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Physical Quality of The House as a Risk Factor for ARI Disease in Toddlers in Working Area of The Gentungan Health Center

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ABSTRACT

Acute Respiratory Infection (ARI) cases became the number one disease in Gowa Regency in 2020, with a total of 17,394 cases and a percentage of 8.52% of the top ten diseases. Several factors, including unhealthy home environment factors, can cause ARI. Data on healthy homes in the Gentungan Health Centre area is 3,328 out of 6,163 houses examined from 7,704 houses. This study aimed to determine the relationship between the physical quality of the house and the incidence of ARI in the Gentungan Health Centre working area, Gowa Regency. This type of research is analytical and observational with a case-control approach. There were 134 samples, 67 case samples, and 67 control samples. Samples in this study used systematic random sampling. The results showed there was a significant relationship between temperature ($p=0.000$), humidity ($p=0.003$), and ventilation ($p=0.005$) with the incidence of ARI in toddlers, and there was no significant relationship between lighting ($p = 0.791$) and the incidence of ARI disease in toddlers. It is expected that the Gentungan Health Centre can counsel the community about the importance of maintaining the physical quality of the house and the dangers of ARI. Then, the community is expected to control the risk factors for ARI by improving the physical quality of the house and for further researchers to conduct research related to the relationship between the physical quality of the house and ARI disease the incidence of ARI in toddlers.

Keywords: ARI, Observational, Home, Toddlers

INTRODUCTION

ARI is a major cause of infectious disease morbidity and mortality in the world. Nearly four million people die from ARI every year, 98% of which are caused by lower respiratory tract infections. Mortality rates are very high in infants, children, and the elderly, especially in countries with low and middle income per capita (WHO, 2007).

The World Health Organization estimates that the incidence of ARI infection in developing countries with under-five mortality rates above 40 per 1000 live births is 15% -20% per year in the under-five age group (Sabri, 2019). Based on the 2018 Indonesia Health Profile data, the incidence (per 1000 children under five) in Indonesia was 20.06%, almost the same as the previous year's data of 20.56%. (Indonesia Health Profile, 2019).

The results of Riskesdas 2018 stated that the prevalence of ARI in South Sulawesi was 1.85%, with the highest prevalence of ARI occurring in the age group of 1-4 years (3.04%), male (2.04%), non-school education (2.08 %), work as a fisherman (3.7%) and a place to live in rural areas (1.88%).

Cases of Acute Respiratory Infection (ARI) became the number one most significant disease in Gowa Regency in 2020, with a total of 17,394 and a percentage of 8.52% of the ten most significant number of diseases (Gowa

Health Office, 2020). In January 2021, the number of visits by toddlers with cough symptoms and difficulty breathing at the Gentungan Health Center was 80 people, with 2,634 toddlers (Gowa Health Office, 2021).

Many factors influence ARI, including host factors and environmental factors. Host factors are susceptibility and immunity. Environmental factors (environment) are geographical conditions (climate, temperature, humidity, rainfall, and others) and demographic conditions (density, mobility, behavior, customs, and economic population) (Aprilia et al., 2019).

One of the physical environments that must be considered is the physical environment of the house by making ventilation of at least 10% of the floor area so that good air circulation occurs. The ideal temperature in a house is 18°C-30°C, while the ideal humidity is 40%-60%. The ideal temperature and humidity in the room are essential because temperature and humidity changes can affect pathogenic microorganisms' survival. The intensity of natural lighting in the house is ideally 60 lux (Ministry of Health, 2011).

The results obtained by Gentungan Health Centre for healthy house data are 3,328 out of 6,163 houses inspected from all houses in the Gentungan Health Centre area, which is 7,704 houses. Factors that affect the health of a house start from the feasibility of the components of

the house, the availability of adequate sanitation facilities, and the behavior of the occupants.

Several recent studies have focused on risk factors associated with ARI incidence, such as ventilation. Research conducted by Sariana Pangaribuan (2017) at Remu Health Centre in Sorong City concluded a relationship between air ventilation and the incidence of ARI with the results ($p=0.000$).

According to Vedjia Medhyna (2019), there is a significant relationship between the physical environment of the house and the incidence of ARI, as shown in the results obtained ($p = 0.04$). Research conducted by Suningsih Suabey (2020) in Anelak Village, Siepkosi District, Jayawijaya Regency, concluded that home ventilation has a relationship with the incidence of ARI with the results ($p = 0.00$).

Although research on ARI has grown rapidly, some cases in certain areas still require further exploration, such as the study of physical environmental factors of the house, namely ventilation, temperature, lighting, and humidity. Therefore, this study aimed to determine the relationship between the physical quality of the house and the incidence of ARI in toddlers in the Gantungan Health Centre Working Area, Gowa Regency.

METHODS

The type of research used is analytical research with a case-control approach where a comparison is made between the case and control groups with the same characteristics.

This research was conducted in the Gentungan Health Center area of Gowa Regency, which is divided into 7 village areas, namely, Gentungan Village, Mandalle Village, Bontomanai Village, Tanabangka Village, Bori Matangkasa Village, Manjalling Village, and KalenMandalle Village.

Primary data was collected by measurement and observation, and secondary data was obtained from Gentungan Health Centre.

The sample in this study was 134 samples. 67 case samples and 67 control samples using a systematic random sampling technique.

Data processing and analysis Data were collected and then processed using SPSS, and data analysis was carried out using univariate and bivariate analysis. Univariate analysis explains the characteristics of each variable studied (temperature, humidity, lighting, and ventilation), while bivariate analysis is used to see the relationship between variables using the chi-square test, where the significant level is $p=0.05$.

RESULTS AND DISCUSSION

Temperature is a measure of cold or heat that has been expressed in several temperature scales in the room of the house. Temperatures that are too low can cause health problems, such as hypothermia, while temperatures that are too high can cause dehydration up to heat stroke (Ministry of Health, 2011). It can also be dangerous if the

temperature is too low or too high because some pathogenic microorganisms thrive at these temperatures.

Table 1

The Relationship between Temperature and ARI Disease Incidence in Toddlers

Temperature	ARI				P value
	Cases		Controls		
	n	%	n	%	
Not eligible	50	74.6	22	32.8	0.000
Eligible	17	25.4	45	67.2	
Total	67	100.0	67	100.0	

In Table 1, the relationship between temperature and the incidence of ARI in children under five, houses with a temperature that meets the requirements are 62 houses, with the number of houses for the control group as many as 45 houses and the case group as many as 17 houses. In comparison, the houses with temperatures that do not meet the requirements are 72 houses, with the number of houses for the control group as many as 22 and the case group as many as 50.

The results of statistical tests with Continuity Correction readings using the chi-square test with a value obtained $p = 0.000 < 0.05$ means a significant relationship exists between temperature and the incidence of ARI in children under five. There is a relationship between temperature and the incidence of ARI in infants because the measurement process is carried out in the morning before noon when the temperature increases.

The temperature measurements did not meet the dominant requirements in the case group due to the lack of ventilation, resulting in less efficient air circulation, which caused the room to become hot and humid. Temperature and humidity are closely related to ventilation. The results of this study are in line with research conducted by Fitrah Anastasia et al. (2021), who concluded that there was a relationship between the temperature variable and the incidence of ARI, with the results of statistical tests using the chi-square test, the results were $p = 0.029 < 0.05$.

Table 2

The Relationship of humidity with the incidence of ARI Disease in toddlers

Humidity	ARI				P value
	Cases		Controls		
	n	%	n	%	
Not eligible	50	74.6	32	47.8	0.003
Eligible	17	25.4	35	52.2	
Total	67	100.0	67	100.0	

Humidity is a good vehicle for the growth of microorganisms. Humidity is closely related to temperature and ventilation. Based on the results of observations, the dominant factor of the number of houses that have humidity that does not meet the requirements is room furniture that is too dense, lack of lighting that affects the level of humidity due to high radiation causes

water vapor to decrease and has an impact on humidity levels.

This study's results align with the research of Vera Triandriani et al. (2019), who concluded that there was a relationship between humidity and ARI with $p=0.022$. In addition, the results of this study are also in line with the research of Syafa Widy Syahaya et al. (2021), who concluded that there was a relationship between humidity and the incidence of ARI with the results of statistical tests using the chi-square test, the results were $p = 0.000 < 0.05$, there was a relationship between humidity with the incidence of ARI due to the lack of air exchange which causes the humidity to be too high.

According to WHO, ARI is an upper or lower respiratory tract infection that can cause various diseases ranging from mild to severe infections and death, depending on the causative agent, host, and environmental factors. This disease is included in the Air Borne Disease, which is a disease that is transmitted through the air.

Microorganisms that cause ARI have optimum humidity for their survival. For example, for *Mycoplasma Pneumoniae*, the optimum humidity preferred for life is $<25\%$ and $>80\%$ (Liu et al., 2016). So that the humidity that meets the requirements can prevent the growth and development of bacteria that cause ARI

Table 3

The Relationship of lighting with the incidence of ARI Disease in toddlers

Lighting	ARI				P value
	Cases		Controls		
	n	%	n	%	
Not eligible	58	86.6	60	89.6	0.790
Eligible	9	13.4	7	10.4	
Total	67	100.0	67	100.0	

Source: Primary Data, 2022

Based on observations, most houses have poor lighting due to the ventilation position not being in accordance with the direction of the sun's orientation, resulting in a lack of light. Another factor is the lack of lighting because the research area is mostly densely populated, so the boundary between one house and another is very narrow.

The results of this study are in line with the research of Nur Amalia Safitri (2020), which concludes that there is no relationship between lighting variables and the incidence of ARI with the results of statistical tests using the chi-square test, the results are $p = 0.959 > 0.05$. There is no relationship between lighting and the incidence of ARI because some respondents have good home lighting.

According to WHO, ARI is an upper or lower respiratory tract infection that can cause various diseases ranging from mild to severe infections and death, depending on the causative agent, host, and environmental factors. This disease is included in the Air Borne Disease, which is a disease that is transmitted through the air. There is a relationship between lighting and bacteria because the process of bacterial growth is

influenced by light. Light can damage bacterial cells that do not contain chlorophyll. However, this study's results indicate no significant relationship between lighting and ARI because it is influenced by ventilation factors that meet the requirements so that air circulation becomes smooth. Another factor that affects the absence of a relationship is the behavior of the house occupants who open the house ventilation daily.

Lighting is one of the factors for the growth and development of pathogenic microorganisms. Natural lighting contains UV rays that can kill pathogenic microorganisms, but if it is too bright, it will cause blindness. Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 1077 of 2011, the lighting that meets the requirements is 60 lux. Therefore, it is necessary to maintain the light intensity in the room by improving the ventilation design. If the house is in a densely populated area, it can use a transparent zinc/roof so that sunlight can enter the room.

Table 4

The Relationship between ventilation and the incidence of ARI Disease in toddlers

Ventilation	ARI				P value
	Cases		Controls		
	n	%	n	%	
Not eligible	48	71.6	31	46.3	0.005
Eligible	19	28.4	36	53.7	
Total	67	100.0	67	100.0	

In the observation process, the dominant case group had ventilation that did not meet the requirements. Based on observations, many houses still have ventilation, but they are rarely opened and nailed, so they cannot be opened, resulting in the obstruction of the air circulation process, which causes the temperature to increase. The furniture is too dense, so the humidity also increases.

The results of this study are in line with research conducted by Sariana Pangaribuan (2017) at the Remu Health Center, Sorong City, which concluded that there is a relationship between air ventilation and the incidence of ARI, with the result $p = 0.000 < 0.05$. Sariana Pangaribuan said there is a relationship between ventilation and the incidence of ARI because only some respondents have ventilation that meets health requirements, so it is difficult for sunlight to enter the house. In addition, the results of this study are also in line with the research of Syafa Widy Syahaya et al. (2021), which concluded that there was a relationship between ventilation and the incidence of ARI with the results of statistical tests using the chi-square test, the results were $p = 0.000 < 0.05$, there was a relationship between ventilation with the incidence of ARI because ventilation is one of the environmental factors that can be a risk factor for ARI disease, the function of ventilation is essential, namely as a means to ensure the quality and adequacy of air circulation in and out of the room.

According to WHO, ARI is an infectious disease of the upper and lower respiratory tract that can cause various illnesses ranging from mild infection to severe infection to death, depending on the causative agent, host

factors, and environmental factors. This disease is included in the Airborne disease, which is a disease that is transmitted through the air. Inadequate ventilation can affect temperature and humidity, which can be a factor in the growth and development of bacteria that cause ARI. If the ventilation meets the requirements, the air circulation will be smooth, so there will be a healthy air change, and the risk of ARI disease transmission will be prevented.

Based on the Decree of the Minister of Health of the Republic of Indonesia Number 1077 of 2011, the ventilation standard is 10% of the floor area. Through adequate ventilation, better air exchange and light will illuminate the room so that it will kill microorganisms. Therefore, ventilation must be opened daily so air circulation is smooth. However, if the number of air vents is sufficient but not opened daily, ventilation as a place for air exchange will not function properly.

CONCLUSION

Based on the results of the study of the relationship between the physical quality of the house and the incidence of ARI in toddlers in the working area of Puskesmas Gentungan, Gowa Regency, it can be concluded that there is a relationship between the physical quality of the house (temperature, humidity, and ventilation), to the incidence of ARI in toddlers in the Gentungan Puskesmas Working Area. However, there is no relationship between lighting and the incidence of ARI in children under five.

SUGGESTION

Based on the research conducted, the suggestions that can be given are for the Gentungan Health Centre to be able to provide counseling to the community about the importance of maintaining the physical quality of the house and the dangers of ARI. The community is expected to control the risk factors for ARI by improving the physical quality of the house, one of which is by pruning lush trees so that light can enter the house and for further researchers to be able to conduct research related to the relationship between the physical quality of the house and the incidence of ARI in toddlers. It can develop the mindset of researchers in studying environmental problems, especially in ARI disease research.

REFERENCES

- Akyuwen, A. (2012). The Relationship of the Akyuwen, A. (2012). The Relationship between the Physical Condition of the House and the Incidence of Pulmonary Tuberculosis Disease in the Piru Health Centre Working Area, West Seram District, West Seram Regency. Makassar: Hasanuddin University.
- Anantasia, F., Mulyadi, & Hidayat. (2021). Condition of House Physical Factors and the Incidence of ARI in Alenangka Village, South Sinjai District, Sinjai Regency. *Sulolipu Journal*. [[Crossref](#)], [[Publisher](#)]
- Aprilla, N., Yahya, E., & Ririn. (2019). The Relationship Between Smoking Behaviour in Parents with the Incidence of ARI in Toddlers in Pulau Jambu Village, Kuok Health Center Working Area in 2019. *Ners Journal*. [[Crossref](#)], [[Publisher](#)]
- Haidah, Nur. (2021). Research Methodology. Makassar: Poltekkes Kemenkes Makassar.
- Indonesia, P. K. (2019). Health Statistics. Jakarta: Ministry of Health of the Republic of Indonesia.
- Irwan. (2017). Epidemiology of Infectious Diseases. Yogyakarta: CV. Absolute Media. <https://repository.ung.ac.id>.
- Ministry of Health. (2011). Guidelines for the Control of Acute Respiratory Infections. Jakarta: Indonesian Ministry of Health.
- Ministry of Health. (2011). Regulation of the Minister of Health of the Republic of Indonesia Number 1077 concerning Guidelines for Air Health in Home Spaces. http://hukor.kemkes.go.id/uploads/produk_hukum/PMK%20No.%201077%20ttg%20Guidelines%20for%20Air%20Health%20In%20Home%20Spaces.pdf.
- Kemenpupr. (2016). Basics of Healthy Homes. Jakarta: Ministry of Public Works and Housing.
- Khariyati, L., & et al. (2020). Relationship between Temperature, Rainfall, Air Humidity and Wind Speed with the Incidence of ARI in Banjarmasin City During 2012-2016. *Journal of Health Epidemiology and Communicable Diseases*. [[Crossref](#)], [[Publisher](#)]
- Latifatul, N. (2019). The Relationship between the Physical Environment of the House and the Incidence of ARI Disease in Toddlers in Guyung Village, Gerih District, Ngawi Regency. Madiun: Stikes Bhakti Husada Mulia Madiun.
- Liu, Y., & et al. (2016). Impact of Meteorological Factors on Lower Respiratory Tract Infections in Children. *Journal of International Medical Research*. [[Crossref](#)], [[Publisher](#)]
- Maulana, L. H. (2020). Pengaruh pencahayaan terhadap penularan penyakit ISPA di Wilayah Puskesmas Bantarkawung. *An-Nadaa: Jurnal Kesehatan Masyarakat (e-Journal)*, 7(1), 1-4. [[Crossref](#)], [[Publisher](#)]
- Medhyna, V. (2019). The Relationship between the Physical Environment of the House and the Incidence of ARI in Infants. *Maternal Child Health Care Journal*. [[Crossref](#)], [[Publisher](#)]
- Mulyadi, & Nugroho, H. S. (2018). Risk Factors at Home on Acute Respiratory Infection (ARI) Incidence in Children Under Five in Sapuli Island, South Sulawesi. *Journal of Chemical Information and Modelling*. [[Crossref](#)], [[Publisher](#)]
- Pangaribuan, S. (2017). The Relationship between Home Environmental Conditions and the Incidence of ARI in Toddlers at Remu Health Centre, Sorong City. *Global Health Science*. [[Crossref](#)], [[Publisher](#)]
- Purnama, S. G. (2016). Environment-Based Diseases. https://simdos.unud.ac.id/uploads/file_pendidikan_dir/e1cf67b8122c1_2a4d2a95d6ac50137ff.pdf

- Sabaruddin, A. (2011). Healthy Home. Bandung: Ministry of Public Works and Housing.
- Sabri, R. (2019). Factors Influencing the High Rate of ARI Disease in Toddlers at the Deleng Pokhkisen Health Centre, Southeast Aceh Regency. Scientific Periodical Of Public Health And Coastal Health. [[Crossref](#)], [[Publisher](#)]
- Safitri, N. A., Budiman, & Yusuf, H. (2020). Toddlers in Lembasada Village, South Banawa Subdistrict Relationship between Physical Condition of the House and the Incidence of ARI in Children in Donggala Regency. *Collaborative Journal of Science*. [[Crossref](#)], [[Publisher](#)]
- Suabey, S. (2020). The Relationship between Home Physical Sanitation and the Incidence of Acute Respiratory Tract Infection in the Community of Kampung Anelak, Siepkosi District, Jayawijaya Regency. *Journal of Tropical Nursing Papua*. [[Crossref](#)], [[Publisher](#)]
- Supardi, S. S. (2016). Public Health Science. South akarta : Pusdik HR Health.
- Syahaya, S. W., Mamlukah, & Indrayani. (2021). The Relationship between Environmental Factors and the Risk of ARI in Toddlers in Sukamukti Village, Jalaksana District, Kuningan Regency in 2021. *Journal of Health Research Science*. [[Crossref](#)], [[Publisher](#)]
- Triandriani, V., & Hansen. (2019). The Relationship between Physical Environment and the Incidence of ARI in Toddlers in the Working Area of Sidomulyo Health Centre, Samarinda City. Borneo Student Researc. [[Publisher](#)]
- Untari, I. (2017). 7 Main Pillars of Public Health Science. Yogyakarta: Theme Publising.
- WHO. (2007). Infection Prevention and Control of Epidemic-and Pandemic-Prone Acute Respiratory Diseases in Health Care. Geneva: World Health Organisation. [[Publisher](#)]
- Widoyono. (2011). Tropical Diseases. Jakarta: Erlangga.
- Zahra, & Assetya, O. (2018). Home Environmental Conditions and the Incidence of ARI in Toddlers in Indonesia. *Journal of Health Ecology*. [[Publisher](#)]