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Availability of clean water and Acute Respiratory Infection (ARI) cases among fishermen

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Abstract

Background: Acute Respiratory Infection (ARI) is one of the diseases with high morbidity, especially in coastal communities. Fishermen face a high risk of ARI due to the work environment, poor sanitation, and limited access to clean water.
Purpose: To examining the relationship between the availability of clean water and the incidence of ARI in fishermen in Aceh Jaya District.
Method: An analytical observational study with a cross-sectional design was conducted on 200 fishermen in two villages using a total sampling technique. Data were analyzed using the chi-square test and logistic regression using STATA.
Results: There is a significant relationship between the availability of clean water (p=0.000), water source (p=0.000), water condition (p=0.000), ease of access (p=0.000), and the availability of clean water within a certain period of time (p=0.000) with the incidence of ARI.
Conclusion: Access to clean water plays an important role in preventing ARI. Efforts to increase the availability of clean water and sanitation are needed to reduce the incidence of ARI in fishing communities.
Suggestion: To examine other factors contributing to the incidence of ARI, such as air quality.

Keywords: Acute Respiratory Infection (ARI); Clean Water; Coastal Health; Fishermen; Sanitation.

INTRODUCTION

Acute Respiratory Infection (ARI) is one of the diseases with high morbidity and mortality rates in the world. In 2020, ARI was responsible for around 15% of total deaths of children under the age of five globally, with most cases occurring in developing countries (Wellid, Simbolon, Falahuddin, Nurfitriani, Sumeru, bin Sukri, & Yuningsih, 2024). According to a report by the World Health Organization (WHO), more than 700 million cases of ARI were recorded globally in the same year, with the highest prevalence in Southeast Asia and Africa (World Health Organization, 2022). This disease impacts individual health and causes a significant economic burden, especially for communities with limited access to health services (Pitton, Oberhaensli, Appiah, Pagani, Fournier, Jakob, Que, & Cameron, 2022).

ARI is a health facility that reports diseases in Indonesia most frequently. This disease can affect anyone, but vulnerable groups such as children, the elderly, and people with poor environmental conditions are at higher risk. Based on data from the Ministry of Health of the Republic of Indonesia, in 2022, there were more than 6.5 million new cases of ARI (Ministry of Health of the Republic of Indonesia, 2022). This figure shows that this disease is still a major health problem, especially in areas with poor sanitation and high poverty rates (Bidart, Mignaqui, Kornuta, Lupi, Gammella, Soria, Galarza, Ferella, Cardillo, & Langellotti, 2021).

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The incidence of ARI in Aceh Province is also quite high. According to the Aceh Health Office, the number of ARI cases in 2019 reached 7,266 and increased significantly to 23,002 in 2020. Until 2023, ARI cases in Aceh were recorded at 17,271, covering 36.7% of the province's 23 districts/cities (Nurdin, 2024). With these high numbers, Aceh is still included in the five provinces with the highest number of ARI sufferers in Indonesia (Lapi, Marconi, Rossi, & Cricelli, 2024).

One community group that is very vulnerable to ARI is fishermen. Fishermen often work in risky environmental conditions, such as exposure to humid air, pollution, and extreme weather changes (Luthfi, Syahputri, & Dewiana, 2024). In addition, smoking habits and a lack of knowledge about ARI risk factors increase the potential for respiratory infections among fishermen. Unsanitary environmental conditions and minimal access to sanitation are also factors that worsen their health conditions (Putri, 2017).

Coastal conditions, which are the residence and workplace of fishermen, have environmental characteristics that can increase the risk of ARI. The air in coastal areas tends to be more humid, which creates an ideal environment for the growth of bacteria and fungi that can worsen respiratory infections (Kaspersen, Antonsen, Horsdal, Kjerulff, Brandt, Geels, Christensen, Frohn, Sabel, & Dinh, 2024). In addition, activities in dense coastal areas, such as the fishing industry, ports, and the high number of motorized vehicles, also increase air pollution, containing irritants that are harmful to the respiratory tract (Zhan, Lin, Yang, Chen, Mao, & Fu, 2024).

The availability of clean water is also a significant problem for fishing communities. Many coastal communities still use contaminated water for daily needs, such as bathing and washing, which can be a medium for spreading bacteria and viruses that cause ARI. The lack of clean water management facilities exacerbates the risk of exposure to infection in this group, increasing the incidence of ARI in fishing communities (Latif, 2016).

The high incidence of ARI among fishermen impacts their health and social and economic aspects. Sick fishermen experience decreased work productivity, directly impacting family income and welfare (Miniharianti, Zaman, & Rabial, 2023). In addition, the cost of treatment and care for ARI can be a heavy financial burden for low-income families. If this problem is not addressed immediately, it can affect coastal communities' social and economic stability (Wildenbeest, Lowe, Standing, & Butler 2024).

Given that Indonesia is an archipelagic country with many fishing communities, research on risk factors for ARI among fishermen is very important to conduct. The results of this study are expected to provide deeper insight into the causes of the high rate of ARI in coastal communities so that they can be used as a basis for designing appropriate interventions. Efforts that can be made include increasing access to clean water, improving sanitation, and health education for fishermen and their families. With appropriate preventive measures, it is hoped that the incidence of ARI among fishermen can be reduced, thereby improving coastal communities' quality of life and welfare. This study aims to determine the relationship between the availability of clean water and the incidence of ARI among fishermen.

RESEARCH METHOD

The analytical observational study with a cross-sectional design was conducted in Gampong Blang and Rigaih Villages, Aceh Jaya Regency, from February 14-21, 2025. The study population consisted of all fishermen working and residing in the two villages. A total of 200 male respondents were selected, consisting of 98 fishermen in Gampong Blang Village and 102 fishermen in Rigaih Village.

The independent variables in this study include socioeconomic factors (age, gender, education, employment status, length of service, length of time at sea, marital status, ventilation area, income, income adequacy, savings, and social assistance) with the incidence of ARI in fishermen, as well as environmental and sanitation factors such as the availability or lack of clean water that meets health quality standards available in sufficient quantities to meet basic daily needs within a certain period of time. Sources of clean water can come from drilled wells, water companies, rivers or natural springs, and rainwater. Clean water can be obtained from drilled wells and water companies, while unclean water can come from rainwater or rivers without filtration. Then the water condition factor is clear or

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cloudy, clean water facilities are easily accessible or not, and the length of time clean water is available.

This study used logistic regression statistical analysis with STATA software to test hypotheses regarding the relationship between the independent and dependent variables. This method allows for a more accurate determination of the relationship between clean water availability and the incidence of Acute Respiratory Infections (ARI) among fishermen.

RESEARCH RESULTS

Table 1. Characteristics of Respondent (N=200)

Variable	Results
Age (n/%)	
(Mean±SD)(Range)(Year)	(49.8±12.19)(17-75)
17-25	2/1.0
26-35	20/10.0
36-45	59/29.0
46-55	47/23.5
56-65	55/27.5
≥65	18/9.0
Education (n/%)	
Base school	87/43.5
Intermediate school	108/54.0
High school	5/2.5
Classification of Fishermen (n/%)	
Fisherman	168/84.0
Fisherman Assistant	22/11.0
Other Marine Jobs	10/5.0
Work Duration (n/%)	
< 5 years	2/1.0
≥ 5 years	198/99.0
The Duration of Time Sailing Each Week (n/%)	
6-24 hours	113/56.5
48-120 hours	66/33.0
>120 hours	21/10.5
Marital status (n/%)	
Unmarried	4/2.0
Marry	184.92.0
Widower	12/6.0
Comparing Ventilation Width and House Floor (n/%)	
< 10%	192/96.6
≥ 10%	8/4.0
Income (n/%)	
< Rp 1.000.000	156/78.0
≥ Rp 1.000.000	44/22.0

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Variable	Results
Income Sufficiency (n/%)	
Yes	4321.5
No	15/78.5
Savings (n/%)	
Yes	16/8.0
No	184/92.0
Social Assistance (n/%)	
Yes	146/73.0
No	54/27.0

Based on the table above, the majority of respondents in this study were male (100%), with the largest age range being 36-45 years, namely 29%. Most of them had a junior high school education 108 respondents (54.0%) and worked as fishermen (168.0%) with work experience ≥5 years (99.0%). As many as 56.5% of fishermen were at sea for 6-24 hours, and 92.0% of respondents were married. The condition of the residential environment showed that 96.0% of respondents had air ventilation less than 10.0% of the floor area of the room. From an economic perspective, as many as 78.0% of respondents earned less than Rp1,000,000 per month, with 78.5% admitting their income was insufficient to meet their needs. In addition, as many as 92.0% of respondents did not have savings, although 73.0% received social assistance.

Table 2. The Relationship Between Clean Water Factors and the Incidence of ARI in Fishermen (N=200)

Variables	ARI Incident		p-value
	No ARI (n=27)	ARI (n=173)	
Availability of Clean Water (n/%)			
Not available	3/11.1	160/92.5	0.000
Available	24/88.9	13/7.5	
The Origin of Clean Water (n/%)			
Boreholes	19/70.4	12/6.9	
Water Company	4/14.8	3/1.7	0.000
River or natural spring	2/7.4	89/51.5	
Rainwater	2/7.4	69/39.9	
Water Conditions (n/%)			
Clear	25/92.5	84/48.5	0.000
Cloudy	2/7.5	89/51.5	
Clean Water Facilities (n/%)			
Easy to reach	21/77.8	15/8.7	0.000
Hard to reach	6/22.2	158/91.3	
Getting Clean Water (n/%)			
Always	23/85.2	16/9.3	0.000
Sometimes	3/11.1	57/32.9	
Rarely	1/3.7	100/57.8	

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The results of statistical tests using the chi square test showed that there was a relationship between the availability of clean water (p=0.000), the origin of clean water (p=0.000), the condition of the water (p=0.000), the ease of obtaining clean water (p=0.000) and the length of time clean water was available (p=0.000) with the incidence of ARI.

DISCUSSION

This study's results indicate a significant relationship between the availability of clean water and the incidence of Acute Respiratory Infections (ARI) in fishermen p-value=0.000. This finding aligns with previous studies stating that communities with limited access to clean water have a higher risk of ARI than areas with adequate water supply. The absence of clean water hampers personal hygiene, increases exposure to pathogens in the environment, and worsens air quality due to uncontrolled dust and pollution (Arif, Isdijoso, Fatah, & Tamyis, 2020; Evitania, 2023).

Inadequate sanitation due to limited clean water contributes to the spread of pathogenic microorganisms that cause respiratory infections. World Health Organization reports that an unhygienic environment due to poor sanitation can increase the risk of ARI by transmitting bacteria and viruses. In fishing communities, this condition is exacerbated by the habit of living in a humid and closed environment, which supports the growth of harmful microorganisms. Therefore, increasing access to clean water is very important in reducing the incidence of ARI (World Health Organization, 2022).

This study also found a relationship between the source of clean water and the incidence of ARI (p = 0.000). Fishermen who consume water from less hygienic sources, such as unfiltered rainwater or shallow wells, have a higher risk of contracting ARI than those who use water from PDAM or protected wells. This is in line with previous research showing that consuming water from unprotected sources can increase the risk of infection due to exposure to bacteria and viruses in the water (Trisnaini & Hepiman, 2018).

Contaminated water can be a medium for the spread of various pathogens that affect respiratory health. Microorganisms such as Legionella pneumophila and Pseudomonas aeruginosa can spread through contaminated water aerosols and cause respiratory infections. This explains why fishermen who use shallow well water or unfiltered rainwater are more susceptible to respiratory infections than those who access safer, clean water sources (Falkinham III, Hilborn, Arduino, Pruden, & Edwards, 2015).

In addition to the water's origin, the water's quality also significantly correlates with the incidence of ARI (p = 0.000). Poor water quality, such as water containing heavy metals or hazardous chemicals, can weaken the body's immune system and increase the risk of respiratory diseases. Previous studies reported that coastal communities with limited access to clean water have a higher incidence of ARI due to poor sanitation and water pollution, which causes secondary respiratory infections (Kundu, Kundu, Al Banna, Ahinkorah, Seidu, & Okyere, 2022).

This study also shows that fishermen with limited access to clean water are more susceptible to ARI than those with easy access. This is supported by previous research which found that coastal communities who have difficulty accessing clean water have a higher risk of ARI due to poor personal hygiene and environmental sanitation (Luthfi et al., 2024). Other studies also emphasize that limited access to clean water contributes to low handwashing and environmental cleaning habits, which have an impact on increasing ARI cases (Lutpiatina, Sulistyorini, Notobroto, Raya, Utama, & Thuraidah, 2022).

The availability of clean water for a sufficient period also plays a role in reducing the incidence of ARI. The results of this study indicate that fishermen who experience time constraints in obtaining clean water have a higher risk of contracting ARI. Previous studies have reported that fishing families without a consistent supply of clean water tend to have poor sanitation, which increases exposure to pathogens that cause ARI. Therefore, efforts to ensure consistent availability of clean water are important in preventing this disease (Kalumbi et al., 2020).

The findings of this study underscore the importance of clean water access in maintaining the health of fishermen and coastal communities. Without adequate clean water availability, fishermen are more susceptible to respiratory infections due to poor personal hygiene and environmental sanitation. In addition, other environmental factors, such as

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poor home ventilation and exposure to air pollutants, can exacerbate the risk of ARI. Therefore, multidimensional interventions are needed to reduce the incidence of ARI in fishing communities.

CONCLUSION

There is a significant relationship between the availability of clean water, its source, water condition, ease of access, and the duration of clean water availability with the incidence of Acute Respiratory Infections (ARI) among fishermen in Aceh Jaya Regency (p=0.000).

SUGGESTION

It is recommended to examine other factors contributing to the incidence of ARI, such as air quality.

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