. A research (Parwati, Elsy Putri, Sodik, 2018) had a similar result that passive smokers are those who do not smoke but breathe the air contaminated with other people's cigarette smoke which contains a greater number of harmful substances produced by the active smoker.

The result of this research showed that respondents who inhale Environmental Tobacco Smoke (ETS) were passive smokers who were forced to inhale the cigarette smoke and at risk of illnesses caused by the cigarette smoke. Chemical substances contained in second-hand smoke are greater in number of damaging substances compared to the main cigarette smoke, so it produces more chemical substances (Aditama, 2009). Hence, the chemical substances produced by cigarette smoke are dangerous for infants aged 0-2 years, ARI is one one the diseases caused by second-hand smoke, especially if the ventilation in the house is insufficient.

Descriptive analysis was conducted to determine the relationship between second-hand smoke exposure from family or the surroundings and the incidence of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village. A Chi-square test was used to analyze the relationship between two variables. According to the result of this research, there was a correlation between second-hand smoke exposure from family or the surroundings and the incidence of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village. Furthermore, as seen from the confidence interval of RR value which showed that there was a relevant correlation between second-hand smoke exposure from the family with the incidence of ARI among infants aged 0-2 years in Tlatah Village. 0-2 years old babies who were exposed to second-hand smoke had a 6.6 times risk of getting ARI compared to those who were not exposed to second-hand smoke.

Babies aged 0-2 years are one of the passive smokers and at a higher risk of getting health problems compared to active smokers. Aryani and Syapitro (2018) reported that the incidence of ARI among toddlers was not only due to the exposure of second-hand smoke but also influenced by intrinsic factors such as age and sex. Hence, according to writers' assumption the incidence of ARI among babies aged 0-2 years majority was due to the exposure of second-hand smoke from their family who had a smoking habit. Babies aged 0-2 years were passive smokers who were exposed to cigarette smoke so that they easily

get ARI. Cigarette smoke produced inside the house as well as outside the house is the cause of air pollution inhaled continuously by other family members who are passive smokers especially babies aged 0-2 years, thus second-hand smoke exposure could cause health problems to the babies. The result of this research was in line with another research (Habibi, Gayatri, and Bantas, 2016) which stated that cigarette smoke produced continuously by family members who smoke will cause respiratory problems like ARI by 8.02 times.

Relationship between Nutritional Status and the Incidence of ARI among Infants Aged 0-2 Years

Nutritional status is a vital component to measure the risk of whether a toddler is susceptible to disease. The lower the nutritional status, the higher the risk of a toddler being ill, like pneumonia or ARI. It was similar to a research (Efni, Machmud and Pertiwi, 2016) which stated that babies under 5 years with poor nutritional status had 9.1 times risk to obtain pneumonia compared to the ones with good nutritional status. Babies will have poor nutritional status or malnutrition if they do not get enough nutrients that they required based on their body condition and age. Insufficient nutrient that the babies received is the main cause of malnutrition so that their nutritional status is not normal. This result was supported by research (Efni, Machmud and Pertiwi, 2016) which proved that the incidence of pneumonia in toddlers was at risk of malnutrition due to inadequate nutrition intake.

According to the result of this research , it can be concluded that children's nutritional status correlated with the incidence of ARI among babies aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village. Babies aged 0-2 years had 2.6 times possibility of being infected by ARI compared to the babies aged 0-2 years with normal nutritional status. In accordance with a research which showed that there was a relationship between nutritional status and the incidence of ARI among toddlers with significance level=0.011, where nutritional status was determined by the mother's ability to give adequate food. Identical with the result of this research , a research by (Asline and Suryani, 2018) stated that there was a relationship between nutritional status and the incidence of ARI, where toddlers with malnutrition are more vulnerable to obtain infectious disease for a long time compared to the toddlers with normal nutritional status.

The result of this research was differ from another research (Syamsi, 2019) which proved that there was no correlation between the incidence of ARI with toddlers' nutritional status. Parents' role is the most essential factor to improve the nutritional status of children to become normal. Well-informed parents related to nutrition can be an insight to give various menus of what their children's needs. The better the parents' knowledge, the more varied the children's food, both the type and the amount. Therefore, parents are expected to be able to seek information and insight about the importance of giving children's nutrition starting from the type as well as the amount of the food based on children's age.

Relationship between Exclusive Breastfeeding and the Incidence of ARI among Infants Aged 0-2 Years

In the first six months, a baby only needs breast milk without any additional solid or liquid food. It is called exclusive breastfeeding. Breast milk contains all good nutrients, hence its function is as an antibody to prevent the baby from any infectious disease (Soetjiningsih, 2014). According to the result of this research , exclusive breastfeeding had no implication to the incidence of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village. It was in line with a research by (Christi, Rahayuning and Nugraheni, 2015) which showed that there was no correlation between exclusive breastfeeding history with ARI incidence. However, this result varies from the previous research (Wiwin, Syaiful and Rasimin, 2020), which stated that there was a correlation between exclusive breastfeeding with ARI incidence. The distinction was due to in this research , children aged 0-2 years with ARI were the ones who receive exclusive breastfeeding compared to the children with ARI but did not receive exclusive breastfeeding.

Relationship between Immunization History and the Incidence of ARI among Infants Aged 0-2 Years

Immunization history carried out in children is to protect the children's body by giving immunity against certain disease and help reduce morbidity and mortality rate caused by an illness. This research result showed that there was no relevant correlation between measles immunization history and the incidence of ARI among infants aged 0-2 years in one of the highest contributing areas for ARI incidents, East Java, which was Tlatah Village. A research by (Christi, Rahayuning and Nugraheni, 2015) had similar result, immunization status did not correlate with the incidence of ARI. The result of this research was completely different from a research by (Yanti and Sari, 2018) which stated that there was a relationship between immunization history and the incidence of ARI where babies with incomplete immunization had 3.3 times risk to obtain ARI compared to the ones who were completely immunized. A research reported by (Wiwin, Syaiful and Rasimin, 2020) showed that there was a correlation between the completeness of immunization with the incidence of ARI among babies and toddlers. The distinction was because majority of babies with ARI were caused by their weak immune system and it also determined by other factors.

CONCLUSION

It can be concluded that the aspects related to the incidence of ARI among infants aged 0-2 years in Tlatah Village, East Java, as one of the highest contributing areas for ARI incidents, were second-hand smoke exposure and children's nutritional status. Meanwhile, the factor that correlated directly with the incidence of ARI among infants aged 0-2 years was second-hand smoke exposure, which means that infants aged 0-2 years who were exposed to cigarette smoke from family members had 6.769 times risk to acquire ARI compared to those who did not expose to second-hand smoke from family members.

SUGGESTION

The author suggests the family of infants aged 0-2 years in Tlatah Village to give more attention to unhealthy habits, such as smoking by any family members inside the house and take care of children's insufficient nutrition intake. Ventilation should be adequately available if smoking occurs inside the house, parents are required to give nutritious food to meet the nutritional need of children to prevent any infectious disease such as ARI. Moreover, it is suggested for health workers to improve promotion and prevention programs. Therefore, the incidence of ARI among infants or toddlers 0-2 years can be decreased.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the help and guidance of all the people during this article writing process as well as to the midwife and health workers in the Tlatal Village.

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