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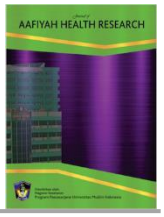

Original Article

Risk Factors for Malaria Incidence in Communities Who Have Migrated at Salutambung Health Center, Majene Regency, Indonesia

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Abstract

Background: Malaria is transmitted through the bite of a female Anopheles mosquito that contains Plasmodium in it. Malaria is one of the infectious diseases that is still a public health problem in the world, including in Indonesia. This study aims to determine the risk factors for malaria incidence in residents of the Salutambung Health Center area of Majene Regency who has migrated.
Method: This research is an analytical observational study using a case-control study design. The population in this study were all pulmonary TB patients who had migrated to Malari endemic areas recorded at the Salutambung Health Center. The sample size was determined based on the Lemeshow formula, as many as 117 people consisting of 39 people for the case group and 78 people for the control group with a case-control ratio of 1:2. sampling technique by means of purposive sampling. The data analysis used was univariate analysis and bivariate analysis with an odds ratio (OR) test.
Results: The results showed that the variables that were risk factors for the incidence of malaria (OR> 1) were the length of stay in endemic areas (OR=1.484;95%CI=0.655-3.361), installation of wire gauze (OR=1.274;95%CI=0.478- 3.390), and the use of mosquito nets (OR=1.844;95%CI=0.575-5.918).
Conclusion: The conclusion of this study is that the length of stay in endemic areas, installation of wire netting, and the use of mosquito nets are risk factors for the incidence of malaria, so it is hoped that the Salutambung Health Center will conduct socialization to the public to use mosquito nets when sleeping at night and take chemoprophylactic drugs when traveling. to malaria-endemic areas.

INTRODUCTION

Malaria is one of the infectious diseases that is still a public health problem in the world, including in Indonesia. This disease affects the high mortality rate for infants, toddlers, and pregnant women. Every year more than 500 million people in the world are infected with malaria, and more than 1,000,000 people die(Ministry of Health, 2011).Malaria is a cause of morbidity and mortality in tropical Africa, Asia, Latin America, and the sub-tropics such as most of Asia (especially Southeast Asia), America (especially South America,) and the Sub-Sahara (Achmadi, 2009).

According to The World Malaria Day 2018, malaria cases in 2016 occurred in 91 countries in the world and almost 50 percent of the population lives in areas at risk of contracting malaria, with a malaria morbidity rate of 216 million cases where the highest malaria cases occurred in the African

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region, namely 194 million cases (90%) and the second-highest in Southeast Asia with 14.6 million cases. The malaria morbidity rate in 2016 increased by five million when compared to the 2015 malaria morbidity rate, which was 211 million, this shows an increase in cases in terms of an increase in the burden of global and regional malaria rates (WHO, 2018).

Malaria is still a threat to public health status, especially for people living in remote areas. This is reflected in the issuance of Presidential Regulation Number: 2 of 2015 concerning the National Medium Term Development Plan of 2015–2019 where Malaria is a priority disease that needs to be addressed and in the RPJM IV of 2020–2024 it is also stated that the prevalence of major infectious diseases, one of which is malaria. is still high accompanied by the threat of emerging diseases due to high population mobility which affects the health status of the community(Ministry of Health, 2020).

Malaria attacks a lot of productive age which can lead to a decrease in productivity levels. In addition to the burden of illness and death it causes, malaria has also caused a large socio-economic impact, especially on the poor in malaria-endemic areas.(Malaria, 2008). Although malaria can be prevented and cured, it remains a major challenge to public health and socioeconomic development, especially in developing countries (Astuti et al., 2020).

In Indonesia, the Decree of the Minister of Health of the Republic of Indonesia No. 293/Menkes/SK/IV/2009 concerning the elimination of malaria in Indonesia. This is the basis and real commitment of the Indonesian government in preparing a malaria elimination program in Indonesia which will be achieved in stages, namely Bali, Batam and the Thousand Islands (DKI Jakarta Province) targeted in 2010. NAD Province, Riau Islands Province and Java Island are targeted for 2015. The Provinces of West Nusa Tenggara, Kalimantan Island, Sumatra Island and Sulawesi Island are targeted for 2020. The areas of East Nusa Tenggara, Maluku, North Maluku, Papua and West Papua are targeted for 2030 (RI, 2009).

The malaria morbidity rate reported in 2020 was 144 positive cases of malaria, in 2019 it was 209, in 2018 there were 138 positive cases of malaria and those who were given malaria treatment were 100% while the blood sample checked was the malaria morbidity rate based on the API (Annual Paracite Incidence) in West Sulawesi Province in 2020 was 0.09%, in 2019 it was 0.17%, in 2018 it was 0.12%, while in areas with low malaria cases, outbreaks often occur (Extraordinary Events) as a result of imported cases (Sismal malaria, 2020).

Majene Regency is a district that still has very high imported cases of 71 malaria cases in 2020, 150 malaria cases in 2019, 41 malaria cases in 2018 and the Puskesmas with the highest cases in the Salutambung Health Center area as many as 39 cases in 2020, 49 cases in 2019, 24 cases in 2018. Malaria cases at the Salutambung Health Center fluctuated every year. From the results of the recording of reporting of malaria cases at the Salutambung Health Center from 2018 to 2020. Although cases began to decline, it is necessary to watch out for an increase in malaria cases again(Sismal malaria, 2020).

The results of the longitudinal survey of mosquito bionemics and the results of vector bionemics in the Salutambung Health Center area were known to include An. Maculatus are commonly found indoors and outdoors. Based on the above conditions, the authors are interested in studying the risk factors for the incidence of malaria in people who have migrated to the Salutambung Health Center, Majene Regency in 2020.

METHOD

Types of research

The type of research used in this research is quantitative research with a case control research design.

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Place and time of research

This research was carried out in the working area of the Salutambung Health Center, Majene Regency, with a research time of July to September 2021.

Population and Sample

The population in this study were all pulmonary TB patients who had migrated to Malari endemic areas recorded at the Salutambung Health Center. The sample size was determined based on the Lemeshow formula, as many as 117 people consisting of 39 people for the case group and 78 people for the control group with a case-control ratio of 1:2. The sampling method is non-probability sampling with purposive sampling technique.

Data analysis

Data analysis was carried out after all data was collected, using the SPSS 22.0 Software program. Statistical analysis used univariate analysis, bivariate analysis with odds ratio (OR) test.

RESULTS

Table 1. Distribution of Cases and Controls Based on Characteristics of Distribution of Cases and Controls Based on Occupational Levels in the Population of the Salutambung Health Center Area, Majene Regency

Characteristics	Malaria incident				Total	
	Case		Control			
	n	%	n	%	n	%
Age group						
< 20 years	1	2.6	3	3.8	4	3.4
20 – 29 years	17	43.6	19	24.4	36	30.8
30 – 39 years old	10	25.6	34	43.6	44	37.6
40 – 49 years old	9	23.1	13	16.7	22	18.8
50 – 59 years	1	2.6	6	7.7	7	6.0
60 years	1	2.6	3	3.8	4	3.4
Amount	39	100	78	100	117	100
Gender						
Man	39	100	62	79.5	101	86.3
Woman	0	0.0	16	20.5	16	13.7
Amount	39	100	78	100	117	100
Education						
No school	8	20.5	15	19.2	23	19.7
SD	9	23.1	9	11.5	18	15.4
junior high school	7	17.9	12	15.4	19	16.2
SMA/SMK	14	35.9	32	41.0	46	39.3
PT	1	2.6	10	12.8	11	9.4
Amount	39	100	78	100	117	100

Source: Primary Data 2021

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Based on table 1, it is known that the highest age group in the malaria case group is in the age group 20-29 years as many as 17 people (43.6%) and the lowest is <20 years, 50-59 years and 60 years each with 1 person (2.6%) while the highest age group in the control group (not malaria) was in the age group 30-39 years as many as 34 people (43.6%) and the lowest age group was < 20 years and 60 years with 3 people respectively. (3.4%).

Table 2. Distribution of Cases and Controls Based on Research Variables in Residents of the Salutambung Public Health Center, Majene Regency

Research variable	Malaria incident				Total	
	Case		Control			
	n	%	n	%	n	%
Length of stay						
Old (> 3 months)	27	69.2	47	60.3	74	63.2
New (< 3 months)	12	30.8	31	39.7	44	36.8
Wire Mesh Installation						
No (High Risk)	32	82.1	61	78.2	93	78.5
Yes (Low Risk)	7	17.9	17	21.8	24	20.5
Use of Mosquito Net No (High Risk)	6	15.4	7	9.0	13	11.1
Yes (Low Risk)	33	84.6	71	91.0	104	88.9

Source: Primary Data 2021

Based on the table, it is known that from 74 people (63.2%) in the category of length of stay in endemic areas which are classified as long in the case group as many as 27 people (69.2%) and in the control group (not malaria) as many as 47 people (60.3 %). Meanwhile, from 44 people (36.8%) in the category of length of stay in endemic areas which were classified as new, 12 people (30.8%) in the case group and 31 people (39.7%) in the control group (not malaria).

Of the 93 people (78.5%) who did not put wire gauze in the case group as many as 32 people (82.1%) and in the control group (not malaria) as many as 61 people (78.2%). Meanwhile, of the 24 people (20.5%) who put wire gauze in the case group as many as 7 people (17.9%) and in the control group (not malaria) as many as 17 people (21.8%). Of the 13 people (11.1%) who did not use mosquito nets in the case group as many as 6 people (15.4%) and in the control group (not malaria) as many as 7 people (9.0%). Meanwhile, of the 104 people (88.9%) who used mosquito nets, 33 people (84.6%) used mosquito nets in the case group and 71 people (91.0%) in the control group (not malaria).

Table 3. Analysis of Malaria Incidence Risk Based on Research Variables

Research variable	Malaria incident				OR	95% CI	*p Nilai value*
	Case		Control				
	n	%	n	%			
Length of stay							
Old (High Risk)	27	69.2	47	60.3	1.484	0.655-3.361	0.456
New (Low Risk)	12	30.8	31	39.7			
Wire Mesh Installation	32	82.1	61	78.2			
No (High Risk)	7	17.9	17	21.8	1,274	0.478-3,390	0.808
Yes (Low Risk)							

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Use of Mosquito Net No (High Risk) Yes (Low Risk)	6 33	15.4 84.6	7 71	9.9 91.0	1,844	0.575-5.918	0.230

Source: Primary Data 2021

Based on table 3, it is known that the results of statistical tests for the variable length of stay in malaria endemic areas obtained an OR value of 1.484 with a 95% confidence level (CI) obtained a lower limit value of 0.655 and an upper limit of 3.361 with a p value of 0.456 which means length of stay in malaria endemic areas is a non-significant risk factor for the incidence of malaria. Thus, residents who have migrated have a 1.484 times greater risk of contracting malaria.

The results of statistical tests for the variable gauze installation obtained an OR value of 1.274 with a 95% confidence level (CI) obtained a lower limit value of 0.478 and an upper limit of 3.390 with a p value of 0.808, which means that the installation of wire netting is an insignificant risk factor for malaria incidence. Thus, residents who do not install wire netting on their home ventilation have a 1,274 times greater risk of contracting malaria.

The results of statistical tests for the variable use of mosquito nets obtained an OR value of 1.844 with a 95% confidence level (CI) obtained a lower limit value of 0.575 and an upper limit of 5.918 with a p value of 0.230 which means that the use of mosquito nets is an insignificant risk factor for the incidence of malaria. . Thus people who do not use mosquito nets have a 1.844 times greater risk of contracting malaria.

DISCUSSION

Risk Factor Analysis of Length of Stay on Malaria Incidence

Workers who have lived in endemic areas and suffer from malaria (69.2%) consider that malaria is not dangerous and is just an ordinary disease that should not be worried about and may have formed an immune system (natural defense) against malaria infection even though it has medical potential. Malaria can happen anytime and anywhere.

The results of statistical tests for the variable length of stay in malaria endemic areas obtained an OR value of 1.484 with a 95% confidence level (CI) obtained a lower limit value of 0.655 and an upper limit of 3.361 with a p value of 0.456 which means length of stay in malaria endemic areas is a factor insignificant risk of malaria. Thus, people who have lived in endemic areas have a 1.484 times greater risk of contracting malaria compared to people who have never lived in endemic areas.

Workers who are classified as long lived and have recently suffered from malaria because based on their history of being at work, they do not use chemoprophylaxis, do not use gauze in ventilation and do not use mosquito nets so that transmission occurs through Anhopeles mosquito bites and causes malaria.

The longer the stay in endemic areas, will indirectly increase the chance of contracting malaria in endemic areas. The duration of stay is short or long in malaria areas if you work and live in the forest far from residential areas. This causes the higher intensity for contact with Anopheles mosquitoes. Most of the respondents in this study are farmers and forest land development. Migrant workers choose to stay or settle in the area where they work with a place to stay in the form of a bascamp

Central Indonesia, precisely in North Penajaman Paser Regency, East Kalimantan Province, is included in the category of malaria endemic areas. Immunity is strongly influenced by the length of stay of a person in malaria endemic areas. Everyone can get malaria. Differences in prevalence according to age and sex are actually related to differences in the degree of immunity, which is caused by variations in exposure to Anopheles mosquito bites.

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This research is in line with(Santy et al., 2014)Regarding the risk of malaria incidence in the working area of the Cikeusik District Health Center, the length of stay (>2 years) in endemic areas is 1.848 times greater than people who live <2 years in endemic areas.

This research was also supported by(Inscription, 2019)who said that people with high mobility frequency (= 3 times) had a 16,670 times greater risk of getting imported malaria compared to people with low mobility frequency (1-2 times).

This research is not in line with(Marliah Santi HR, 2012a)that the length of stay in the migration area is proven to be unrelated to the incidence of malaria in residents of Lengkong District, Sukabumi Regency who have migrated.

Analysis of the Risk Factors for the Installation of Wire Gauze on the Incidence of Malaria

The existence of ventilation is a condition of a healthy home, but ventilation can also be a way for mosquitoes to enter the house and bite humans. The preventive way that can be done to avoid mosquito bites is to use wire netting on the ventilation of the house.

The results of statistical tests for the variable gauze installation obtained an OR value of 1.274 with a 95% confidence level (CI) obtained a lower limit value of 0.478 and an upper limit of 3.390 with a p value of 0.808, which means that the installation of wire netting is an insignificant risk factor for malaria incidence. Thus, residents who do not install wire netting on their home ventilation have a 1,274 times greater risk of contracting malaria.

The use of screen nets that are not comprehensive can cause mosquitoes to enter the house and increase contact between mosquitoes and humans so that the potential for mosquitoes to bite is greater. The use of screens on ventilation is very important to prevent mosquitoes from entering the house.

In this study, it was still found in the case group (82.1%) and the control group (78.5%) who did not use wire gauze. Some of the reasons why people don't use wire screens for ventilation are because they don't know the benefits of using wire screens so they don't think it's important.

Another factor is the condition of the houses of the people (workers) who live in the Base Camp which are made of boards to be used as shelters, so that the use of wire mesh for ventilation is difficult to do. For those who already understand the benefits of wire netting, they will install the wire mesh in the ventilation at the base camp, but for those who don't know the benefits, they will not install the wire netting.

Most of the houses they live in are non-permanent, namely houses using boards, this is what causes people to prefer to leave their house ventilation open even though they know the use of installing wire netting in an effort to prevent malaria.

The gauze can be given protection against mosquitoes, flies and other insects including mosquito-borne diseases such as Malaria. The gauze is a thin, see-through curtain with nets that can keep various insects from biting or bothering people who use it. The nets are made in such a way that even though insects cannot enter, it is still possible to pass through the air. Gauze is installed on the ventilation of the house to cover the entry of mosquito vectors.

In addition, people's residences in the forest and filled with thick bushes that cannot be penetrated by sunlight are close around the house. The presence of lush bushes will block the sun's rays from penetrating the soil surface, so that the presence of lush bushes results in a shady and humid environment so that prevention efforts through wire gauze are difficult to suppress the incidence of malaria because of the mosquito population around workers.

This research is in line with(Susanti & Wantini, 2014)about the factors related to the incidence of malaria in the Work Area of the UPT Puskesmas Rajabasa, Rajabasa District, South Lampung Regency who said that the use of wire netting on home ventilation with an OR of 1.274 which means

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that the risk of getting malaria is 1.274 times greater for people who live at home without using wire screens on the ventilation of their homes compared to those using wire screens.

This research is also in line with(Lubis et al., 2021)who examined the effect of the use of mosquito nets, wire netting and geodemographic conditions on the incidence of malaria in Batu Bara Regency who said that there was an effect of using wire netting on the incidence of malaria in Batu Bara Regency with an OR of 2.5, which means the risk of contracting malaria was 2.5 times. greater in people who live at home not using wire gauze compared to those who use wire gauze.

This research is not in line with(Atikoh, 2015)who said that there was no relationship between community behavior (installation of mosquito repellent gauze) and the incidence of malaria in Selakambang Village, Kaligondang District, Purbalingga Regency in 2014.

Analysis of Risk Factors for Using Mosquito Nets on Malaria Incidence

How to control malaria in addition to treatment is very important as well as for prevention. One of the efforts to prevent malaria is to use insecticide-treated mosquito nets or without insecticides at night. The results of statistical tests for the variable use of mosquito nets obtained an OR value of 1.844 with a 95% confidence level (CI) obtained a lower limit value of 0.575 and an upper limit of 5.918 with a p value of 0.230 which means that the use of mosquito nets is an insignificant risk factor for the incidence of malaria. . Thus, residents who do not use mosquito nets have a 1.844 times greater risk of contracting malaria.

One of the efforts to eliminate malaria is the distribution of insecticide nets distributed by the Puskesmas. The distribution of insecticide nets is based on the number of family members and the number of beds in the residents' homes. An interesting fact in this study is that people routinely use mosquito nets but suffer from malaria (case group) as much as (84.6%).

The situation around the base camp (residential house) is in the wilderness and thick bushes so that it blocks the sun's rays from penetrating the ground. The existence of lush bushes results in a shady and humid environment and conditions like this are a favorite resting place for Anopheles mosquitoes and cause the number of mosquito populations around the house/base camp to increase so that individuals who live in houses with bushes around them have a higher risk. There is a greater chance of transmitting malaria compared to individuals who live in houses where there are no bushes around them.

Not wearing mosquito nets when sleeping at night will increase the chance of being bitten by mosquitoes, thereby increasing the risk of contracting malaria. It was still found that people had not used mosquito nets, seen in the case group (5.1%) and the control group (5.9%) this was due to the condition that was damaged or torn or unfit for use so that people were lazy to install it. Base camp conditions are less likely to install mosquito nets.

The habit of using mosquito nets is an effective effort to prevent and avoid contact between Anopheles mosquitoes and healthy people while sleeping at night, in addition to using mosquito repellents. Because the Anopheles mosquito's habit of looking for blood is at night, so always sleep using mosquito nets that are not damaged or Holes at night can prevent or protect from Anopheles mosquito bites.

To get used to something so that it becomes a habit that sticks in the community takes a relatively long time. But this is something that is not difficult to implement. For this reason, the use of mosquito nets to prevent contact with malaria mosquitoes or others must be socialized intensively from the parties. in addition to support for availability in the market, making it easier for the public to obtain them.

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This research is in line with(Santy et al., 2014)which explains that there is a relationship between the habit of using insecticide nets and the incidence of malaria in Sungai Ayak 2 Village, obtained OR = 3.2, meaning that someone who does not have the habit of using insecticidal nets has a 3.2 times greater risk of malaria than people who have habit of using mosquito nets.

These results are supported by research (Lubis et al., 2021)who examined the effect of the use of mosquito nets, wire netting and geodemographic conditions on the incidence of malaria in Batubara Regency who said that there was an effect of using mosquito nets on the incidence of malaria in Batu Bara Regency with an OR of 2.8, which means the risk of getting malaria was 2.8 times more greater in people who live at home not using wire gauze compared to those who use mosquito nets.

Research result (Sutarto & Cania, 2017)said that people who have a habit of sleeping without using a mosquito net will develop malaria 1.93 times greater than people who have a habit of sleeping using a mosquito net. Research result (Rangkuti et al., 2018)that if a person has a habit of not using mosquito nets at night, he will have a probability of suffering from malaria by 4.2%. Compared with people who have the habit of sleeping using mosquito nets.

This research is different from the research (Susanti & Wantini, 2014)which stated that the use of mosquito nets was not related to the incidence of malaria, because the mosquito nets used were not insecticide standard nets with a p value of 0.445.

CONCLUSION

This research concludes that people who have lived in malaria endemic areas have a 1.484 times greater risk of contracting malaria than people who have never lived in endemic areas. People who did not put the screen on the ventilation in their house had a 1,274 times greater risk of contracting malaria than those who put the screen on. People who do not use mosquito nets have a 1.844 times greater risk of contracting malaria compared to those who use mosquito nets at night.

Declaration of Conflicting Interest

The author (s) declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article

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