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Relationship of Puddles, Swamps, Bushes, Cattle Cages to Malaria Incidence in Endemis District, North Labuhan Batu Regency in 2022

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Abstract

The purpose of this research is relationship of puddles, swamps, bushes, cattle cages to malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. This type of research is an analytical survey research with a case control research design. The population in this study are all residents in Kualuh Leidong Sub-District and Kualuh Hilir who suffered from malaria based on the results of the blood preparation examination, which was indicated by the discovery of plasmodium in the blood by laboratory personnel and was declared positive for malaria. The sample in this study is 114 consisting of 57 cases and 57 controls who have the same characteristics (age and sex). Data analysis in this study using bivariate analysis. The results show that there is a significant relationship between puddles and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is a significant relationship between swamps and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is a significant relationship between bushes and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is no significant relationship between cattle cages and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022.

Keywords
puddles; swamps; bushes; cattle cages; malaria incidence

I. Introduction

Data from the World Health Organization states that there were 219 million cases of malaria worldwide in 2019 (World Health Organization, 2017). So that malaria is still an endemic disease in the world. Every year the number of people with the disease transmitted by the Anopheles mosquito reaches more than 200 million.

Malaria is a life-threatening disease caused by a protozoan parasite of the genus plasmodium through the bite of a female anopheles mosquito as a malaria vector. Malaria is caused by a parasitic infection of plasmodium which is transmitted by the bite of the female anopheles mosquito. Anopheles mosquitoes mainly bite humans at night from late afternoon until morning. In humans there are four genera of plasmodium, namely, plasmodium falciparum, plasmodium ovale, plasmodium vivax, and plasmodium malariae.

Malaria is still a threat to health status for people living in remote areas. This is also supported by Sembiring et al. (2020) said that malaria is a disease that often occurs in coastal areas. In 2015, according to Presidential Regulation Number 2 concerning the 2015-2019

National Medium-Term Development Plan, malaria is a major disease that needs to be tackled.

Annual parasite incidence determines the annual morbidity of malaria in an area with the number of cases per 1,000 population in one year. Nationally, the annual parasite incidence from 2015 to 2018 continues to decline. The success of controlling the malaria program is well implemented by the central government, regional governments, citizens and related partners. The highest annual parasite incidence rate in Indonesia in 2018 is located in the eastern region with the percentage of districts/cities based on their distribution.

In 2018 as many as 67,314 people in North Sumatra were positive for malaria, the areas with the most malaria were Nias 14,165 sufferers, Deli Serdang 9,124 sufferers, Mandailing Natal 7,011 suffers, Padang Lawas with 6,942 suffers, Labuhanbatu 6,263 suffers, South Nias 4,692 suffers, Batu Bara 4,340 suffered, Middle Tapanuli suffered 3,416, and Padang Lawas suffered 2,622.

Sources of information on morbidity and mortality from the ten largest diseases in North Labuhanbatu Regency, malaria is one of them. North Labuhanbatu Regency Health Office in 2015-2016 recorded people with malaria without checking blood supplies in North Labuhanbatu Regency there were 329 people with malaria and malaria with checking blood supplies there were 200 people with malaria. In 2017, it was recorded that there were 258 people with malaria without checking the blood supply and 210 people with malaria with checking the blood supply. In 2018, there were 267 people with malaria without checking blood supplies and 267 people with malaria with checking blood supplies for 220 people. Judging from the information on the morbidity and consequences of malaria by gender, sub-district, and health centers in the North Labuhan Batu Regency Health Office, there were 333 positive malaria.

Based on information from the Health Office of North Labuhanbatu Regency, Kualuh Leidong Sub-District and Kualuh Hilir Sub-District, the annual parasite incidence decreased from 1.040 per 1000 population in 2012 and 0.192 per 1000 population in 2013. Of the eight sub-districts in North Labuhanbatu, Kualuh Leidong Sub-District and Kualuh Hilir Sub-District are district with the highest population. With an area of 340.32 km² of Kualuh Leidong Sub-District and 385.48 km² of Kualuh Hilir Sub-District, Kualuh Leidong Sub-District has a population of 25,961 people in 2018 while Kualuh Hilir Sub-District is 32,573 people. Kualuh Leidong Sub-District and Kualuh Hilir Sub-District, Labuhanbatu Regency, are one of the malaria endemic areas compared to other subdistricts located in North Labuhanbatu Regency.

Based on its geographical location, Kualuh Leidong Sub-District, North Labuhanbatu Regency, is close to the coast and some areas of Kualuh Leidong Sub-District still have swamp areas, because of these environmental conditions, Tanjung Leidong Sub-District has the potential as a breeding ground for Anopheles spp. In addition, the behavior of people who are often outside the house, especially at night, can facilitate the transmission of malaria. North Labuhanbatu Regency consists of 08 coverage areas sub-district, namely Aek Kuo, Aek Natas, Kualuh Hilir, Kualuh Hulu, Kualuh Leidong, Kualuh Selatan, Merbau, and Na IX-X. Kualuh Leidong and Kualuh Hilir are Kelurahan Tanjung Leidong, which is one of the coverage areas of the Tanjung Leidong Sub-District Health Center which has the most malaria sufferers compared to other puskesmas coverage areas.

Based on the geographical location of Tanjung Leidong Sub-District, it is close to the beach and swamp. Based on gender at the North Labuhanbatu Regency Health Office, in 2017 there were 81 people out of 5,963 people with malaria and in 2018 there were 133 people out of 5,963 people.

Based on several studies, the increase in malaria cases is related to the condition of the area near the house that supports mosquito breeding with the presence or absence of breeding places and mosquito shelters around the house, according to the results of Pamela's research stating that there is a relationship between wall density, the presence of ditches or ditches, and ceilings on the incidence of malaria.

The results of the initial survey conducted on 35 respondents, namely 60% of respondents or 21 respondents with junior high school education, 25% of respondents or 9 respondents with high school education, and 15% of respondents or 5 people with undergraduate education. The walls of houses made of boards are 80% or 28 respondents, and 20% or 7 respondents made of plastered stone. There is a puddle of water around the house that is 75% or 26 respondents, and there is no puddle of water around the house that is 25% or 9 respondents.

The government has provided assistance related to malaria control in Tanjung Leidong Sub-District, but the number of sufferers remains.

The purpose of this research is relationship of puddles, swamps, bushes, cattle cages to malaria incidence in Endemis District, North Labuhan Batu Regency in 2022.

II. Research Method

This type of research is an analytical survey research with a case control research design. Analytical survey research is a survey or research that tries to explore how and why health phenomena occur (Octiva et al., 2018; Pandiangan, 2018). Case control research design is an analytical study that analyzes causal relationships using reverse logic, namely determining the disease (outcome) first and then identifying the cause (risk factor) (Octiva et al., 2021; Pandiangan et al., 2021; Pandia et al., 2018).

Population is a group or collection of objects or objects that will be generalized from the results of research (Asyraini et al., 2022; Octiva, 2018; Pandiangan, 2015). The population in this study are all residents in Kualuh Leidong Sub-District and Kualuh Hilir who suffered from malaria based on the results of the blood preparation examination, which was indicated by the discovery of plasmodium in the blood by laboratory personnel and was declared positive for malaria. The control population in this study were all residents in Kualuh Leidong Sub-District and Kualuh Hilir Sub-District who did not suffer from malaria but came to the Public Health Center with complaints of other diseases, such as wounds, coughs and colds, then had their blood tested, 160 and was declared negative (-) Malaria is characterized by the absence of plasmodium in the blood by laboratory personnel. The sample is part of the population that has characteristics similar to the population itself (Jibril et al., 2022; Pandiangan et al., 2018; Pandiangan, 2022). Samples are also called samples. The calculated value obtained from this sample is called the statistic. The sample is the target population that meets the inclusion criteria and is added to the control group and is used as the subject of the study. In the case-control study, the researcher uses the odds ratio as an estimate of the desired outcome, thus if P1=the proportion of cases and P2 the proportion of controls, the sample in this study is 114 consisting of 57 cases and 57 controls who have the same characteristics (age and sex).

Data analysis in this study using bivariate analysis. Bivariate analysis is a kind of statistical analysis when two variables are observed against each other (Pandiangan et al., 2022; Tobing et al., 2018). One of the variables will be dependent and the other is independent. The variables are denoted by X and Y. The changes are analyzed between the two variables to understand to what extent the change has occurred.

III. Discussion

3.1 Overview of Research Locations

North Labuhanbatu Regency is one of the areas located in the East Coast of North Sumatra. Geographically, North Labuhanbatu Regency is located at 1058' – 2 050' 05'°25'– 100° North Latitude, 99 East Longitude with an altitude of 0 – 700 m above sea level. Tanjung Leidong Village is one of the villages in Kualuh Leidong Sub-District, North Labuhanbatu Regency, North Sumatra Province, Indonesia. This area is one of the malaria endemic areas in North Labuhan Batu.

Kualuh Leidong Sub-District is located at 2.4521 North Latitude, 99.5627 East Longitude with an altitude of 0-5 m above sea level. Kualuh Leidong Sub-District occupies an area of 340.32 km^2 which consists of 7 villages/groups and 59 hamlets/definitive neighborhoods. Kualuh Leidong Sub-District area in the north is bordered by Asahan Regency and the Malacca Strait, in the east by Kualuh Hilir Sub-District, in the south by Kualuh Hulu Sub-District, and in the west by Asahan Regency.

The population of North Labuhan Batu Regency in 2020 is 21,544 people. Meanwhile, based on the 2010 Population Census Projection figures, the population of Kualuh Leidong Sub-District is 29,677 people with a population density of 87.20 people per km^2. The largest population and the highest density are in Tanjung Leidong Village, which is 9,116 people with a population density of 506.44 people per km^2, while the least population and the smallest density are in Teluk Pulai Luar Village of 2,116 people with a population density of 40.08 people per km^2.

The population of Kualuh Leidong Sub-District with male sex is more than female population. In 2018 the male population was 15,139 people, while the female population was 14,538 people with a sex ratio of 104.13.

The number of workers by employment in Kualuh Leidong Sub-District is 92.11 percent in the agricultural sector, 0.40 percent in the industrial sector, 0.79 percent in civil servants/TNI/Polri, and 6.67 percent in other sectors.

3.2 Bivariate Analysis

Table 1. Bivariate Analysis Results

Variable	Case		Control		Total		p-value	OR	95% CI	
	n	%	n	%	n	%			Lower	Upper
Puddles										
There is	42	73.7	51	89.5	93	81.6	0.030	0.329	0.117	0.924
There isn't	15	26.3	6	10.5	21	18.4				
Any										
Swamps										
Yes	28	49.1	11	19.3	39	34.2	0.001	4.038	1.746	9.335
No	29	50.9	46	80.7	75	65.8				
Bushes										
Yes	18	31.6	8	14.0	26	22.8	0.022	2.827	1.112	7.186
No	39	68.4	49	86	88	77.2				
Cattle Cages										
Yes										
No	5	8.8	3	5.3	8	7	0.463	1.731	0.394	7.612
	52	91.2	54	94.7	106	93				

The results show that there is a significant relationship between puddles and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is a significant relationship between swamps and malaria incidence in Endemis District, North Labuhan Batu

Regency in 2022. There is a significant relationship between bushes and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is no significant relationship between cattle cages and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022.

IV. Conclusion

4.1 Conclusion

The results show that there is a significant relationship between puddles and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is a significant relationship between swamps and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is a significant relationship between bushes and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022. There is no significant relationship between cattle cages and malaria incidence in Endemis District, North Labuhan Batu Regency in 2022.

4.2 Suggestions

Sugegestions for research are:

1. For the Department of Health and Policy Stakeholders
   a. It is necessary to improve the guidance and supervision regarding the improvement of the maintenance of the residential environment as one of the priority programs for the prevention and eradication of animal-sourced diseases aimed at increasing public awareness and ultimately reducing malaria cases.
   b. The District Health Office should coordinate with cross-sectoral (Regional Development Planning Agency, Social Service, and Public Works Office) in the construction of livable housing for the poor and provide revolving assistance to overcome the risk factors for malaria caused by the physical condition of the house unfavorable conditions, such as the condition of the walls of the house with holes, the ventilation of the house is not installed with wire netting and the presence of a ceiling. Activities that can be carried out include making integrated planning with related sectors, counseling about healthy homes, providing revolving assistance for the renovation of inadequate housing or the distribution of wire netting and increasing participation from the community themselves.
2. For Society
   All communities must play a role in prevention to improve individual health status by implementing several malaria prevention methods including; improve the home environment such as installing wire nets on ventilation, repairing house walls with holes and trying to install ceilings when building a house as an effort to reduce contact between mosquitoes and humans.
3. For Further Researchers
   It is hoped that further research will conduct further research on various other risk factors associated with the incidence of malaria. In addition, it is expected that future researchers will conduct random sampling in the selection of controls because in this study the determination of control was carried out purposively so that it was more susceptible to bias, both information bias and selection bias, and it is also recommended for further researchers to further enlarge the number of samples, so that the strength of the study is expected to increase to be better.

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