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# FACTORS ASSOCIATED WITH THE INCIDENCE OF ACUTE RESPIRATORY INFECTIONS IN TODDLERS

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**ABSTRACT**
Acute Respiratory Infection (ARI) is the biggest death disease in babies and toddlers, especially in developing countries where one toddler dies in 20 seconds or 3 people per minute. This research aims to find out what factors are associated with the incidence of ARI in toddlers at the Antang Makassar Community Health Center. This research is a type of analytical observational research using the Cross Sectional Study method. The sampling technique used accidental sampling and count of sample is 44 respondents was obtained in accordance with the inclusion criteria. Data collection was carried out using questionnaire measuring instruments which has been modified and taken from several previous research results that have been validated and observation sheets. The results of this study showed that the percentage of ARI incidents in toddlers was 93.2% and the p.value for immunization status with ARI incidents was 0.006, p.value house environmental with ARI incidents was 0.003, and p.value mother's knowledge with ARI incidents was 0.002. The conclusion of this research is that there is a correlation between immunization status, house environmental, and mother's knowledge with the incidence of ARI in toddlers.

Keywords: acute respiratory infection; house environmental; immunization status; mother's knowledge; toddlers

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## INTRODUCTION

Acute Respiratory Infection (ARI) is a disease caused by an infectious agent. Symptoms usually appear quickly, ranging from several hours to days after infection. The spectrum of ARI symptoms can vary, usually in the form of fever and cough. Pathogens associated with this disease include pneumococcus and tuberculosis bacteria as well as influenza and parainfluenza viruses (WHO, 2014). Several researchers found several factors related to the incidence of ARI in children under five, including nutritional status, immunization, exclusive breastfeeding, caregivers, exposure to cigarette smoke during pregnancy, population density, income, smoking behavior in the family, mother's knowledge, use of fuel for cooking, and pesticides (Syahidi & Gayatri, 2014), (Rana et al., 2019), (Tazinya et al., 2018), (Tarmure et al., 2020). Other research shows that improving the quality of clean water, sanitation, hygiene and nutrition can reduce the incidence of ARI in children under five (Ashraf et al., 2020). Humid and moldy home conditions are associated with the incidence of ARI in children hospitalized in New Zealand, while lack of lighting and ventilation in the house is also associated with the incidence of ARI (Ingham et al., 2019), (Mahendrayasa & Farapti, 2018).

ARI is the biggest death disease in infants and toddlers, especially in developing countries where one toddler dies in 20 seconds or 3 people per minute (Syahrir, 2015). The World Health Organization (WHO) estimates that the incidence of ARI in developing countries is 0.29% (151 million people). ARI is the first disease suffered by babies and toddlers in Indonesia. The prevalence of ARI in Indonesia is 25.5% with pneumonia morbidity in infants 2.2% and toddlers 3%, while mortality in infants is 23.8% and toddlers 15.5% (Marni, 2014). In 2015, the South Sulawesi Provincial Department of Health stated that pneumonia was the biggest cause of infant mortality in Indonesia, namely 22.3% of all infant deaths. The results of Basic Health Research (Riskesdas) in 2014 found that there were 82,262 people suffering from pneumonia and the number of children under five suffering from pneumonia who were found and treated was 14,265 (17.34%). Meanwhile, the highest coverage of pneumonia cases among toddlers in South Sulawesi is in Gowa Regency (Syahrir, 2015).

Data obtained from the Antang Community Health Center, Makassar City, showed that the incidence of ARI with non-pneumonia coughing in 2014 was 1,069 new cases of visits among toddlers. Meanwhile in 2015 the number of visits by children with ARI with non-pneumonia coughs decreased by 675 new cases, while the number of new cases or visits by children under five in 2016 (January to September) increased by 695 people. This means that the incidence of ARI with non-pneumonia coughing at the Antang Health Center in Makassar City is experiencing fluctuations and there is a high possibility of an increase in the incidence of new ARI diseases among the target children under five in 2016 (Puskesmas Antang Makassar, 2016). Based on the background and the study of the problem above, this research aims to find out what factors are associated with the incidence of ARI in toddlers at the Antang Makassar Community Health Center This research aims to determine what factors are associated with the incidence of ARI in toddlers at the Antang Makassar Community Health Center.

## METHOD

This research method used a cross sectional study which studying the correlation between risk factors (independent) and effect factors (dependent), where researchers observe or measure variables at the same time. This research was carried out at the Antang Health Center, Makassar City in 2016. The population in this study were all toddlers suffer of ARI at the Antang Health Center, Makassar City. The sampling technique used in this research is Non-Random Sampling using an Accidental Sampling approach, namely sampling is carried out momentarily, so that the sample obtained is the sample available at that time with a total sample size of 44 respondents (Suyanto, 2011).

The inclusion criteria in this study were toddlers who were suffer of new ARI, toddlers who were suffer of ARI with a cough that was not pneumonia, toddlers who came for examination at the Community Health Center, mothers who were willing to have their toddler examined, mothers of toddlers who were willing to fill out a questionnaire. Meanwhile, the exclusion criteria in this study were toddlers who did not visit or were not at the Community Health Center, toddlers who suffered from other infectious diseases, and mothers of toddlers who were not willing to fill out the questionnaire. Before conducting research, researchers provide informed consent to respect, protect and maintain the confidentiality of patient information and privacy. Primary data collection was carried out using questionnaire measuring instruments which has been modified and taken from several previous research results that have been validated and observation sheets that had been made by researchers and referring to the literature which consisted of several questions. The data used as complementary data for primary data related to the problem under study, namely data taken from the Antang

Community Health Center, Makassar City. Univariate analysis was carried out on each research variable to see the demographic frequency distribution of respondents and the percentage of each independent variable. Bivariate analysis was carried out to see the correlation between immunization status, house environmental and mother's knowledge with the incidence of ARI in toddlers using the Chi Square test with a significance level (α) of 0.05.

## RESULTS

Tabel 1
Dinstribution of Respondents Based on Respondent Characteristics of Patients (n=44)

| Variables | f | % |
|---|---|---|
| Age (years old) | | |
| 1-2 | 30 | 68,2 |
| 3-4 | 14 | 31,8 |
| Gender | | |
| Male | 23 | 52,3 |
| Female | 21 | 47,7 |
| Age of Mother (years old) | | |
| 21-27 | 11 | 25,0 |
| 28-35 | 22 | 50,0 |
| 36-45 | 11 | 25,0 |
| Last Education | | |
| Bachelor Degree | 9 | 20,4 |
| Senior High School | 20 | 45,5 |
| Junior High School | 10 | 22,7 |
| Elementary School | 5 | 11,4 |
| Occupation | | |
| Government Employees | 7 | 15,9 |
| Housewife | 31 | 70,5 |
| Self-Employed | 6 | 13,6 |
| Immunization Status | | |
| Complete | 13 | 29,5 |
| Incomplete | 31 | 70,5 |
| House Environmental | | |
| Healthy | 12 | 27,3 |
| Unhealthy | 32 | 72,7 |
| Mother's Knowledge | | |
| Good | 5 | 11,4 |
| Not Good | 39 | 88,6 |
| Suffer of ARI | | |
| Yes | 41 | 93,2 |
| No | 3 | 6,8 |

Tabel 1 Show that the majority of respondents were in the 1-2 years old category (68.2%) with male gender (52.3%) and the majority of mothers were in the 28-35 years old category (50%). Most of the respondents had a high school education (45.5%) and their mother's job was as a housewife (70.5%). Most respondents had incomplete immunization status (70.5), unhealthy home environments (72.7%), had insufficient knowledge (88.6%) and most suffer of ARI (93.2%).

Tabel 2 Show that from the 44 respondents, there were 10 toddlers (22.7%) who had complete immunization status suffer of ARI, and there were 3 toddlers (6.8%) who had complete immunization status who did not suffer of ARI. Meanwhile, the number of toddlers who had incomplete immunization status suffered from ARI as many as 31 toddlers (70.5%). Based on the results of statistical tests, it was found that the p.value was 0.006, which means there is a correlation between

immunization status and the incidence of ARI, where the number of toddlers who have incomplete immunization status suffer more of ARI than toddlers who have complete immunization status.

Tabel 2.
Correlation between Immunization Status with suffer of ARI (n=44)

| Immunization Status | Suffer of ARI | | | | Total | | *P Value* |
|---|---|---|---|---|---|---|---|
| | Yes | | No | | | | |
| | f | % | f | % | f | % | |
| Complete | 10 | 22,7 | 3 | 6,8 | 13 | 29,5 | ,006 |
| Incomplete | 31 | 70,5 | 0 | 0,0 | 31 | 70,5 | |

Tabel 3.
Correlation House Environmental Status with suffer of ARI (n=44)

| House Environmental | Suffer of ARI | | | | Total | | *P Value* |
|---|---|---|---|---|---|---|---|
| | Yes | | No | | | | |
| | f | % | f | % | f | % | |
| Healthy | 9 | 20,5 | 3 | 6,8 | 12 | 27,3 | |
| Unhealthy | 32 | 72,7 | 0 | 0 | 32 | 72,7 | ,003 |

Tabel 3 Show that from the 44 respondents, there were 9 toddlers (20.5%) who had a healthy house environmental who suffer of ARI, and there were 3 toddlers (6.8%) who had a healthy house environmental who did not suffer of ARI. Meanwhile, the number of toddlers who have an unhealthy house environmental who suffer of ARI is 32 toddlers (72.7%). Based on the results of statistical tests, it was found that the p.value was 0.003, which means there is a correlation between the house environmental and the incidence of ARI where the number of toddlers who have unhealthy house environmental suffer of ARI more than toddlers who have healthy house environmental.

Tabel 4.
Correlation Mother's Knowledge Status with Suffer of ARI (n=44)

| Mother's Knowledge | Suffer of ARI | | | | Total | | *P Value* |
|---|---|---|---|---|---|---|---|
| | Yes | | No | | | | |
| | f | % | f | % | f | % | |
| Good | 3 | 6,8 | 2 | 4,5 | 5 | 11,3 | ,002 |
| Not good | 38 | 86,4 | 1 | 2,3 | 39 | 88,7 | |

Tabel 4 Show that from the 44 respondents, there were 3 toddlers (6.8%) who had good mother's knowledge of suffering of ARI, and there were 2 toddlers (4.5%) who had good mother's knowledge of not suffer of ARI, and there were 38 toddlers (86 .4%) toddlers who have less mother's knowledge suffer of ARI, and there is 1 toddler (2.3%) who has less mother's knowledge who does not suffer of ARI. Based on the results of statistical tests, it was found that the p.value was 0.002, which means there is a correlation between mother's knowledge and the incidence of ARI where the number of toddlers who have less mother's knowledge suffer more of ARI than toddlers who have good mother's knowledge.

## DISCUSSION

ARI is the biggest cause of death in children throughout the world. Children who were not immunized with pneumococcal, HiB, measles, vitamin A vaccines showed a higher incidence of ARI compared to children who were immunized (Vinod & Kaimal, 2023). Immunization can prevent various types of infectious diseases including ARI (Nomi, 2012). Immunization is the process of forming the body's immune system which functions as the body's defense against microorganisms (bacteria and viruses) that can cause infection (Rahma, 2020). Every child must receive basic immunization against seven main diseases before the age of one year, namely BCG, DPT, polio, measles and hepatitis B immunization (Murti, 2018). Inadequate immunization is a risk factor that can increase the incidence of ARI so that the factor of children being immunized is crucial in the high incidence of ARI (Tosepu, 2015). The results of the research show that exclusive breastfeeding is related to the incidence of ISPA in the

Sumba region, East Nusa Tenggara. Therefore, it is hoped that mothers will provide exclusive breastfeeding for six months, participate actively in health education so that they can increase their knowledge (Zebua et al., 2023).

The results of this study showed that there were 10 (22.7%) respondents who received complete immunization but suffer of ARI. We are assuming that this is caused by several factors such as living environmental conditions and inadequate nutritional intake. On the other hand, 31 (70.5%) toddlers with incomplete immunization status suffer of ARI. We are assuming that this is because the immunization of toddlers is incomplete, which causes the body's immune system to be weak, making it vulnerable to transmission of infectious diseases. Research conducted by Ibrahim (2021) shows that there is a correlation between immunization status and the incidence of ARI in toddlers (Ibrahim et al., 2021). This is in line with research conducted by Mashur (2023) which states that there is a correlation between immunization status and the incidence of ARI (Manshur & Azim, 2023). Immunization status is expected to prevent deterioration in toddlers with ARI. Deaths and complications due to pneumonia in toddlers due to pneumonia can be prevented by administering DPT immunization. Complete immunization status can prevent and reduce the risk of disease (Amiruddin1 et al., 2020), (Fitriani et al., 2022).

ARI is an infectious disease that passes through the air and enters the body through the respiratory tract, so that epidemiologically air has a large role in the transmission of respiratory infections (Tosepu, 2015). The results of research conducted by Verma (2024) show a tendency for ARI disease in children in rural areas, exposed to indoor tobacco smoke (Verma et al., 2024). In general, indoor air quality is influenced by indoor smoke originating from smokers, the use of wood/charcoal/kerosene as fuel, and the use of mosquito coils. There are changes in the function of the lungs and respiratory system of adults due to long-term exposure to emissions from coal-fired power plants. Factors that influence the decline in lung function in adults are the level of NOx and SO2 exposure, distance from residence, wind direction, age, and smoking status (Rachmat et al., 2021). Beside that, indoor air is also determined by ventilation, spatial layout and occupant density (Cecep & Pusphandani, 2015). The increased possibility of a child suffering from ISPA symptoms is due to environmental vulnerabilities such as territory and air pollution (Chiao & Deji-Abiodun, 2020).

Several studies state that air pollution originating from the kitchen has made a major contribution to ARI (Cecep & Pusphandani, 2015). This is in line with the results in this study which showed that there were 9 (20.5%) toddlers who had a healthy home environment but suffer of ARI. The researchers assume that this could be caused by the transition from the dry season to the rainy season and a family history of ARI. Meanwhile, 32 (72.7%) toddlers who had unhealthy home environments suffer of ARI. Researchers assume that this is because apart from the home environment itself, there are several factors in the home environment that do not receive special attention, such as the use of anti-mosquito coils, direct exposure to cigarette smoke by family members who smoke, which are strong triggers for ARI. Maurarkar (2021) in his research stated that the prevalence of ARI was higher in children living in rural areas and children under five whose parents had smoking habits (Murarkar et al., 2021). Environmental factors in the home including sanitation, crowds, and smoking habits in the home significantly influence ARI in children (Islam et al., 2024). Parents can carry out simple and basic personal and household hygiene measures to reduce the risk of children contracting ARI and other respiratory diseases (Leung et al., 2022).

Furthermore, in the results of this study it was found that 3 (6.8%) toddlers whose mothers had good knowledge suffer of ARI. Researchers assume this could be triggered by poor economic status and nutritional status factors, thus triggering the occurrence of ARI. Meanwhile, there were 38 (86.4%) toddlers whose mothers had less knowledge of suffer of ARI. We are assuming that this is caused by mothers' lack of knowledge about ARI and is supported by the mothers' educational and occupational backgrounds, resulting in mothers' lack of ability to prevent their children from factors that can cause ARI. This is in line with research conducted by Yue, which states that ongoing health education campaigns are needed to increase knowledge about risks and self-protection measures against transmission of respiratory tract infections (Yue et al., 2022). Mother's knowledge about ARI is also closely related to the incidence of ARI in toddlers. Lack of knowledge can influence a person's behavior, including behavior in the health sector, so it can be the cause of the high rate of spread of diseases, including ARI (Lestari, 2015).

Arevola (2017) in his research found that parental knowledge still plays a major role in determining when and how to use antibiotics for ARI in children (Cantarero-Arevalo et al., 2017). This is in line with research by Bhalla (2019) in his research that parents need knowledge about the risk factors for ARI and awareness of the use of antibiotics (Bhalla et al., 2019), (Hammour et al., 2018). Sisfiani (2018) stated a similar thing, namely that there is a correlation between parental knowledge and health behavior for children to avoid getting ARI (Sarimi et al., 2018). Knowledge, Attitudes and Practices (KAP) regarding the care of ARI children among caregivers, who are usually mothers, have an important influence on morbidity and mortality rates due to ARI in children under 5 years old (Manh et al., 2023). For this reason, health workers need to build effective intervention projects to increase awareness about ARI among parents who care for children with ARI through media such as television, leaflets so as to encourage self-ability and self-management and increase awareness in disease prevention (Thaw et al., 2019), (Tunny et al., 2020).

## CONCLUSION

The results of this study showed that the percentage of ARI incidents in toddlers was 93.2% and the p.value for immunization status with ARI incidents was 0.006, p.value house environmental with ARI incidents was 0.003, and p.value mother’s knowledge with ARI incidents was 0.002. The conclusion of this research is that there is a correlation between immunization status, house environmental, and mother’s knowledge with the incidence of ARI in toddlers at the Tamangapa Makassar Community Health Center. For this reason, it is recommended that health service providers continue to increase the provision of information to the public by providing education about ARI diseases, and not forget to also provide education about the importance of immunization and a healthy home environment. For the Makassar City Health Service to always try to overcome of ARI incidents. To families and the community should participate in efforts to control of ARI in toddlers.

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