



Analysis of Environmental Factors with Malaria Incidence in Mabodo Health Center

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ABSTRACT

Malaria is one of the health problems that occur in the world, especially in tropical and subtropical regions. Malaria is an infectious disease transmitted through the bite of the female Anopheles mosquito and symptoms felt by malaria sufferers in the form of fever, cold heat, anemia, and sweating. This study aims to analyze the influence of environmental factors with the incidence of malaria in the working area of Mabodo Health Center muna regency. This type of research is quantitative with case control study design. The total sample in this study was 88 respondents, with sampling techniques are total sampling and purposive sampling. The results showed that riskfactors that have an influence on the incidence of malaria are the state of the walls (p value 0.004), bushes (p value 0.004), going out at night (p value 0.003), the habit of hanging clothes(p value 0.002),and using mosquito nets (p value 0.005).The incidence of malaria occurs in the working area of Mabodo Health Center, because of environmental factors that support so that malaria cases still occur in the area.

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ABSTRAK

Malaria salah satu masalah kesehatan yang terjadi di dunia terutama di wilayah tropis dan subtropis. Malaria merupakan penyakit menular yang ditularkan melalui gigitan nyamuk Anopheles betina dan gejala yang dirasakan penderita malaria berupa demam, panas dingin, anemia, serta berkeringat. Penelitian ini bertujuan untuk menganalisis pengaruh factor lingkungan dengan kejadian malaria di wilayah kerja Puskesmas Mabodo Kabupaten Muna. Jenis penelitian ini yaitu kuantitatif dengan desain case control study. Total sampel dalam penelitian ini sebanyak 88 responden, dengan tehnik pengambilan sampel yaitu total sampling dan purposive sampling. Hasil penelitian menunjukkan bahwa factor lingkungan yang memiliki pengaruh terhadap kejadian malaria yaitu keadaan dinding (p value 0.004), semak-semak (p value 0.004), keluar rumah pada malam hari (p value 0.003), menggantung pakaian (p value 0.002), dan kebiasaan menggunakan kelambu (p value 0.005). Kejadian malaria yang terjadi di wilayah kerja Puskesmas Mabodo, karena adanya faktor lingkungan yang mendukung sehingga kasus malaria masih terjadi di daerah tersebut.

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INTRODUCTION

Malaria is one of the health problems that occur in the world, especially in tropical and subtropical regions. Based on WHO data in 2017 there were 219 million cases of malaria and 435,000 deaths in the world (World Health Organization, 2020). Indonesia Health Data in 2019, the number of pain or Annual Parasite Incidens malaria as much as 0.93 and in 2018 as much as 0.84 per 1000 population at risk. Southeast Sulawesi is one of the endemic areas of malaria. Based on southeast Sulawesi health data in 2018 there were 916 incidences of malaria and the incidence of pain (Annual Parasite Incidens) of 0.34 and in 2019 as many as 855 cases with malaria pain (Annual Parasite Incidens) of 0.31 per 1000 population at risk. Munaregency is one of the highest areas of malaria cases in 2019 with the number of cases as many as 314 and the malaria pain rate (Annual Parasite Incidens) of 1.4 per 1000 population at risk (Kementerian Kesehatan Republik Indonesia, 2019).

Based on data from the Muna District Health Office, Mabodo Health Center is the Health Center with the highest malaria cases in 2019 with the number of positive cases as many as 76 cases with a pain rate of 8.8 and in 2020 there are 44 positive cases of malaria with the annual parasite incidens of 5.3 per 1000 population at risk (Dinas Kesehatan Kabupaten Muna, 2020.)

Malaria is an infectious disease transmitted through the bite of the female Anopheles mosquito and symptoms felt by malaria sufferers in the form of fever, cold heat, anemia, and sweating. The incidence of malaria can occur due to several factors, namely agent (Plasmodium), host (human and mosquito Anopheles), and environment (Kazwaini & Willa, 2014). Environmental factors such as temperature, humidity, gauze wire on ventilation, the state of the walls, the ceiling of the house, hanging clothes, bushes, puddles, the presence of livestock cages near the house, salinity, Ph, habits of going out at night, habits of using mosquito nets and using mosquito repellent (Putra et al., 2020), (Selvia et al., 2019), (Darmawansyah et al., 2019), (Watmanlusy & Raharjo, 2019). Research conducted in Aceh shows that standing water, the presence of animal cages, walls of houses, and the use of mosquito repellent affect the incidence of malaria. Some other studies have also found that the ceiling of the house, gauze wire on ventilation, the condition of the walls of the house, bushes, the habit of using mosquito nets are associated with the incidence of malaria (Selvia et al., 2019), (Darmawansyah et al., 2019).

Based on the background, environmental factors such as the presence of gauze wire in ventilation, the condition of the walls of the house, the ceiling of the house, the habit of hanging clothes, the presence of bushes, puddles around the house, livestock cages around the house, habits of going out at night, habits of using mosquito nets, and the habit of using mosquito repellent related to the incidence of malaria is important to be studied because to find out the risk factors or environmental factors that are associated with the incidence of malaria in the working area of Mabodo Health Center Muna Regency.

METHOD

This research has obtained ethical clearance or Eitk code from the Health Research Ethics Commission of the Faculty of Public Health, Diponegoro University with number 238 /

EA / KEPK-FKM / 2021. This type of research is quantitative with the design of case control study (case and control) aims to look for environmental risk factors of the case group or who suffer from malaria and control or who do not suffer from malaria. The total sample in this study was 88 respondents with a sample of 44 respondents and a control sample of 44 respondents. Sampling techniques in this study are total sampling and purposive sampling. The total sampling technique is used for case samples where the total malaria case based on Mabodo Health Center data amounted to 44 cases in 2020 and purposive sampling techniques are used for the withdrawal of control samples living in the working area of Mabodo health center and have never suffered from malaria.

The respondents' data collection was conducted using questionnaires about environmental factors studied related to malaria incidence. This research was conducted in the working area of Mabodo Health Center, namely bungi village, Mabodo village, Masalili village, Kontunaga village, and Liabalano village and was held in July-August 2021. Data analysis used is univariate analysis (to describe respondent characteristics and research variables), bivariate analysis (used to analyze the relationship between environmental factors or free variables with the incidence of malaria or bound variables), and multivariate analysis (used to analyze for variables or environmental factors that are most influential with malaria incidence).

RESULTS OF STUDY

Respondents involved in this study as many as 88 respondents from the case group (44 respondents) and control (44 respondents) spread across the working area of Mabodo Health Center. Based on Table 1 it is known that the most respondents aged >30 years and more respondents are female both in case and control. The last education of respondents was many in cases and controls with the level of elementary and high school/vocational education and the employment status of respondents that they had a lot as housewives in cases and controls.

Based on Table 2 all respondents both case and control did not install gauze wire on the ventilation of his house and the condition of the walls of the house more in conditions of not meeting both in case and on control. The existence of many ceilings does not exist or does not install in the house either in case or on control. The habit of hanging clothes in the house is widely done by the group of cases and controls, the presence of bushes around the house is more in the case compared to control. The presence of standing water around the house is much in control compared to the case. The existence of livestock cages is widely located around the control house compared to the case group. The habit of going out at night is widely done by cases while many control groups do not have the habit of going out at night. The habit of using mosquito nets is widely carried out by the case and control group, and the habit of using mosquito repellent in cases is equally both using and not using while in the control group more use or there is a habit of using mosquito repellent in the house compared to those who do not use.

Table 1
Characteristics of Respondents in the Working Area of Mabodo Health Center

Characteristics of Respondents	Case		Control	
	n	%	n	%
Age				
a. <20 years	3	42.9	4	57.1
b. 20-30	16	53.3	14	46.7
c. >30	25	49	26	51
Gender				
a. Man	4	36.4	7	63.6
b. Woman	40	51.9	37	48.1
Education				
a. No School	3	25	9	75
b. Elementary School	14	51.9	13	48.1
c. Junior High School	6	42.9	8	57.1
d. Senior High School	14	56	11	44
e. Diploma	3	100	0	0
f. Bachelor's degree	4	57.1	3	42.9
Profession				
a. Does not work	3	60	2	40
b. Housewife	26	54.2	22	45.8
c. Farmer	5	35.7	9	64.3
d. Weave	4	80	1	20

Table 2
Environmental Factors in The Working Area of Mabodo Health Center Muna Regency

Environmental Factor	Case		Control	
	n	%	n	%
Wire netting				
There is	0	0	0	0
There is not any	44	50	44	50
Wall state				
Walls that are tight	18	78.3	5	21.7
Walls that are nottight	26	40	39	60
Ceiling				
There is	8	27.6	21	72.4
There is not any	36	61	23	39
Puddle				
There is	13	35.1	24	64.9
There is not any	31	60.8	20	39.2
Bushes				
There is	23	71.9	9	28.1
There is not any	21	37.5	35	62.5
Cattle pen				
There is	18	60	12	40
There is not any	26	44.8	32	55.2
Out of the house at night				
Yes	30	66.7	15	33.3
No	14	32.6	29	67.4
Hanging clothes				
Yes	41	59.4	28	40.6
No	3	15.8	16	84.2
Use mosquito nets				
Yes	40	58.8	28	41.2
No	4	20	16	80
Use mosquito repellent				
Yes	22	38.6	35	61.4
No	22	71	9	29

Based on Table 3 shows that, environmental factors that have an association with the incidence of malaria are the state of the wall (p value 0.004) and as a risk factor for malaria incidence with OR=5,400 times, there is a relationship of the ceiling of the house with the incidence of malaria (p value 0.006) and as a protective factor of malaria incidence, puddles have an association with malaria incidence (p value 0.031) and as a protective factor of

malaria incidence, there is a relationship between the presence of bushes with the incidence of malaria (p value 0.004) and as a risk factor for malaria incidence with OR=4,259, there is no association between the presence of livestock cages (p value 0.261), there is a relationship between the habit of going out at night with the incidence of malaria (p value 0.003) and as a risk factor for malaria incidence with OR= 4,143, clothing hanging habits have an

association with the incidence of malaria (p value 0.002) and as a risk factor for malaria incidence with OR=7,810, there is a relationship between the habit of using mosquito nets with the incidence of malaria (p value 0.005) and as a risk factor

for malaria incidence with OR=5,174, there is a relationship between the habit of using mosquito repellent in the house with the incidence of malaria (p value 0.007) and as a protective factor for malaria incidence.

Table 3
Analysis Environmental Factors in the Working Area of Mabodo Health Center

Environmental Factor	<i>p</i> value	OR	95% CI
Wall state	0.004	5.400	1.783-16.355
Ceiling	0.006	0.243	0.092-0.641
Puddle	0.031	0.349	0.145-0.841
Bushes	0.004	4.259	1.661-10.921
Cattle pen	0.261	1.846	0.754-4.519
Out of the house at night	0.003	4.143	1.702-10.082
Hanging clothes	0.002	7.810	2.079-29.335
Use mosquito nets	0.005	5.174	1.726-18.922
Use mosquito repellent	0.007	0.257	0.100-0.659

Based on the results of a multivariate analysis in Table 4, showed that the most influential variables of all the variables studied were the wall state with a value of 0,003 and OR=14,220 (95% CI: 2,481-81,502) which means that

respondents whose house walls are not tight have a 14,220 times risk of experiencing malaria compared to respondents whose house walls are tight.

Table 4
Analysis Multivariate

Environmental Factor	B	<i>p</i> value	OR	(95% CI)
Wall state	2.655	0.003	14.220	2.481-81.502
Bushes	1.433	0.016	4.191	1.309-13.416
Out of the house at night	1.364	0.019	3.913	1.257-12.178
Hanging clothes	1.528	0.054	4.610	0.976-21.780
Use mosquito nets	2.827	0.007	16.888	2.136-133.527
Constant	-19.686	0.000	0.000	

DISCUSSION

The incidence of malaria in the study as many as 44 people in the working area of Mabodo Health Center with a rate of pain or API (Annual Paristelnsidence) as much as 5.3 per 1000 population at risk.4 The number of cases in this study is less than the previous research conducted by Riska in the mabodo health center working area, which is 70 cases (Riska et al., 2020). The incidence of malaria can occur due to the presence of several risk factors, one of which is environmental factors. This research was conducted in July-August 2021 in the working area of Mabodo Health Center of Kontunaga District of Muna Regency. Environmental factors studied in this study such as gauze wire, the state of the walls, the ceiling of the house, the habit of hanging clothes, bushes, puddles, livestock cages, habits of going out at night, using mosquito nets and mosquito repellent.

The condition of the walls of the house can also affect the incidence of malaria because the condition of the walls of the house is not good, such as walls that are not tight and there are holes in the wall can make it easier for mosquitoes to enter the house through walls that are not tight and perforated, so there is contact between Anopheles mosquitoes and humans. Based on the results of research conducted the condition of the walls of the house proved to have a relationship with the incidence of malaria in the working area of Mabodo Health Center. This study is in accordance with research conducted in the Southeast Aceh

region, which found that the walls of houses affect the incidence of malaria(Putra et al., 2020).

Another study conducted by Nababan showed that the condition of the walls of the house has a relationship with the incidence of malaria (Nababan & Umniyati, 2018). In contrast to the research conducted in Pati Regency with the result that there is no relationship between the state of the walls of the house with the incidence of malaria (Wiwoho et al., 2016).

The results of this study showed that most respondents do not have a ceiling, in respondents who have a ceiling usually only exist in a few rooms of the house, such as in the living room, room, and living room. Houses that do not install ceilings or ceilings can have a gap between the upper wall and the roof of the house, which will be a path in and out of mosquitoes in the house. Based on the results of this study showed that there is a relationship between the ceiling of the house and the incidence of malaria in the working area of The Mabodo Health Center. This study is in line with sofia's research which found that the presence of ceilings or ceilings has a relationship with a history of malaria(Sofia, 2018). In contrast to the research conducted in Woyla District of West Aceh Regency, with the results of research that there is no meaningful relationship between the existence of the ceiling of the house and the incidence of malaria (Junaidi et al., 2015).

Puddles are one of the places favored by Anopheles mosquitoes because it is a breeding ground. Puddles found at

the research site are puddles, swamps, used drums, buckets and springs. The results of this study showed that standing water has an association with malaria incidence with a value of 0.031 and OR = 0.349 (95% CI: 0.145-0.841) which means standing water as a protective factor against malaria incidence.

This study is in accordance with research conducted in North Sumatra, with the result that there is a relationship between the presence of puddles and the incidence of malaria (Rangkuti et al., 2017). In contrast to research conducted by Dedi Alamsyah, which found that there is no relationship between the presence of puddles and the incidence of malaria (Dedi Alamsyah, 2017)

The results of this study show that the presence of bushes around the house is most common in cases. The presence of bushes around the house can be a risk of malaria transmission, because moist and shady places are very preferred by Anopheles mosquitoes for resting places before or after sucking blood. Based on the results of this study showed that there is a relationship between the bush and the incidence of malaria in the working area of Mabodo Health Center. In contrast to the results of research conducted by Sutriawan, it shows that there is no meaningful relationship between bushes and malaria incidence (Sutriawan, 2017). Research conducted in Aceh Jaya, shows that there is a relationship between bushes with a history of malaria (Sofia, 2018).

The habit of going out at night is an activity that can cause contact between mosquitoes and humans. The more often a person moves outdoors at night, the more frequent contact between mosquitoes and humans. The results of this study showed that there is a relationship between the habit of going out at night and the incidence of malaria in the working area of Mabodo Health Center. This study is in accordance with research conducted by Sembiring, with the result that there is a relationship between the habit of going out at night and the incidence of malaria in endemic districts of Asahan Regency (Sembiring, 2019). Another study conducted by Novianti found that there is a relationship between the presence of going out at night with the incidence of malaria (Novianti et al., 2016).

Bad habits such as hanging clothes behind the door of the room, on the walls of the house, in the window, and in other rooms will be the resting place of mosquitoes before or after sucking blood. The results of this study showed that there is a relationship between the habit of hanging clothes in the house and the incidence of malaria in the working area of Mabodo Health Center.

The study conducted in Bengkulu City, found that there was no relationship of clothing depending on the incidence of malaria, because both the case group and the control group had many clothing hanging habits so there was no difference in proportion between the case and control (Sutriawan, 2017). While the study conducted by Sembiring with the result that there was a relationship of clothing hanging habits with the incidence of malaria (Sembiring, 2019).

The use of mosquito nets at night is one way that can be done to avoid contact between mosquitoes and humans. Based on the results of research conducted showed that there is a relationship between the habit of using mosquito nets with the incidence of malaria in the working area of Mabodo Health Center. Another study conducted in Asahan Regency, with the result that there is a relationship of mosquito net habits with the incidence of malaria (Sembiring, 2019). In contrast to research conducted by Isnaeni which found that there is no association between the

use of mosquito nets and the incidence of malaria (Isnaeni et al., 2019).

The habit of using of mosquito repellent in the house is an effort that is often done by the community to prevent mosquito bites in the house. The results of the study showed that the habit of using mosquito repellent is the risk factor that most affects the incidence of malaria and respondents who do not have a habit of using mosquito repellent are at risk 10,413 times able to experience malaria compared to respondents who have a habit of using mosquito repellent. This study is in line with research conducted by Isnaeni, with the result that there is a link between using mosquito repellent and the incidence of malaria (Isnaeni et al., 2019). This research is also supported by research conducted in the working area of Puskesmas Leuser with the result that there is an influence on the use of mosquito repellent with the incidence of malaria (Putra et al., 2020). In contrast to research conducted by Nababan that showed that there is no association between of mosquito repellent and the incidence of malaria (Nababan & Umniyati, 2018).

CONCLUSION

This study shows that environmental factors that have an influence on the incidence of malaria are the state of the walls, bushes, going out at night, and using mosquito nets. This study shows that the incidence of malaria occurs in the working area of Mabodo Health Center, because of environmental factors that support so that malaria cases still occur in the area.

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