



The Relationship Between Environmental Physical Conditions and the Incidence of Malaria in Percut Sei Area, Chart XV Percut Village

Meutia Nanda^{1*}, Anissa Humaira², Meida Sari Siregar³, Tania Yusrina⁴, Ismi Larasati Hasibuan⁵

¹⁻⁵Ilmu Kesehatan Masyarakat UIN Sumatera Utara Medan

Article Info

Article history:

Received 28 Juny, 2024

Revised 5 September, 2024

Accepted 12 October, 2024

Keywords:

Anopheles Sp;
Malaria;
Physical Condition
Environment

ABSTRACT

Environmental factors have an important role in the incidence of Malaria. The environment provides physical conditions that allow the Malaria disease vector, Anopheles Sp., to multiply. Anopheles Sp. has the ability to adapt to its surroundings, allowing it to survive. The purpose of this study is to determine the relationship between environmental conditions and the incidence of malaria in the Percut Sei area, Bagan XV, Percut Village. This study uses a quantitative method with an approach using a cross sectional design. The population in this study was 300 people using the lameshow formula, 51 samples were obtained in the study with random sampling techniques, The results of the study on the type of wall had a significant relationship with the incidence of malaria with a Pvalue of $0.006 < 0.05$. In the presence of gauze wire there is a significant relationship with the incidence of malaria with a Pvalue value of $0.000 < 0.05$. In waterlogging, there was a significant relationship with the incidence of malaria with a Pvalue value of $0.028 < 0.05$. In the existence of livestock cages, there was a significant relationship with the incidence of malaria, the Pvalue value obtained was $0.024 < 0.05$. In the activity of going out at night, a significant relationship was obtained with a Pvalue value of $0.000 < 0.05$. From this study, it is hoped that community members will maintain environmental conditions to avoid malaria attacks caused by the Anopheles mosquito.Sp.

Corresponding Author:

Meutia Nanda
Ilmu Kesehatan Masyarakat UIN Sumatera Utara Medan
Email: meutianandaumi@gmail.com

INTRODUCTION

Malaria is an infectious disease that is spread through the bite of the Anopheles mosquito. The mosquito inserts the parasite into a person's blood through its saliva (Pasau, 2023). Malaria is a problem serious health in the community so that cause high mortality rate in many Country at One of the world's most popular destinations is Indonesia. Environmental factors have an important role in malaria incidence (Agustina, 2021). The environment provides conditions that allow malaria vectors, are Anopheles Sp., to breed. Anopheles Sp. has the ability Have Capabilities to adapt to the surrounding environment, allowing it to survive. (Siregar, 2021)

Until now, malaria is still a problem that affects many individuals in various countries around the world. Mosquito Anopheles sp is the main cause of this disease. The population affected by malaria reaches more than 500 million people, with more than 1 million deaths each year. According to the latest report from the World Health Organization (WHO) in 2020, the number of malaria cases in 2018 was around 228 million and increased to 229 million in 2019. The estimated death rate from malaria in 2018 is around 411,000 people, while in 2019 it reached 409,000 people. One of the countries with the highest death rate due to malaria is Indonesia. In 2021, there were 94,610 cases of malaria in Indonesia, a decrease from 226,364 cases in the previous year (Madayanti, 2022).

It can be seen from data from the Central Statistics Agency of North Sumatra Province that 742 cashiers were obtained in 2020 (BPS of North Sumatra Province). Malaria cases with the highest positive infection rate in every regency/city in North Sumatra Province still occur in Gunung Sitoli Regency, where the number of positive cases reaches 88.14% for the male group Number of people affected A total of 104 patients, and 100% for the female group with a total of 86 patients. Asahan Regency occupies the second position with an infection rate of 17.99% involving 701 residents. Meanwhile, the third place is held by Mandailing Natal Regency, where the malaria positivity rate reaches 17.10% with a total of 3,087 patients (North Sumatra Provincial Health Profile 2016). .(PULUNGAN, 2019)

Coastal areas are often affected by malaria due to environmental conditions that favor the development of the Anopheles mosquito, which is the main vector of malaria. . The purpose of this study is to determine the relationship between environmental conditions and the incidence of malaria in the Percut Sei area, Bagan XV, Percut Village.(Pradani, 2020)

METHODOLOGY

This study uses a quantitative approach method with a cross-sectional design. The population in this study was 300 people using the lameshow formula, 51 samples were obtained in the study using random sampling techniques for sampling. Data were collected using observation sheets using questionnaires as research instruments. Data collection was carried out through interviews. Thedata analysis technique was carried out using the Chi-Square test to find the relationship between environmental conditions and personal hygiene with the incidence of malaria. The results of statistical calculations used a significance limit (confidence level) of 0.05. The hypothesis is rejected if the p-value < 0.05, which means there is a significant relationship (H0 is rejected). Conversely, if the p-value > 0.05, this indicates the absence of a significant relationship (H0 fails to be rejected).

RESULTS

Table 1. Frequency Distribution of Respondent Tracharacteristic

Types of Kelamain	Sum	Frequency
Man	12	23,7
Woman	43	84,3
Total	51	100
Age		
10-20	5	9,8
21-40	20	39,2
51 and above	26	50
Education		
Not Finishing School	2	3,8
SD	10	19,6
JUNIOR	20	39,2
SMA	18	15,6
PT	1	1,9
Total	51	100

From table 1, it can be observed that the research subjects are 51 respondents consisting of 43 () female respondents and 12 () male respondents. The average age was 26 () respondents 51 and above, 20 respondents aged 21-40, and 5 respondents aged 10-20. The education level of the respondents was with the highest number of junior high school education with 20 () respondents, 18 () high school respondents, 10 elementary school respondents, 2 respondents did not finish school, and 1 respondent with a college education.

Table 2. Univariate Data

Variable	Sum	Frequency
Wall Type		
Meeting	20	39,2
No Meeting	31	60,8
The Existence of Kassa Wire		
Exist	10	19,6
None	41	80,4
Puddle		
Exist	21	41.2

None	30	58,8
The Existence of Cattle Cages		
Exist	15	29,4
None	36	70,6
Nighttime Outings		
Yes	41	80,4
Not	10	19,6
Malaria Incidence		
Suffer	39	76,4
Not Suffering	12	23,6
Total	51	100

Based on the univariate test carried out, there were 20 (39.2%) respondents' tight wall types and 31 (60.8%) respondents' non-tight walls. In the presence of gauze wire, 10 (19.6%) respondents had gauze and 41 (80.4%) respondents did not have gauze wire. In the puddle, 21 (41.2%) respondents found puddles and 30 (58.8) respondents did not have puddles. In the existence of cattle pens, it was found that there were 15 (29.4%) respondents and no cattle pens 36 (70.6%) respondents. In the activity of going out at night, 41 (80.4%) respondents had activities to go out at night and 10 (19.6%) respondents did not have activities at night. In the malaria incident, 39 (76.4%) respondents suffered from malaria and 12 (23.6%) respondents did not suffer from malaria.

Table 3. Bivariate Data

Variable	Physical Condition of the Environment				Pvalue/OR
	Risky		No Risk		
	n	%	n	%	
Wall Type					
Meeting	5	12,5	9	81,8	0,006
No Meeting	35	87,5	2	18,2	
The Existence of Kassa Wire					
Exist	2	4,4	0	0	0,001
None	44	95,6	5	100	
Puddle					
Exist	28	82,3	17	100	0,028
None	6	11,7	0	0	
The Existence of Cattle Cages					
Exist	30	85,7	6	37,4	0.024
None	5	14,3	10	62,5	
Nighttime Outings					
Yes	40	88,8	0	0	0.001
Not	5	11,2	6	100	
Total					

Based on the bivariate test using *chi square* analysis on the wall type, there was a significant correlation with the incidence of malaria with a Pvalue of $0.006 < 0.05$. In the presence of gauze wire, there was a significant correlation with the incidence of malaria with a Pvalue of $0.001 < 0.05$. In waterlogging, there was a significant relationship with the incidence of malaria with a Pvalue value of $0.028 < 0.05$. In the existence of livestock cages, there was a significant relationship with the incidence of malaria, the Pvalue value obtained was $0.024 < 0.05$. In the activity of going out at night, a significant relationship was obtained with a Pvalue value of $0.001 < 0.05$.

DISCUSSION

Relationship between Wall Type and Malaria Incidence

Walls made of materials that absorb or retain moisture, such as clay or woven bamboo, can create a more humid environment in the home. Anopheles mosquitoes prefer humid conditions, so this type of wall can be a higher risk factor for malaria.

In this study, it was found that the type of wall that was not tight was 35 respondents at risk of malaria and 9 respondents were not at risk of malaria while the walls were tight 5 respondents were at risk of malaria

and 2 respondents were not at risk of malaria.

From the results of the chi-square test, a P value value of $0.006 < 0.05$ means that there is a relationship between the type of wall and the incidence of malaria. Calculating the estimated risk of producing an OR of 13.889 at 95% CI = 2.149-89.779 showed that the research subjects who used the type of non-tight walls would have a 13.8 times higher risk than the study subjects who used closed walls.

The Relationship between the Existence of Kassa Wire and the Incidence of Malaria

The presence of gauze wire (mosquito wire) on windows and ventilation of the house is strongly related to the incidence of malaria because gauze serves as a physical barrier that prevents *Anopheles* mosquitoes (malaria vectors) from entering the house.

In this study, it was found that respondents who had the presence of gauze wire at home 2 respondents were at risk of malaria while those who did not have gauze at home 44 respondents were at risk and 5 respondents were not at risk.

From the results of the Chi-square test, it can be seen that the P value is $0.000 < 0.05$, meaning that there is a relationship between the existence of ventilation swabs and the incidence of malaria. Calculating the estimated risk of producing an OR of 7.677 at the level of 95% CI = 1.363-43.135 shows that research subjects who have the presence of ventilation at home will have a risk of 7.6 times higher than those of research subjects who do not have ventilation at home.

The Relationship between Waterlogging and Malaria Incidence

Standing water allows *Anopheles* mosquitoes to multiply rapidly, thus increasing the mosquito population in an area. The more mosquitoes, the higher the risk of malaria transmission. *Anopheles* mosquitoes lay their eggs in calm or stagnant water. Standing water, whether natural (such as a pond, swamp, or calm river) or artificial (such as used tires, cans, or unused tubs), provides an ideal habitat for mosquito larvae to thrive.

In this study, respondents who had waterlogging in the home environment area were found to be 30 respondents at risk of malaria and 17 respondents were not at risk of malaria while respondents who did not have waterlogging in the home environment area were 6 respondents at risk of malaria events.

Based on chi-square analysis, it was found that the P value was $0.028 < 0.05$ which means that there is a relationship between waterlogging and malaria incidence. The estimated risk of OR 16,200 at 95% CI = 1,389-188,883 showed that the study subjects who had puddles around the house were higher than the study subjects who did not have puddles around the house.

The Relationship between the Existence of Livestock Cages and the Incidence of Malaria

Cattle pens often create suitable environmental conditions for mosquito breeding, such as stagnant water from drinking or cage cleaning. This can increase the mosquito population around the area. The existence of livestock pens has the potential to affect the incidence of malaria both positively and negatively, depending on various factors such as environmental management, mosquito species, and the proximity of the cage to human habitation. The right approach in the placement and management of livestock pens can help minimize the risk of malaria transmission.

In this study, it was found that respondents who had the existence of livestock pens 30 respondents were at risk of malaria and 6 respondents were not at risk of malaria while respondents did not have livestock pens, 5 respondents were at risk of malaria and 10 respondents were not at risk of malaria.

Based on the analysis of the Chi-square test, a P value of $0.024 < 0.05$ was obtained, meaning that there was a relationship between the existence of livestock pens and the incidence of malaria. Calculating the estimated risk of producing an OR of 7.677 with 95% CI = 1.363-43.135 shows that the research subjects who have the existence of livestock pens around the house will have a risk of 7.6 times higher than the research subjects who do not have livestock pens around the house.

The Relationship between Night Walks and Malaria Incidence

Anopheles mosquitoes are more active in looking for prey at night, especially from dusk to dawn. Outdoor activities at these times increase a person's chances of being bitten by an infected mosquito. People who are outdoors at night are more likely to be bitten by mosquitoes, especially if they are not using protection such as long clothing or mosquito recalls.

In this study, it was found that respondents who had activities outside the home at night 40 respondents were at risk of malaria while respondents who did not have wild activities at night 5 respondents were at risk of malaria and 6 respondents were not at risk of malaria events.

From the results of the Chi-square test, it can be seen that the P value of $0.001 < 0.05$ means that there is a relationship between activities outside the home and the incidence of malaria. The estimated risk calculation produced by OR 91,000 with 95% CI = 7,677-1155,467 showed that the research subjects who were often active outside the home at night were many times more likely to go out of the house than the

study subjects who rarely did activities outside the home at night.

CONCLUSION

There was a significant gap in the type of wall with the incidence of malaria with a Pvalue value of $0.006 < 0.05$. There was a significant relationship between the presence of gauze wire and the incidence of malaria with a Pvalue of $0.001 < 0.05$. There was a significant relationship between waterlogging and malaria incidence with a Pvalue of $0.028 < 0.05$. There was a significant relationship between the existence of livestock pens and the incidence of malaria with a Pvalue of $0.024 < 0.05$. There was a significant relationship between night outing activities and the incidence of malaria with a Pvalue value of $0.001 < 0.05$.

SUGGESTION

From this study, it is hoped that community members will maintain the physical condition of the environment to avoid malaria attacks caused by *Anopheles* mosquitoes.

REFERENCES

- Haqi, N. Z., & Astuti, F. D. (2017). The relationship between environmental and behavioral factors and the incidence of malaria in the working area of the Sanggeng Health Center, Manokwari Regency, West Papua. *Journal of Medicine and Health*, 12(2), 202-213.
- Hidayati, F., Raharjo, M., Martini, M., Wahyuningsih, N. E., & Setiani, O. (2023). The Relationship between Environmental Quality and Malaria Incidence (Malaria Endemic Area, Kaligesing Health Center Work Scope, Purworejo Regency in 2022). *Indonesian Journal of Environmental Health*, 22(1), 21-27.
- Madayanti, S. M. (2022). "Risk Factors Affecting the Incidence of Malaria in the South Jayapura District Area, Jayapura City.". *Indonesian Journal of Environmental Health*, 358-365.
- Pasau, J. L. (2023). *Community Social Action in Malaria Prevention in Jayapura City* (Doctoral dissertation, BOSOWA UNIVERSITY).
- Malaria Disease in the Working Area of the Kokap II Health Center, Kulon Progo Regency, Special Region of Yogyakarta.". *Journal of Public Health*, 417-426.
- Perdana, A. A. (2021). Characteristics of environmental conditions of malaria patients to malaria incidence. *Journal of Medika Utama*, 3(01 October), 1696-1702.
- Pradani, F. Y. (2020). Social Behaviors Cause Increased Risk of Malaria Transmission in Pangandaran. *Health Systems Research Bulletin*, 155-125.
- Pulungan, M. (2019). The relationship of knowledge, attitudes and community actions towards the incidence of malaria in Tambiski Village, Nagajuang District, Mandailing Natal Regency.
- Siregar, P. A. (2021). Risk Factors for Malaria in Coastal Communities in Pantai Cermin District, Serdang Bedagai Regency. *Tropical Public Health Journal*, 50-57.
- Utami, D., Triwahyuni, T., & Julita, Y. (2019). The Relationship between the Home Environment and the Incidence of Malaria in Sidodadi Village, Pesawaran Regency in 2018. *Journal of Medical and Health Sciences*, 6(3), 216-223.