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Risk Factors of Malaria Incidence in Working Areas Puskesmas Dawai District East Yapen Sub Province Kepulauan Yapen

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ABSTRACT

Background: Malaria is one of a health problem in Papua. The government is trying to elimination malaria but the incidence of malaria is still high. Efforts to detect and prevent malaria events continue to be carried out for malaria elimination.
Research objective: To determine the risk factors for malaria in the Dawai Health Center in Yapen Timur District, Yapen Islands Regency
Research Methods: Analytical with case control study design. The population were who came to visit the Dawai Health Center, with a total sample of 30 people and 60 controls. Data were obtained using questionnaires, observations, medical record data from laboratory results and analyzed using chi square test and logistic binary regression.
Results: Factors that have no effect and risk are job variables (ρ-value = 0.501; OR = 1.496; CI95% = (0.620 - 3.605), education (ρ-value = 0.203; OR = 1.962; CI95% = (0,807 - 4,766), income (ρ-value = 0,941; OR = 0,875; CI95% = (0,364 - 2,105), distance of house (ρ-value = 0,110; OR = 2,286; CI95% = (0,933– 5,599) livestock cages (ρ-value = 0.708; OR = 1.308; CI95% = (0.543 - 3.150). Factors that have no effect but are at risk are standing water (ρ-value = 0.056; OR = 2.875; CI95% = (1,072-7,710) While the factors that influence and risk are the use of wire netting (ρ-value = 0.021; OR = 3.267; CI95% = (1.2283 - 8.316), the type of house wall (ρ-value = 0,021; OR = 3,217; CI95% = (1,282 - 8,076), use of mosquito nets (ρ-value = 0,009; OR = 3,754; CI95% = (1,469 - 9,994) using malaria mosquito repellent (ρ-value = 0.020; OR = 3.208; CI95% = (1,288 - 7,990), going out at night (ρ-value = 0,030; OR = 3,143; CI95% = (1,209 - 8,167). The dominant and risky factor is the use of wire netting, the distance of the house, the use of mosquito nets, using mosquito repellent and going out at night is the dominant factor with the risk of malaria.

Keywords: Risk Factors, Malaria Incidence

1. INTRODUCTION

Malaria is one of the public health problems that can cause death, especially in high-risk groups, namely infants, toddlers, pregnant women, besides malaria directly causes anemia and can reduce work productivity (Director General P2PL, 2008). Malaria is an infectious disease caused by plasmodium parasites that live and multiply in human blood cells, transmitted by female malaria (anopheles sp) mosquitoes. Malaria is also a re-emerging disease (a disease that suddenly increases) and occurs in 107 countries with patients reaching 300-500 million people and cases of death reaching 1 million people every year including children (Dirjen P2PL, 2013). Malaria is a very dominant infectious disease in the tropics and sub-tropics that can be deadly. In Indonesia today, malaria is still a major public health problem. The average malaria case is estimated at 15 million clinical cases per year. The population at risk of malaria is the population who generally live in areas endemic to malaria, estimated at 85.1 million with low, moderate and high endemicity rates. Malaria 60 percent attacks productive age. (Harmendo).

The government views malaria as a threat to the health status of the community,

especially to people living in remote areas. This is reflected in the issuance of Presidential Regulation Number 2 of 2015 concerning the 2015-2019 National Medium Term Development Plan where malaria is a priority disease that needs to be addressed. Diseases that have an impact on the decline in the quality of human resources have a strong influence on the emergence of various social and economic problems. Based on data from the World Malaria Report on the World Health Organization (WHO) in 2016 there were approximately 212 million new cases of malaria and caused the deaths of around 429 thousand people worldwide. (Director General of P2P, 2017).

The malaria eradication policy in Indonesia since 1959 was carried out by obtaining assistance from the World Health Organization (WHO) and the United State of America Indonesia Development (USAID). The malaria eradication program held was called the Malaria Eradication Program (MEP). In 1962 a program called KOPEM (Command for the Eradication of Malaria Operations) was carried out. With the success achieved, efforts and strategies for eradicating malaria are emphasized on activities that eradicate malaria. In 1968 KOPEM was officially abolished, then the countermeasure method was changed to the Malaria Control Program. (Eli Winandi, 2004). Malaria prevention efforts continue to be carried out; so far it has shown significant results. The Millennium Development Goals (MDGs) target for malaria, which is to reduce the incidence of malaria worldwide in 2015, has been achieved with a 37% decrease in malaria incidence worldwide since 2000. Meanwhile, the worldwide mortality rate from malaria between 2000-2015 was successful suppressed to 60% and around 6.2 million people could be saved thanks to upayascale up malaria interventions carried out by all countries in the world.

The malaria program has reached the Millennium Development Goals (MDGs) indicator and malaria is included in the indicators of Sustainable Development Goals (SDGs) in the 3.3 target of ending the epidemic of AIDS, Tuberculosis, Malaria and neglected tropical diseases and combating hepatitis, water-borne diseases and other infectious diseases. In 2016, a total of 178.7 million people in Indonesia (69%) had lived in areas free of malaria transmission; a total of 63.6 million people (25%) lived in areas with low risk of malaria transmission, the rest who lived in moderate risk areas and high. Compared to the previous year, there was an increase in percentage, along with the number of districts / cities that had reached elimination. (Director General of P2P, 2017)According to the World Health Organization (WHO), there are an estimated 247 million malaria cases in 3.3 billion people, and cause around 1 million people to die. Malaria is still a public health problem in Indonesia. 73.6% are malaria endemic areas and 45% of the population are at risk of contracting malaria. Based on the Household Health Survey in 2000-2008, API (Annual Parasite Incidence) and AMI (Annual Malaria Incidence) showed a downward trend. API in 2000 0.81 per 1000 population continued to decline to 0.15 per 1000 population in 2004. API in 2006 increased to 0.19 per 1000 population.

The province of Papua which is located in the easternmost part of Indonesia known as one of the malaria endemic areas in Indonesia with morbidity ranks first of the top 10 diseases, in 2009 the number of AMI (Annual Malaria Incidence) in Papua reached 33.91 per 1000 population or 81,205 sufferers and in 2010 the number of AMI (Annual Malaria Incidence) increased to 32.27 per 1000 population or 86,952 patients. Predominant vector types that are spread in Papua are Anopheles Farauti, Anopheles Koliensis, and Anopheles puncutulatus, the high incidence and prevalence of malaria show that malaria eradication efforts have not been optimal or not optimal. (Imbiri, Suhartono 2012)

Annual Parasite Incidence (API) is an indicator to monitor the progress of

malaria. Malaria morbidity rate (API) in 2015 was 322.6 per 1000 population. The mortality rate / Case Fatality Rate (CFR) in 2015 was 0.06% or as many as 12 cases. For APIs in stringed health centers, it has increased from 2016 at 215.1% to 2017 362.1%. (Yapen Islands Regency Health Profile 2017).Various efforts to eradicate malaria in Yapen Islands District in general and the Dawai Health Center area in particular have been carried out according to the existing programs, for example taking preventive measures with vector control, active patient discovery activities / ACD (Active Case Detection) and passive / PCD (Passive Case Finding), treatment for clinical patients and patients with laboratory confirmation, treatment of severe malaria (Inpatient Health Center) and surveillance. (Health Profile of Yapen Islands District 2017).

The forms of community participation that are expected in malaria prevention efforts include: (1) adherence to taking anti-malaria drugs so that every patient can take medication thoroughly: (2) prevention of mosquito bites through the use of mosquito nets, installation of mosquito nets at home, use of drugs repellent, wearing long clothes: (3) prevention of malaria mosquito nests through cleaning of moss in moist places or parts of the house, prevention of the formation of puddles / potential places to breed Anopheles mosquitoes, nurturing larvae and prevention of the formation of mosquito nests. (Health Profile of Yapen Islands District 2017).From the activities that have been carried out, malaria cases in Yapen Islands District in general and the Piuskesmas Dawai region have not shown a decrease but increased by 147%. The mass gray giving program run in February 2018 is expected to be one of the problems solving to reduce malaria incidence in the Dawai Health Center work area. Based on these circumstances, researchers were motivated to conduct research on "Risk Factors for Malaria in the Work Area of Dawai District Health Center in Yapen Timur District, Yapen Islands Regency".Efforts to eradicate and combat malaria have been carried out in an effort to achieve the 2030 malaria elimination program in Papua. Malaria which is still difficult in eradicating in Papua is related to inadequate environmental management, low economic status of the population, lack of nutritional status, limited health services, and lack of support for healthy lifestyles.

2. MATERIALS AND METHODS

2.1 Types of research

The research that will be carried out is an observational study using a case control study. The design was chosen because it was in accordance with the purpose of the study that is to analyze the risk factors that affect the occurrence of a disease. This study was conducted to measure the magnitude of risk factors that influence the incidence of malaria. The case group includes people who are sick with malaria marked by positive blood test (SD) results. The control group includes people who are not sick with malaria characterized by negative blood test (SD) results.

This group is then compared about the causes or past experiences that may be relevant to the cause of the disease. Case control studies were chosen with considerations including offering a number of advantages, namely the costs required are relatively small, it is possible to identify various risk factors at once in one study, to assess the relationship between exposure to disease. This design can be taken with a high level of efficiency with respect to time and cost when compared to using other analytical study approaches.

2.2. Sample

Samples taken using consulative sampling, where the sample is taken when the patient is consulted at the General Poly and every respondent who experiences symptoms of malaria will be tested for blood. The sample population of the sample was 30 respondents and the control sample was 60 respondents by simple random sampling.

3. RESULTS

The influence of work with the risk of malaria

Table 1. Employment Effect with Malaria Occurrence Risk at Dawai Health Center Yapen Timur District, Yapen Islands Regency

No	Occupation	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Out building	16	53,3	26	43,3	42	100
2	In building	14	46,7	34	56,7	48	100
Total		30	100	60	100	90	100
p-value = 0,501; OR = 1,496; CI95%= (0,620 – 3,605)							

Table 1, it shows that in the case group of malaria incidence of respondents who worked outside the building as many as 16 people (53.3%) and respondents who worked in the building were 14 people (46.7%). Chi square test results obtained the value of ρ-value = 0.501> 0.05. This means that there is no effect of work with the risk of malaria events at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 1.496; CI95% = (0.620 - 3.605) with the lower value not including 1 which is interpreted that work is not a risk factor for the incidence of malaria.

The influence of low education level factors with the risk of malaria incidence

Table 2. Effect of Level of Education with risk of malaria incidence at Dawai Health Center Yapen Timur District Yapen Islands District

No	Education level	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	≤junior school	17	56,7	24	40	41	100
2	>junior school	13	43,3	36	60	49	100
Total		30	100	60	100	90	100
p-value = 0,203; OR = 1,962; CI95%= (0,807 – 4,766)							

Table 2, shows that in the case group of malaria incidence in the respondents the level of education <SMP was 17 people (56.7%) and respondents who were educated> SMP were 13 people (43.3%). Chi square test results obtained ρ-value = 0.203> 0.05. This means that there is no influence on the level of education with the risk of malaria incidence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 1.962; CI95% = (0.807 - 4.766) with the lower value not including 1 which is interpreted that the level of education is not a risk factor for the incidence of malaria.

Effect of income factor (<UMR) with risk of malaria incidence

Table 3. Income Influence with Malaria Occurrence Risk at Dawai Health Center Yapen Timur District, Yapen Islands Regency

No	Income	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Less	14	46,7	30	50	44	100
2	Enough	16	53,3	30	50	46	100
Total		30	100	60	100	90	100
p-value = 0,941; OR = 0,875; CI95%= (0,364 – 2,105)							

Based on Table 3, shows that in the case of malaria cases in respondents who earn less as many as 14 people (46.7%) and respondents who earn enough as many as 16 people (53.3%). The chi square test results obtained the value of ρ-value = 0.941> 0.05. This means that there is no influence of income with the risk of malaria incidence at Dawai Health Center Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 0.875; CI95% = (0.364 - 2.105) with the lower value not including 1 which is interpreted that income is not a risk factor for the incidence of malaria.

The effect of the use of wire netting on ventilation with the risk of malaria incidence

Table 4. The Influence of the Use of wire netting with the Risk of Malaria in the Dawai Health Center, Yapen Timur District, Yapen Islands Regency

No	wire netting use	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	None	21	70	25	41,7	46	100
2	Yes	9	30	35	58,3	44	100
Total		30	100	60	100	90	100
p-value = 0,021; OR = 3,267; CI95%= (1,283 – 8,316)							

Table 4 shows that in the case group of malaria incidence of respondents who did not use wire netting as many as 21 people (70%) and respondents whose homes used wire netting as many as 9 people (30%). Chi square test results obtained the value of p-value = 0.021 <0.05. This means that there is an influence of wire mesh usage with the

risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 3.267; CI95% = (1,283 - 8,316) was interpreted that respondents who did not use wire netting in their homes were at risk of malaria incidence 3,267 times higher than respondents who used wire mesh at their homes.

The influence of home wall type factors with the risk of malaria incidence

Table 5. Influence of House Wall Type with risk of malaria incidence at Dawai Health Center Yapen Timur District, Yapen Islands District

No	House Wall Type	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Wall	20	66,7	23	38,3	43	100
2	Concrete	10	33,3	37	61,7	47	100
Total		30	100	60	100	90	100
p-value = 0,021; OR = 3,217; CI95%= (1,282 – 8,076)							

Based on Table 5, it shows that in the malaria case group the respondents had a house with a type of wall from the board as many as 20 people (66.7%) and respondents who had walls of the house using a wall as many as 10 people (33.3%). Chi square test results obtained the value of ρ-value = 0.021 <0.05. This means that there is an influence on the type of house wall with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 3.217; CI95% = (1,282 - 8,076) which was interpreted that respondents whose walls were using planks were at risk of malaria incidence 3,217 times higher than respondents whose walls were from walls.

The influence of the factors of the presence of waterlogging with the risk of malaria incidence

Table 6. The Influence of Water Inundation with the risk of malaria incidence at Dawai Health Center, Yapen Timur District, Yapen Islands Regency

No	Water Inundation	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Yes	23	76,7	32	53,3	55	100
2	No	7	23,3	28	46,7	35	100
Total		30	100	60	100	90	100
p-value = 0,056; OR = 2,875; CI95%= (1,072 – 7,710)							

Table 6 shows that in the case of malaria cases in respondents whose home environment had a pool of water as many as 23 people (76.7%) and respondents whose home environment did not have as many as 7 people (23.3%). Chi square test results obtained the value of ρ-value = 0.056> 0.05. This means that there is no effect of the presence of stagnant water with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 2.875; CI95% = (1,072-7,710) was interpreted that respondents whose home environment was inundated were at risk of malaria incidence 2,875 times higher than respondents whose home environment had no standing water.

The influence of the distance factor of the house to the place of breeding with the risk of malaria

Table 7. The influence of the distance of the house to the place of breeding with the risk of malaria incidence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency

No	distance of the house to the place of breeding	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	N	%
1	Close	16	53,3	20	33,3	36	100
2	Far	14	46,7	40	66,7	54	100
Total		30	100	60	100	90	100
p-value = 0,110; OR = 2,286; CI95%= (0,933 – 5,599)							

Based on Table 7 shows that in the case of malaria incidence in the respondents the distance of houses with close breeding places was 16 people (53.3%) and respondents who were far away from home with breeding place were as many as 14 people (46.7%). Chi square test results obtained ρ-value = 0.110> 0.05. This means that there is no influence of the distance between the house and the place of breeding with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 2,286; CI95% = (0.933-5.599) interpreted the distance of the house to the near breeding place has a risk of malaria incidence 2,286 times higher than the distance of the house with a remote breeding place.

The influence of the presence of large livestock cages with the risk of malaria

Table 8. The effect of the existence of large livestock cages with the risk of malaria incidence in Dawai Health Center Yapen Timur District, Yapen Islands Regency

No	the existence of large livestock	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	N	%
1	Yes	15	50	26	43,3	41	100
2	None	15	50	34	56,7	49	100
Total		30	100	60	100	90	100
p-value = 0,708; OR = 1,308; CI95%= (0,543 – 3,150)							

Based on Table 8, showed that in the case group of malaria incidence in the respondents there were 15 large livestock pens (50%) and there were no large livestock cages as many as 15 people (50%). Chi square test results obtained the value of ρ-value = 0.708> 0.05. This means that there is no influence of the presence of large livestock cages with the risk of malaria occurrence in the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 1.308; CI95% = (0.543 - 3.150) with a lower value of less than 1 which is interpreted as the absence of the presence of large livestock cages not at risk of malaria.

Proving the habit of using mosquito nets with the risk of malaria

Table 9. The influence of the habit of using mosquito nets with the risk of malaria incidence in Dawai Health Center Yapen Timur District, Yapen Islands Regency

No	using mosquito nets	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Not	21	70	23	38,3	44	100
2	Yes	9	30	37	61,7	46	100
Total		30	100	60	100	90	100
p-value = 0,009; OR = 3,754; CI95%= (1,469 – 9,594)							

Based on Table 9, it shows that there were 21 people in the malaria case group in the respondents who did not use mosquito nets (70%) and 9 people using mosquito nets (30%). Chi square test results obtained ρ-value = 0.009 <0.05. This means that there is an effect of the use of mosquito nets with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 3.754; CI95% = (1,469 - 9,594) was interpreted that respondents who did not use grayish were at risk of malaria incidence of 3,754 times higher than respondents who did not use mosquito nets.

The influence of habitual factors using anti-mosquito drugs with the risk of malaria.

Table 10. Effect of habit of using mosquito repellent drugs with risk of malaria incidence at Dawai Health Center Yapen Timur District, Yapen Islands Regency

No	using mosquito repellent	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Not	19	63,3	21	35	40	100
2	Yes	11	36,7	39	65	50	100
Total		30	100	60	100	90	100
p-value = 0,020; OR = 3,208; CI95%= (1,288 – 7,990)							

Table 10 showed that in the case group of malaria incidence of respondents who did not have the habit of using mosquito repellent as many as 19 people (63.3%) and respondents who used anti-mosquito mosquito drugs as many as 11 people (36.7%). Chi square test results obtained p-value = 0.020 <0.05. This means that there is an influence of the habit of using malaria anti-mosquito drugs with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test were obtained OR = 3.208; CI95% = (1,288 - 7,990) was interpreted that respondents who did not use malaria anti-mosquito drugs were at risk of malaria incidence of 3,208 times higher than respondents who did not use malaria anti-viral drugs.

The influence of the habit habits of going out at night without using protection with the risk of malaria

Table 11. The influence of the habit of going out at night with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency

No	habit of going out at night	Malaria Occurrence				Number	
		Case		Control			
		n	%	n	%	n	%
1	Ya	22	73,3	28	46,7	50	100
2	Not	8	26,7	32	53,3	40	100
Total		30	100	60	100	90	100
p-value = 0,030; OR = 3,143; CI95%= (1,209 – 8,167)							

Based on Table 11, shows that in the case of malaria cases in respondents who had a habit of going out at night as many as 22

people (73.3%) and respondents who did not have the habit of going out at night as many as 8 people (26.7%). Chi square test results obtained the value of ρ-value = 0.030 <0.05. This means that there is an influence of the habit of going out at night with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. The results of the odds ratio test obtained OR = 3.143; CI95% = (1,209 - 8,167) was interpreted that respondents who had the habit of going out at night had a risk of malaria incidence of 3.143 times higher than respondents who did not have the habit of going out at night.

4. DISCUSSION

4.1 Effect of work with the risk of malaria

The results showed that there was no effect of work with the risk of malaria events at Dawai Health Center Yapen Timur District, Yapen Islands Regency. In the case group of malaria incidence, 16 respondents (53.3%) worked outside the building and 14 people worked in the building (46.7%). this shows that the same job factor - has the same risk as malaria. The results of this study are in line with the previous research conducted by Santy (2014) in Sungai Ayak 3 Village, Belitang Hilir Subdistrict, Sekadau District, that work was not related to the risk of malaria. Work is an activity or activity carried out to obtain income to fulfil their needs (Notoatmodjo, 2010). The work environment is everything that exists around individuals, both physical, biological, and social. The environment influences the process of entry of knowledge into individuals in the environment with the incidence of malaria.

The environment of community work in the work area of the Dawai Health Center as farmers, fishermen and some are employees of the company. This happens because of reciprocal or not interactions that will be responded to as knowledge by each individual (Fitriani, 2010). The work environment in an area or environment can affect the incidence of malaria, the work environment that is malaria endemic is more likely to be at risk of suffering from malaria (Harijanto, 2012).

This study proves that employment is not a risk factor for the incidence of malaria because the job variables are influenced by other factors that are stronger against the incidence of malaria, such as the use of malaria mosquito repellent drugs, so that the risk of anopheles mosquitoes as a cause of malaria is avoided.

4.2. Effect of education on the incidence of malaria

The results showed that there was no influence of the level of education with the risk of malaria incidence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. Respondents in the case group of malaria incidence in the respondent level of education <SMP as many as 17 people (56.7%) and respondents who were educated> SMP as many as 13 people (43.3%). This shows that both low and high education have the same risk of malaria. The results of the study in line with what Sudarsono (2014) conducted at Arso West Health Center in Arso District, Keerom Regency revealed that there was no influence of education on the incidence of malaria. This is because the level of education actually does not have a direct effect on the incidence of malaria but generally affects the type of work and health behavior of a person.

Education means guidance given by someone to someone else in order to understand something. It cannot be denied that the higher one's education, the easier it is for them to receive information, and in the end the more knowledge they have. Conversely, if someone has a low level of education, it will hinder the development of the person's attitude towards the acceptance of information and newly introduced values (Mubarak, 2011).Education which is not a risk factor with the incidence of malaria is caused by malaria as an endemic malaria disease, so that people already know about the causes of malaria. In addition, health promotion of malaria has been disseminated

by local health institutions in prevention, so that the behavior of the community has a strong influence in preventing malaria.

4.3. Effect of income with risk of malaria incidence

The results showed that there was no influence of income with the risk of malaria incidence in Dawai Health Center Yapen Timur District Yapen Islands District, namely in the case of malaria cases in respondents who earn less as many as 14 people (46.7%) and respondents who earn enough as many as 16 people (53.3%). This shows that the high and low income does not affect the risk of malaria incidence. This research is in line with the previous conducted by Sukiswo (2014) revealing that there is no effect of income and risk on the incidence of malaria. Mortality and morbidity are also determined by the socioeconomic level of a person (Achmadi, 2008).

Although malaria sufferers in the work area of Dawai Health Center, Yapen Timur District, Yapen Islands Regency, have higher income but malaria incidence remains high, this indicates that there is no willingness of the community to use part of their income in trying to prevent or minimize contact with mosquitoes such as buying wire netting or mosquito repellent. Economic status will affect the incidence of malaria but does not underlie changes in health behavior if it is not accompanied by the implementation of preventive measures (Notoatmodjo, 2010).

4.4. Effect of the use of wire mesh with the risk of malaria

The results showed that there was an effect of wire mesh usage with the risk of malaria incidence in the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. In the case of malaria cases in respondents who did not use wire netting as many as 21 people (70%) and respondents whose homes used wire netting as many as 9 people (30%). The results of the odds ratio test were interpreted that respondents who did not use wire netting in their homes were at risk of malaria incidence 3,267 times higher than respondents who used wire netting in their homes. This research is in line with the previous conducted by Sudarsono (2014) at the Arso Barat Health Center in Keerom Regency which revealed that the use of gauze attached to ventilation had an effect on the incidence of malaria, which was 10.8 times the risk of malaria occurrence in homes that were not attached to wire mesh. According to Davey (1965) in Babba (2006) the use of gauze on ventilation can reduce contact between Anopheles mosquitoes and humans. Installation of wire netting on the ventilation will cause the smaller mosquito contact outside the house with the occupants of the house, where mosquitoes cannot enter the house.

4.5 Influence of Wall types with the risk of malaria occurrence

The results showed that there was an effect of the type of house wall with the risk of malaria occurrence in the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. In the case of malaria cases, the respondents had a house with a type of wall from the board as many as 20 people (66.7) and respondents who had walls of their houses using walls as many as 10 people (33.3%). The results of the odds ratio test were interpreted to mean that respondents whose walls were using planks were at risk of malaria incidence 3,217 times higher than respondents whose walls were from walls.

The results of a previous study conducted by Sudarsono (2014) revealed that walls affect and are at risk with malaria work including the use of walls made of planks, which results in a dense wall density and is a mosquito resting place. According to Santoso (1992) in Babba (206), the state of the house walls made of wood allows more holes to enter mosquitoes. From the observations, most of the houses in the Arso West Health Center work area still use wooden walls.

According to Suwadera (2003) revealed that the walls of houses made of wood or planks, bamboo plaits greatly allow

more holes to enter mosquitoes into the house, the wooden walls are also the most favored by Anopheles mosquitoes. The walls of the house are also related to spraying activities (Indoor Residual Spryng) or liquid mosquito repellent drugs, where insecticides sprayed onto the walls of the house will absorb so that when mosquitoes land they will die from contact with these insecticides and on walls that are not permanent or there is a gap for mosquitoes perch will die due to contact with the insecticide and on a wall that is not permanent or there is a gap for mosquitoes to enter, it will cause contact with humans.

The results showed that there was an effect of the use of mosquito nets with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. This research is also in line with the previous research conducted by Lestari (2014) in the Province of West Nusa Tenggara, East Nusa Tenggara, Maluku, Maluku Ut ara, Papua, and West PapuaBabba (2006) that the use of mosquito nets has no effect on the incidence of malaria that the variables that have a stronger influence on the habit of using mosquito nets are the installation of gauze wire. So even though the respondent did not use mosquito nets while sleeping, the vents were not installed in the wire netting, allowing mosquitoes to enter the house and bite. In malaria cases, there were 21 respondents (70%) and nets using nets as many as 9 people (30%) and the odds ratio test found that respondents who did not use gray mosquito had a risk of malaria incidence of 3,754 times higher than respondents who do not use mosquito nets.

The use of mosquito nets is significant with the risk of malaria. This is because respondents who do not sleep use mosquito nets, although they have used wire netting and walls made of walls, mosquitoes can still enter through the gaps of doors or doors that are often opened / in and out, so that the presence of malaria mosquitoes can enter the room and bite if you don't sleep, use a mosquito net. The use of mosquito nets is now equipped with insecticides, so that if mosquitoes land on mosquito nets, the mosquitoes can die.

4.6 Effect of the use of anti-mosquito drugs at night with the incidence of malaria

The results showed that there was an effect of the habit of using malaria anti-mosquito drugs with the risk of malaria incidence in Dawai Health Center Yapen Timur District, Yapen Islands Regency. In the case of malaria cases in respondents who did not have the habit of using mosquito repellent as many as 19 people (63.3%) and respondents who used malaria anti-mosquito drugs as many as 11 people (36.7%).

The use of malaria anti-mosquito drugs is proven and has a large risk with malaria incidence of 3,208 times higher than respondents who do not use malaria anti-viral drugs. This is caused if the respondent who has dindin made from planks and acts using gauze, but using malaria mosquito repellent drugs can prevent malaria mosquito bites. The activity of spraying liquid mosquito repellent which is sprayed into the room can kill mosquitoes in the short term, but the house that is not attached to wire netting and dindin made of boards, makes it easier for mosquitoes to enter again. The main action is an individual preventive measure of how a person can avoid mosquito bites, whereas most respondents said using mosquito repellent creams rubbed in areas of the body at risk of mosquito bites.

4.7 The influence of the habit of going out at night with the incidence of malaria

The results showed that there was an influence on the habit of going out at night with the risk of malaria occurrence at the Dawai Health Center in Yapen Timur District, Yapen Islands Regency. Activities at night are activities that are at risk of developing malaria as stated by Sujari (Sujari, 2008). This is in accordance with the life behavior of mosquitoes that are more often prey at night outside the home than during the day (Sukowati, 2011).

However, from the results of Sandjaja's (2014) study, 8.7% of the research subjects performed at night. In the case of malaria cases in respondents who had the habit of going out at night as many as 22 people (73.3%) and respondents who did not have the habit of going out at night as many as 8 people (26.7%). The odds ratio test results are interpreted that respondents who have the habit of going out at night are at risk of malaria incidence of 3.143 times higher than respondents who do not have the habit of going out at night

This is due to the schedule of mosquitoes to bite malaria often in the afternoon to night. So that a person who has activities at night is more at risk of being infected with malaria due to anopheles mosquito gnats. Even though they have tried to wear protective clothing such as long sleeves and long sleeves and mosquito repellent creams, there are times when the activity is negligent or not done. Like the work in the forest, activities at night are usually carried out by adults, both hunting animals in the forest, fishing in the sea and even visiting relatives, because the electricity available in this district is only 18:30 until 22:30 WIT. in the evening at night or doing activities in the shade and darkness, for example the habit of defecating and others, it is very influential on the occurrence of malaria transmission. (Basuki B, 2000; Prabowo, 2004).

4.8. Dominant factor

The results showed that the dominant factors that influence and risk the occurrence of malaria from the results of multivariate analysis note that the use of wire nets, the distance of the house to breeding place, the use of mosquito nets, the habit of using mosquito repellent and the habit of going out at night are the dominant factors with malaria incidence risk. The dominant factor is caused by having a relationship with the risk of malaria, namely someone who does not use or install wire netting; mosquitoes easily enter the house, especially houses adjacent to breeding place. In addition, someone who does not use mosquito nets and does not use mosquito repellent containing mosquitoes with mosquito bites at night. While the habitual behavior of going out at night without using anti-mosquito creams is at risk for bite-sized mosquito bites at night.

5. CONCLUSION

There is no work effect and not a risk factor for malaria events at Dawai Health Center Yapen Timur District Yapen Islands District (p-value = 0.501; OR = 1.496; CI95% = (0.620 - 3.605). There is no influence on the level of education and is not a risk factor for malaria incidence in Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.203; OR = 1.962; CI95% = (0.807 - 4.766). in addition, There is no income effect and is not a risk factor with the risk of malaria occurrence in Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.941; OR = 0.875; CI95% = (0.364 - 2.105).

However, there is an effect of wire mesh usage and is a risk factor for malaria occurrence in Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.021; OR = 3.267; CI95% = (1,283 - 8,316). Then, there is an influence on the type of house wall with the risk of malaria occurrence at Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.021; OR = 3.217; CI95% = (1.282 - 8.076). There was no effect of the presence of standing water but a risk factor for malaria in the Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.056; OR = 2.875; CI95% = (1.072-7.710).There was no influence of the distance between the house and breeding place and not a risk factor for malaria incidence at Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.110; OR = 2.228; CI95% = (0.933-5.599).There is no effect of the presence of large livestock cages and not a risk factor for malaria incidence in Dawai Health Center Yapen Timur District Yapen

Islands District (ρ-value = 0.708; OR = 1.308; CI95% = (0.543 - 3.150).

There is an effect of using mosquito nets and is a risk factor for malaria occurrence in Dawai Health Center Yapen Timur District Yapen Islands District (ρ-value = 0.009; OR = 3.754; CI95% = (1.469 - 9.594). There is the influence of the habit of using malaria anti-mosquito drugs and is a risk factor for malaria incidence in Dawai Health Center, Yapen Timur District, Yapen Islands District (ρ-value = 0.020; OR = 3.208; CI95% = (1.288 - 7.990).There was an influence on the habit of going out at night and was a risk factor for malaria in the Dawai Health Center in Yapen Timur District, Yapen Islands District (ρ-value = 0.030; OR = 3.143; CI95% = (1.209 - 8.167).The dominant and risk factors with malaria occurrence are the use of wire nets, the distance of the house to breeding place, the use of mosquito nets, the habit of using mosquito repellent and the habit of going out at night is a dominant factor with the risk of malaria.

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