# Determinants of the Incidence of Acute Respiratory Infections (ARIs) in Children Under Five at the Getengan Community Health Center, Tana Toraja Regency

**Zadrak Tombeg[1*], Erni Yetti R.[2], Anto J. Hadi[3], Ahmad Safii Hasibuan[4], Suherman Rate[5], Fitri Rahma Handayani[6], Nayodi Permayasa[7]**

[1]Department of Maternal and Child Health, Sinar Kasih Toraja Health Academy, Tana Toraja, Indonesia, zadraktombeg1@gmail.com

[2]Department of Health Promotion and Behavioral Sciences, Sinar Kasih Toraja Health Academy, Tana Toraja, Indonesia, erniyetti12345@gmail.com

[3]Department of Public Health, Faculty of Health, Aufa Royhan University, Padangsidimpuan, Indonesia, antoarunraja@gmail.com

[4]Department of Public Health, Faculty of Health, Aufa Royhan University, Padangsidimpuan, Indonesia, ahmadsafii@gmail.com

[5]Nutrition Study Program, Adila College of Health Sciences, Bandar Lampung, Indonesia, sunsuherman@gmail.com

[6]Department of Midwifery, Faculty of Health, Aufa Royhan University, Padangsidimpuan, Indonesia, fitrirahmahandayani@unar.ac.id

[7]Health and Occupational Safety Study Program, Sentral College of Health Sciences, Padangsidimpuan, Indonesia, nayodipermayasa@gmail.com

**\*Corresponding Author:** zadraktombeg1@gmail.com

| ARTICLE INFO | ABSTRACT |
|---|---|
| | **Introduction**: Acute Respiratory Infections (ARIs) remain one of the main health problems among toddlers in Indonesia, including in Tana Toraja Regency. The objective of the study was to identify the determinants of the incidence of Acute Respiratory Infections (ARIs) on Toddlers at Getengan Health Center Tana Toraja Regency.<br>**Methods**: The study used a cross-sectional study research design. It was conducted in January 2024. The sample of the study consisted of mothers who had toddlers aged 1-5 years and visited the Getengan Health Center about 320 toddlers. The sampling technique was carried out by using purposive sampling. Data was collected through interviews using a previously validated questionnaire. Data analysis was carried out using univariate, bivariate, and multivariate analysis.<br>**Results**: The results of the study showed that maternal knowledge of Acute Respiratory Infections (ARIs), use of mosquito repellent, smoking habits in the family environment, and residential density were significant determinant factors related to the incidence of Acute Respiratory Infections (ARIs) on toddlers at Getengan Community Health Center, Tana Toraja Regency.<br>**Conclusion**: The implications of the study are the need to increase maternal knowledge of Acute Respiratory Infections (ARIs), reduce excessive use of mosquito repellent, and promote an environment free of cigarette smoke and air pollution to reduce the risk of Acute Respiratory Infections (ARI) on toddlers in the region. |

## INTRODUCTION

Acute Respiratory Infection (ARIs) is a health problem that often occurs on toddlers throughout the world, including in Indonesia. Acute Respiratory Infection (ARIs) is one of the main causes of morbidity and mortality on

toddlers, especially in areas with limited access to health services and inadequate sanitation (1). According to a report from WHO (2019), Acute Respiratory Infection (ARIs) was a disease that very often attacked children, ranking fourth with a high level of morbidity (2). In Indonesia, the toddler mortality rate due to Acute Respiratory Infection (ARIs) is ranked first among countries that are members of the Association of Southeast Asian Nations, contributing 22.30% of the total toddler mortality cases (3). Indonesian Basic Health Research in 2018 also revealed that the percentage of Acute Respiratory Infection (ARIs) cases on toddlers peaked, ranking first compared to other age groups, reaching 13.7% (4). According to Anteneh and Hassen (2020), 49% of deaths on toddlers occurred in Africa, while 24% occurred in Southeast Asia. This data confirms that ARIs remains a significant health problem, especially in these regions, and highlights the importance of efforts to reduce ARIs-related deaths among toddlers (5).

The results of the Basic Health Research report in 2018, the prevalence of Acute Respiratory Infection (ARI) on toddlers in South Sulawesi Province according to the diagnosis of health workers was 2.73% (Ministry of Health of the Republic of Indonesia, 2019). Meanwhile, the prevalence of Acute Respiratory Infection (ARI) in Tana Toraja Regency is 41.1% (6). Meanwhile, based on data from the Getengan Community Health Center, Tana Toraja Regency in 2022, the incidence of Acute Respiratory Infection (ARI) remains the 10th largest disease in the Health Center, and the number of cases increased from year to year by 2,152 cases, and decreased in 2023 by 464 cases (7). The spread of respiratory tract infections is caused by several factors including the environment (8), people's behavior towards health, and low nutritional status(9). Environmental factors include inadequate basic sanitation such as access to clean water, proper latrines, good waste management, healthy housing, as well as water and air pollution (10). Poor community behavior is reflected in habits that have not yet been formed, such as washing hands, throwing rubbish, and spitting carelessly (11). Awareness of taking precautions such as covering your mouth and nose when sneezing or using a mask when you have a cold to prevent transmission to other people is still low (12).

The high incidence of Acute Respiratory Infections (ARI) on toddlers in Indonesia is often caused by mothers' lack of knowledge of ARI (13). Tana Toraja Regency, as one of the regions in Indonesia, cannot escape from the Acute Respiratory Infection (ARI) problem. Getengan Health Center, one of the health service centers in Tana Toraja Regency, is experiencing challenges in handling Acute Respiratory Infection (ARI) on toddlers so that it can improve the health and quality of life of toddlers in Tana Toraja Regency. It shows that efforts to increase public health awareness and behavior need to be increased to reduce the spread of respiratory infections. The objective of the study is to analyze the determinants of the incidence of Acute Respiratory Infection (ARI) on toddlers at the Getengan Health Center, Tana Toraja Regency.

## METHOD

The study used observational research with a cross-sectional study approach. The research was carried out at the Getengan Health Center, Tana Toraja Regency in January 2024. The population was the subject of the research. They were all toddlers at the Getengan Health Center, Tana Toraja Regency in 2024, totaling 320 toddlers. The sample in this study was selected using a purposive sampling technique, consisting of mothers who met the criteria determined by the researcher. The inclusion criteria for becoming a sample were mothers who had children aged 1-5 years (toddlers), who were willing to be the sample by filling in the consent form that had been prepared, and the toddlers who were at the research location at the time the research was conducted. The exclusion criteria included mothers who were not willing to be sampled, mothers who had malnourished toddlers, and mothers who had toddlers with chronic diseases. The research instrument consisted of an interview list, observation format, and questionnaire. To ensure the validity of the data, a questionnaire was tested on several respondents, where each question asked had to be understood and answered well by the respondent. Primary data collection was carried out using a questionnaire whose validity and reliability had been previously tested. Data analysis was carried out in three stages, namely univariate analysis for the description of research variables, bivariate analysis, and multivariate analysis with cross-tabulation, and using a computer program. Multivariate analysis was carried out using the logistic regression test.

## RESULTS

The study was carried out at the Getengan Health Center, Tana Toraja Regency for 31 days from January 1-31, 2024, by taking a sample of 105 toddlers. The data was processed and analyzed according to research objectives. The results of data analysis were presented in table form complemented with the following explanation:

**Table 1.** Distribution of Characteristics of Toddlers and Respondents at Getengan Health Center Tana Toraja Regency

| Characteristics of Toddlers | n | Percentage |
|---|---|---|
| **Gender** | | |
| Man | 48 | 45,7 |
| Woman | 57 | 54,3 |
| **Total** | **105** | **100,0** |
| **Age Group of Toddlers** | | |
| ≤ 19 | 9 | 8,6 |
| 20 – 27 | 50 | 47,6 |
| 28 – 35 | 28 | 26,7 |
| 36 – 43 | 6 | 5,7 |
| 44 – 51 | 5 | 4,8 |
| 52 – 59 | 3 | 2,9 |
| ≥ 60 | 4 | 3,8 |
| **Total** | **105** | **100,0** |
| **Characteristics of Respondents** | | |
| **Education Level of Mothers of Toddlers** | | |
| Elementary School | 28 | 26,7 |
| Junior High School | 32 | 30,5 |
| Senior High School | 25 | 23,8 |
| Diploma III | 11 | 10,5 |
| Undergraduate | 9 | 8,6 |
| **Total** | **105** | **100,0** |
| Type of Occupations | | |
| Unemployment | 40 | 38,1 |
| Laundress | 12 | 11,4 |
| Laborer | 27 | 25,7 |
| Self-employed | 11 | 10,5 |
| Military/Police | 7 | 6,7 |
| Civil servant | 8 | 7,6 |
| **Total** | **105** | **100,0** |

Table 2 showed that of the 105 toddlers, 45.7% were male, and 54.3% were female. The age group of toddlers with 47.6% was the highest, being in the 20–27 months age and the lowest being 52 –59 months old as much as 2.9%. Then, the highest education level had a junior high school education of as much as 30.5%, the lowest had a bachelor's education level of as much as 8.6%, the highest had no work as much as 38.1%, and the lowest was military/police as much as 6.7%.

**Table 2.** Determinants of Acute Respiratory Infection (ARI) Incidence at Getengan Health Center Tana Toraja Regency

| Variable | Acute Respiratory Infection (ARI) Incidence | | | | Total | X² ( p ) |
|---|---|---|---|---|---|---|
| | Suffering | | is Not Suffering | | | |
| | n | Percentage | n | Percentage | | |

| Knowledge | | | | | | |
|---|---|---|---|---|---|---|
| Sufficient | 75 | 86,2 | 12 | 13,8 | 87 | 6,338 (0,012) |
| Insufficient | 11 | 61,1 | 7 | 38,9 | 18 | |
| **Total** | 86 | 81,9 | 19 | 18,1 | 105 | |

| Use of Mosquito Repellent | | | | | | |
|---|---|---|---|---|---|---|
| Use | | | | | | |
| Not used | 69 | 93,2 | 5 | 6,8 | 74 | 21,742 (0,000) |
| | 17 | 54,8 | 14 | 45,2 | 31 | |
| **Total** | 86 | 81,9 | 19 | 18,1 | 105 | |

| Smoking habit | | | | | | |
|---|---|---|---|---|---|---|
| Smoke | 69 | 92,0 | 6 | 8,0 | 75 | 18,050 (0,000) |
| Do not smoke | 17 | 56,7 | 13 | 43,3 | 30 | |
| **Total** | 86 | 81,9 | 19 | 18,1 | 105 | |

| Residential Density | | | | | | |
|---|---|---|---|---|---|---|
| Unqualify | | | | | | |
| Qualify | 59 | 88,1 | 8 | 11,9 | 67 | 4,732 (0,030) |
| | 27 | 71,1 | 11 | 28,9 | 38 | |
| **Total** | 86 | 81,9 | 19 | 18,1 | 105 | |

From the results of the analysis shown in Table 2, it can be concluded that maternal knowledge about the health of toddlers plays an important role in the incidence of Acute Respiratory Infections (ARI). Of the 87 mothers of toddlers who had insufficient knowledge, 86.2% suffered from Acute Respiratory Infection (ARI), while of the 18 mothers of toddlers who had sufficient knowledge, as many as 61.1% experienced Acute Respiratory Infection (ARI). Statistical analysis shows the calculated $\chi^2$ value (6.338) > $\chi^2$ table (3.841) and p-value (0.012) < 0.05, which indicates a significant relationship between maternal knowledge and the ARI incidence. Furthermore, the use of mosquito repellent is also correlated with the ARI incidence. Of the 74 mothers of toddlers who did not use mosquito repellent, 93.2% experienced ARI, while of the 31 mothers who used mosquito repellent, 54.8% experienced ARI. The results of statistical analysis showed the calculated $\chi^2$ value (21.742) > $\chi^2$ table (3.841) and p-value (0.000) < 0.05, confirming that the use of mosquito repellent was significantly related to ARI incidence. Likewise with smoking habits, where of the 75 mothers of toddlers who stated that they had families who smoked, 92.0% experienced ARI, while of the 30 mothers who stated that their families did not smoke, 56.7% experienced ARI.

The calculated $\chi^2$ value (18.050) > $\chi^2$ table (3.841) and the p value (0.000) < 0.05, indicate that there was a significant correlation between smoking habits and ARI incidence. Lastly, residential density also influences the incidence of Acute Respiratory Infection (ARI), where of the 67 mothers of toddlers who lived in places with housing density that did not meet the requirements, 88.1% experienced Acute Respiratory Infection (ARI), while 38 mothers who lived in places with the residential density that met the requirements. conditions, as many as 71.1% experienced Acute Respiratory Infection (ARI). The calculated $\chi^2$ value (4.732) > $\chi^2$ table (3.841) and the p-value (0.030) < 0.05, confirmed that residential density was also significantly correlated with the incidence of ARI.

**Table 3.** Multivariate Analysis of Acute Respiratory Infection (ARI) Incidence at Getengan Health Center Tana Toraja Regency

| Variable | B | Sig | Exp (B) | OR | 95% C for EXP (B) | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Knowledge | 1,265 | 0,088 | 3,543 | 14,222 | 0,828 | 15,164 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Use of mosquito repellent | 1,832 | 0,006 | 6,244 | 13,364 | 1,701 | 22,919 |
| Smoking Habit | 1,962 | 0,004 | 7,111 | 18,153 | 1,872 | 27,018 |
| Residential Density | 1,045 | 0,104 | 2,842 | 4,760 | 0,808 | 9,999 |
| Constant | -10,090 | 0,000 | 0,000 | | | |

The results of the analysis in table 3 showed that there was a significant relationship between several factors and Acute Respiratory Infections (ARI) incidence. The significance value (p-value) obtained for knowledge was 0.012, the use of mosquito repellent was 0.000, for smoking habits was 0.000, and for residential density was 0.030. Of the four variables, it was known that the smoking habit variable had the smallest p-value, namely 0.000, indicating that the relationship between smoking habits and the incidence of ARI was very significant. It showed that smoking habits had a strong influence in the incidence of ARI on research subjects.

## DISCUSSION
### Determinants of Knowledge and Acute Respiratory Infection (ARI) Incidence on Toddlers

Mothers' knowledge of Acute Respiratory Infection (ARI) on toddlers is one of the factors that can influence ARI incidence. In this study, it was found that there was a relationship between the knowledge of mothers of toddlers and the incidence of Acute Respiratory Infection (ARI) on toddlers (p=0.012). Good knowledge of Acute Respiratory Infection (ARI) can help mothers recognize early symptoms, take preventive measures, and seek appropriate treatment if their child experiences symptoms of Acute Respiratory Infection (ARI) (14). Conversely, a lack of knowledge about ARI can result in delays in providing appropriate care, or even not taking necessary preventive measures. For example, a mother who does not know that ARI is caused by viruses or bacteria may not take steps to prevent transmission to her child or may not seek appropriate treatment if her child is sick (15).

There is still a lack of knowledge among mothers regarding the incidence of Acute Respiratory Infection (ARI) on toddlers because respondents are only at the knowledge level and have not yet understood, applied, analyzed, synthesized, and evaluated material related to the incident of Acute Respiratory Infection (ARI). Apart from that, this level of knowledge is also influenced by multifactor such as the level of education, the role of health instructors, access to available information, and the desire to seek information from various media (16). This research is in line with research by Salsabila et.al at the Children's Polyclinic at RSUD dr. R. Koesma Tuban in 2023 showed that there was a relationship between parental knowledge and knowledge of Acute Respiratory Infection (ARI) prevention with a p value = 0.022 < 0.05 (16). Parents' lack of understanding of Acute Respiratory Infection (ARI) also causes delays in bringing their sick children to health workers. They assumed that their baby/toddler was just suffering from an ordinary cough, which was an early sign of ARI. Parents only gave traditional cough medicine which did not solve the problem. Therefore, increasing maternal knowledge of Acute Respiratory Infection (ARI) can help reduce the incidence of Acute Respiratory Infection (ARI) on toddlers by enabling them to take more effective action in preventing and managing this disease (17).

### Determinants of the use of mosquito repellent and ARI incidence on Toddlers

The use of mosquito repellent as a tool to avoid mosquito bites can reduce indoor air quality, causing respiratory problems because it produces smoke and unpleasant odors (18). The presence of air pollution in the home environment will damage the lung's defense mechanism, making it easier for respiratory problems to occur. In this study, it was found that there was a relationship between the habit of using mosquito repellent at bedtime and the incidence of ARI (p=0.000). From these results, it can be said that people who sleep using mosquito repellent had a greater risk of ARI than people who did not use it. The use of mosquito repellent by families as an effort to prevent mosquito bites is often associated with the incidence of Acute Respiratory Infections (ARI) on toddlers (19). This can be caused by several factors. First, inappropriate, or excessive use of mosquito repellent can produce toxic chemicals that are inhaled by toddlers, which can cause irritation of the respiratory tract and increase the risk of ARI. Second, the use of mosquito repellent can produce smoke or vapor that irritates the child's respiratory system, especially if the room does not have sufficient ventilation. Third, mosquito repellent containing certain chemicals,

such as DEET, can cause allergic reactions in susceptible children. In addition, the use of mosquito repellent can also give the false impression that children are completely protected from mosquito bites, which can reduce parental awareness of the potential for transmission of mosquito-borne diseases, including ARI (20).

The study is in accordance with research conducted by Ahla (2021) in Kuin Raya Health Center Working Area, Banjarmasin City, which stated that the habit of using mosquito repellent (p=0.041) was associated with Acute Respiratory Infection (ARI) disease on toddlers (21). Prevention efforts using mosquito repellent have not yet become widespread among the public. The habit of not using mosquito repellent at bedtime is often found in cases. This habit is common among people because Acute Respiratory Infection (ARI) is no longer considered a dangerous disease. This is because the area is categorized as an endemic area and the incidence of Acute Respiratory Infection (ARI) has been going on for a long time. Moreover, many respondents do not like the smell of the anti-mosquito medication and there is still a lack of knowledge among respondents about the dangers of Acute Respiratory Infection (ARI) (22). Therefore, it is important to use anti-mosquito drugs wisely, choose safe products according to the instructions for use, and take other preventive steps, such as using mosquito nets or mosquito nets, to protect children from mosquito bites without increasing the risk of ARI.

**Determinants of smoking habits and the incidence of ARI on toddlers**

Smoking habits in the family environment can be a significant determinant in the incidence of Acute Respiratory Infections (ARI) on toddlers. In this study, it was found that smoking habits were related to ARI incidence (p=0.000). Exposure to cigarette smoke, both directly and indirectly, can increase the risk of ARI on toddlers. Toddlers who live in homes with family members who smoke have a higher risk of experiencing ARI because they are exposed to various toxic substances contained in cigarette smoke (23). Cigarette smoke contains various dangerous chemicals such as nicotine, carbon monoxide and tar which can damage a child's respiratory system, making them more susceptible to respiratory tract infections. Meanwhile, the results of this study are in accordance with research conducted by Christine et.al (2019) in Kedung Sari Village, Sukajadi District, Pekanbaru City, showing that smoking habits (p= 0.000) were related to the incidence of Acute Respiratory Infection (ARI) on toddlers (24). Apart from that, cigarette smoke can also disrupt a child's immune system, making them more susceptible to attacks by viruses and bacteria that cause Acute Respiratory Infection (ARI). Apart from direct effects, smoking habits in the family can also influence toddlers' behavioral patterns and life habits, such as being an example for toddlers to start smoking in their adulthood. Therefore, avoiding exposure to cigarette smoke around toddlers, either by stopping the smoking habit or limiting exposure to cigarette smoke in the home, can be an important step in preventing the incidence of ARI on toddlers (25).

Environmental conditions can influence Acute Respiratory Infection (ARI) on toddlers. A striking environmental influence in this case is air pollution, especially cigarette smoke. The smoke in the air contains dangerous substances and if it is inhaled by people around the smoker, that person will also inhale dangerous chemicals within themselves even though they themselves do not smoke. For example, toddlers will be more dangerous than adults because their immune system is still low (25,26). The increasing number of smokers means that there are more people suffering from health problems due to smoking or inhaling cigarette smoke (for passive smokers), who are generally women and children. This cannot be considered trivial because several studies show that it is passive smokers who experience a greater risk than actual smokers (27). Having one or more smokers in the house will increase the risk of family members suffering from illnesses, such as respiratory problems, worsening asthma and aggravating angina pectoris and can increase the risk of getting an acute respiratory infection (ARI) especially on toddlers (28).

**Determinants of Residential Density and Acute Respiratory Infection (ARI) Incidence on Toddlers**

Overcrowding or density in a room, especially a toddler's room, which does not comply with standards will increase the room temperature caused by the release of body heat which will increase humidity due to water vapor from heating. Thus, the greater the number of occupants in a bedroom, the faster the room air will experience gas or bacterial contamination. With more occupants, indoor oxygen levels decrease, and it is followed by an increase in carbon dioxide and the impact of increasing indoor carbon dioxide is a decrease in indoor air quality (27,28). In

this study, it was found that residential density was related to ARI incidence on toddlers (p=0.030). Residential density, which reflects the level of population density in a residential area, can be a determining factor that plays a role in the incidence of Acute Respiratory Infections (ARI) on toddlers (29). Environments with high residential densities tend to provide more ideal conditions for the spread of infectious diseases, including ARI. Factors such as closer physical contact between individuals, poor ventilation, and shared use of sanitation facilities, may increase the risk of ARI transmission (30).

Moreover, high residential density can also worsen indoor air quality because the buildup of air pollutants and particles that cause respiratory tract irritation can occur more easily in densely populated environments. The bad impact can be more intense on toddlers, whose respiratory systems are still vulnerable and not yet fully developed. The results of the study are in accordance with research by Rini Handayani et.al (2020) in Bengkulu City showing that residential density (OR: 2.14; 95% CI: 1.07-4.28) was associated with Acute Respiratory Infection (ARI) incidence (31). Therefore, it is important to pay attention to residential density conditions to prevent Acute Respiratory Infection (ARI) on toddlers by ensuring good ventilation, paying attention to environmental cleanliness, and minimizing exposure to air pollution in the house, especially in areas with high residential density. Residential density is determined by the Ministry of Health (2000), namely the ratio of the floor area of all rooms to the minimum number of occupants of 8 m$^2$ / person. The minimum bedroom area is 8m2/person, and it is not recommended that more than two people sleep in one bedroom, except for toddlers. The problem of residential density is mostly caused by the large number of family members or heads of families with their toddlers living in one house (17).

## CONCLUSION

It can be concluded that several factors are significantly related to ARI incidence. Maternal knowledge of toddlers' health, use of mosquito repellent, smoking habits in the family environment, and residential density are factors that influence ARI incidence. Therefore, interventions aimed at increasing maternal knowledge of toddlers' health, reducing the use of mosquito repellent, avoiding smoking habits in the family environment, and managing high residential density can be effective strategies in preventing and controlling Acute Respiratory Infection (ARI) on toddlers in Getengan Health Centers Tana Toraja Regency.

## BIBLIOGRAPHY

1.  Wulandari RA, Fauzia S, Kurniasari F. Investigations on the risk factors of Acute Respiratory Infections (ARIs) among under-five children in Depok City, Indonesia. Ann Di Ig Med Prev e Di Comunità. 2023;
2.  Nshimiyimana Y, Zhou Y. Analysis of risk factors associated with acute respiratory infections among under-five children in Uganda. BMC Public Health. 2022;22(1):1–10.
3.  Fathmawati F, Rauf S, Indraswari BW. Factors related with the incidence of acute respiratory infections in toddlers in Sleman, Yogyakarta, Indonesia: Evidence from the Sleman Health and Demographic Surveillance System. PLoS One. 2021;16(9):e0257881.
4.  Indonesia KKR. Hasil utama Riskesdas 2018. Jakarta Badan Penelit dan Pengemb Kesehatan, Kementrian Kesehat Republik Indones. 2018;
5.  Anteneh ZA, Hassen HY. Determinants of acute respiratory infection among children in Ethiopia: a multilevel analysis from Ethiopian demographic and health survey. Int J Gen Med. 2020;17–26.
6.  Kemenkes RI. Hasil Utama Riskesdas 2018. Badan Penelitian dan Pengembangan Kesehatan. Jakarta: Badan Penelitian dan Pengembangan Kesehatan; 2018.
7.  Dinkes Tana Toraja. Profil Kesehatan Kabupaten Tana Toraja. Makale. 2018;
8.  Tombeg Z, Hadi AJ. Predisposisi Tuberkulosis Paru: A Cross Sectional Study. J Public Heal Pharm. 2021;1(1):9–13.
9.  Hadi AJ, Manggabarani S, Tombeg Z, Ishak S, Said I. Consumption Pattern and Nutrition Conseling Roles on Obesity of Integrated Primary School Students. Unnes J Public Heal. 2019;8(1):45–50.
10. Hasibuan SBH, Hadi AJ, Ali RSM, Palluturi S, Lubis NL. Penguatan Gerakan Keluarga Sehat melalui Posyandu

terhadap Pencegahan Stunting di Wilayah Kerja Puskesmas Paringgonan Kabupaten Padang Lawas. Media Publ Promosi Kesehat Indones. 2023;6(7):1415–22.

11.   Sihombing CM, Efendy I, Hadi AJ. Faktor Yang Mempengaruhi Perilaku Penyedia Makanan Terhadap Pelaksanaan Perilaku Hidup Bersih Dan Sehat Di Warung Kecamatan Panyabungan. Wind Heal J Kesehat. 2020;18–27.

12.   Hasibuan AS, Manggabarani S, Maulana I, Hadi AJ. Determinan Model Karakteristik Budaya Kesehatan pada Pemanfaatan Pelayanan Pencegahan Covid-19 di Puskesmas Padangmatinggi Kota Padangsidimpuan. Media Publ Promosi Kesehat Indones. 2022;5(12):1641–7.

13.   Setiani EM, Mirasa YA, Winarti E. Determinasi Pengetahuan Ibu dan Pengaruh Rokok terhadap Kejadian ISPA pada Balita: Karakteristik responden berdasarkan pengetahuan. Sci-tech J. 2023;2(2):233–44.

14.   Wang X, Li Y, O'Brien KL, Madhi SA, Widdowson M-A, Byass P, et al. Global burden of respiratory infections associated with seasonal influenza in children under 5 years in 2018: a systematic review and modelling study. Lancet Glob Heal. 2020;8(4):e497–510.

15.   Kulkarni D, Wang X, Sharland E, Stansfield D, Campbell H, Nair H. The global burden of hospitalisation due to pneumonia caused by Staphylococcus aureus in the under-5 years children: A systematic review and meta-analysis. EClinicalMedicine. 2022;44.

16.   Fardani SF, Nugraheni WT, Ningsih WT, Sumiatin T. Hubungan Tingkat Pendidikan dan Pengetahuan Orang Tua dalam Pencegahan Ispa Pada Balita di Poli Anak RSUD dr. R. Koesma Tuban. J Pendidik Tambusai. 2023;7(3):20450–7.

17.   Syahidi MH, Gayatri D, Bantas K. Faktor-faktor yang Mempengaruhi Kejadian Infeksi Saluran Pernapasan Akut (ISPA) pada Anak Berumur 12-59 Bulan di Puskesmas Kelurahan Tebet Barat, Kecamatan Tebet, Jakarta Selatan, Tahun 2013. J Epidemiol Kesehat Indones. 2016;1(1).

18.   Afriani B. Faktor-faktor yang berhubungan dengan kejadian ispa pada balita. Cendekia Med J Stikes Al-Maarif Baturaja. 2020;5(1):1–15.

19.   Indarti S. Hubungan Pencemaran Udara Rumah Tangga Dengan Kejadian Infeksi Saluran Pernapasan Akut (ISPA) Pada Balita. J Ilm Kesehat. 2019;8(1):37–42.

20.   Garmini R, Purwana R. Polusi udara dalam rumah terhadap infeksi saluran pernafasan akut pada balita di tpa sukawinatan palembang. J Kesehat Lingkung Indones. 2020;19(1):1–6.

21.   Ahla AY. Determinan Penyakit ISPA Pada Balita Di Wilayah Kerja Puskesmas Kuin Raya Kota Banjarmasin Tahun 2021. Universitas Islam Kalimantan MAB; 2021.

22.   Husna S, Sakdiah S, Idayati R, Safri M, Mulia VD. Hubungan Sumber Polutan dalam Rumah dengan Kejadian ISPA pada Balita di Puskesmas Lubuk Sanai, Mukomuko, Bengkulu. J Kedokt Nanggroe Med. 2022;5(1):1–10.

23.   Fatmawati TY. Analisis Karakteristik Ibu, Pengetahuan dan Kebiasaan Merokok dengan Kejadian ISPA pada Balita di Kelurahan Kenali Asam Bawah. J Ilm Univ Batanghari Jambi. 2018;18(3):497–502.

24.   Purba CVG, Safryanni O, Hidayati A, Rasyid Z. Determinan Kejadian ISPA Non Pneumonia Pada Anak Balita Di Kelurahan Kedung Sari Kecamatan Sukajadi Kota Pekanbaru. J Penelit Kesmasy. 2019;1(2):91–7.

25.   Hilmawan RG, Sulastri M, Nurdianti R. Hubungan kebiasaan merokok dengan kejadian ISPA pada balita di Kelurahan Sukajaya Kecamatan Purbaratu Kota Tasikmalaya. J Mitra Kencana Keperawatan Dan Kebidanan. 2020;4(1):9–16.

26.   Aprilla N, Yahya E, RIRIN R. Hubungan antara perilaku merokok pada orang tua dengan kejadian ISPA pada balita di desa pulau Jambu wilayah kerja Puskesmas Kuok tahun 2019. J Ners. 2019;3(1):112–7.

27.   Irianto G, Lestari A, Marliana M. Hubungan Kebiasaan Merokok Anggota Keluarga Dengan Kejadian Ispa Pada Balita Umur 1-5 Tahun. Healthc Nurs J. 2021;3(1):65–70.

28.   Sofia S. Faktor Risiko Lingkungan dengan Kejadian ISPA pada Balita Di Wilayah Kerja Puskesmas Ingin Jaya Kabupaten Aceh Besar. AcTion Aceh Nutr J. 2017;2(1):43–50.

29.   Medhyna V. Hubungan Lingkungan Fisik Rumah Dengan Kejadian Ispa Pada Bayi. Matern Child Heal Care. 2019;1(2):82–6.

30. Dongky P, Kadrianti K. Faktor risiko lingkungan fisik rumah dengan kejadian ISPA balita di kelurahan Takatidung Polewali Mandar. Unnes J public Heal. 2016;5(4):324–9.

31. Handayani R, Mahkota R. Determinan Kejadian Infeksi Saluran Pernafasan Akut (ISPA) pada Balita di Kota Bengkulu saat Kebakaran Hutan. J Ilm Kesehat Masy Media Komun Komunitas Kesehat Masy. 2020;12(3):137–44.