


## Risk Factors Of Malaria At Tanjung Ria Health Center, Jayapura City, Indonesia

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Article Info	ABSTRACT
<b>Keywords:</b> Risk Faktor, Malaria, Cross Sectional	Malaria is caused by parasites of the genus plasmodium and transmitted by Anopheles mosquitoes. Sp is one of the most prevalent diseases in Jayapura City. This study aims to determine the risk factors for malaria incidence in the working area of Tanjung Ria Health Center, Jayapura City in 2023. This type of research is analytic quantitative research with a cross sectional approach. The sampling technique used systematic sampling technique with a total sample of 72 respondents. The data collected were then analyzed with univariate, bivariate and Chi Square statistical tests. The results of this study showed that the variables that became the dominant risk factor were Gender (p-value 0.033, PR = 1.867 CI 95% ( 1.045-3.334), Use of Mosquito Net/ITN (p-value 0.042, PR = 1.67, CI 95% (1.091-2.575), Distance from House to Mosquito Breeding (p-value = 0.084, PR = 1.681, CI 95% (1.119-2.526). The results of this test prove that gender and distance to mosquito breeding sites have an association with malaria incidence at Tanjung Ria Health Center, Jayapura City.
This is an open access article under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY-NC</a> license 	<b>Corresponding Author:</b> Novita Medyati Magister Ilmu Kesehatan Masyarakat, Universitas Cenderawasih <a href="mailto:novitauncen@gmail.com">novitauncen@gmail.com</a>

### INTRODUCTION

Malaria is still a public health problem both globally based on the World Malaria Report (2022), there are 247 million cases of malaria in 84 countries. Indonesia is one of the malaria endemic countries which based on 2023, has 443,530 cases of malaria and 89% came from Papua Province ([malaria.kemkes.go.id](http://malaria.kemkes.go.id)). Malaria in Papua is endemic due to the geographical carrying capacity of the environment which greatly contributes to the proliferation of malaria (Purnama, 2017). (Purnama, 2017). Malaria is a disease caused by Plasmodium parasites that enter and settle in the human liver, then infect red blood cells. The Plasmodium parasite that causes malaria has 4 species, including Plasmodium Falciparum, Plasmodium Vivax, Plasmodium Malariae, and Plasmodium Ovale. These four Plasmodium species have different levels of symptoms and incubation periods. Plasmodium Falciparum species is still one of the most common causes and the leading cause of death from malaria. (Supranelfy and Oktarina, 2021).

To break the chain of malaria there are many ways that can be done such as giving chemoprophylaxis, using mosquito nets, using anti-mosquito creams / drugs, cleaning mosquito nests around settlements, killing adult mosquitoes with insecticides and several other preventive measures (Harijanto, 2012). Various efforts to deal with malaria have been

made but malaria cases are still a health problem in Indonesia, especially in endemic areas such as Papua Province. Based on the Papua Provincial Health Office report that malaria cases in 2020 reached 216,868 with an API of 78.40/1000 population. Jayapura City is the second highest area in Papua. According to the Jayapura City Health Office report, Malaria in Jayapura City in 2019 was 28,648 cases with an API of 92.55/1000 population, in 2020 there were 28,075 cases with an API of 89.35/1000 population, while in 2021 there were 30,235 cases with an API of 99.49/1000 population. (Madayanti, Raharjo and Purwanto, 2022)

The high incidence of malaria is certainly influenced by many factors such as the use of insecticide-treated bed nets / ITNs, the distance between houses and mosquito breeding sites and other predisposing factors. Therefore, researchers are interested in examining the relationship between risk factors and the incidence of malaria in the Tanjung Ria Health Center working area in 2023.

## METHODS

This type of research is analytical quantitative research with a *cross sectional* approach that uses statistics as an analytical tool because it is considered more rational and objective. The population in this study were patients who visited the Tanjung Ria Health Center throughout 2023 with a total visit of 19,881. respondent data was taken by systematic sampling method. The types of data in this study are divided into two, namely secondary data obtained through Tanjung Ria Health Center data and primary data obtained through interviews and distributing questionnaires. Data analysis in the study included two, namely bivariate analysis conducted with the chi square test as a non-parametric test to determine the relationship of risk factor variables to the incidence of malaria in the work area at the Tanju Ria Health Center in 2023.

## RESULTS AND DISCUSSION

### Characteristics of research subjects

Based on data from 72 respondents, it is known that 62.5% are male and 37.5% are female. 72.2% of respondents were dominated by respondents who wore mosquito nets / ITNs and 27.8% did not wear mosquito nets. The distance from the respondent's house to the mosquito breeding site was dominated by a distance of > 300 m by 81.9% and 18.9% was a distance of < 300 m. the data can be seen in table 1.

**Table 1.** Demographic Characteristics of Respondents

Characteristics	Frequency	Presentation
Gender		
Men	45	62,5%
Women	27	37,5%
ITN / Mosquito Net Usage		
Use	52	72,2%
No	20	27,8%
Distance to Mosquito Breeding Sites		
<300 m	13	18,1%

Characteristics	Frequency	Presentation
>300 m	51	81,9%

### Bivariate Analysis

**Table 2:** Results of Cross-Test of Risk Factor Variables with Malaria Incidence

Variables	Variable Categories	Malaria incidence		p-value	RP	95% CI	
		Positive N	Negative %			Low	Up
Gender	Men	28	62,2	0.033	1.867	1.045	3.334
	Women	9	33,3				
Use of mosquito nets	No	18	69,2	0.042	1,676	1,091	2,575
	Yes	19	41,3				
Distance to mosquito breeding sites	<300 m	10	76,9	0.084	1.681	1.119	2.526
	>300 m	27	45,8				

- Based on the results of the bivariate test of the relationship between gender and the incidence of malaria in table 3 shows that of the 45 male respondents there were 28 people (62.2%) who suffered from malaria and 17 people (37.8%) did not suffer from malaria. While in 27 female respondents there were 9 people (33.3%) who suffered from malaria and 18 people (66.7%) who did not suffer from malaria. In addition, the results of the *chi-square* statistical test obtained  $p\text{-value} = 0.033 < 0.05$ , which indicates that there is a significant relationship between gender and the incidence of malaria in the working area of Tanjung Ria Health Center, Jayapura City. When viewed from the value of  $RP = 1.867$ ; 95% CI (1.045 - 3.334) which can be interpreted that someone who is male has a tendency to get malaria 1.867 times greater than women.
- The results of the bivariate analysis test of the use of mosquito nets with the incidence of malaria in table 3 show that, 26 respondents who did not use mosquito nets were 18 people (41%) who suffered from malaria and 8 people (30.8%) did not suffer from malaria. While 46 respondents who used mosquito nets there were 19 people (41.3%) who suffered from malaria and 27 people (58.7%) who did not suffer from malaria. The results of the *chi-square* statistical test obtained a  $p\text{-value} = 0.042 < 0.05$ , which indicates that there is a significant relationship between the use of mosquito nets and the incidence of malaria in the Tanjung Ria Health Center work area, Jayapura City. When viewed from the value of  $RP = 1.676$ ; 95% CI (1.091 - 2.575) it can be interpreted that respondents who do not use mosquito nets have a tendency to get malaria 1.643 times greater than respondents who do not use mosquito nets.
- The results of the bivariate analysis test in table 3 also show that of the 13 respondents whose house distance to mosquito breeding sites <300 meters, 10 people (76.9%) had malaria and 3 people (23.1%) did not suffer from malaria. While 59 respondents with a distance of >300 meters from the house to the mosquito breeding site, 27 people (45.8%) suffered from malaria and 32 people (54.2%) did not suffer from malaria. To find out the relationship can be seen in the results of the *chi-square* statistical test

obtained  $p\text{-value} = 0.084 > 0.05$ , which indicates that there is no significant relationship between the distance of mosquito breeding with the incidence of malaria in the working area of Tanjung Ria Health Center, Jayapura City. When viewed from the value of  $RP = 1.681$ ; 95% CI (1.119 - 2.526) which can be interpreted that respondents with house distance to mosquito breeding sites  $< 300$  m have a tendency to get malaria 1.681 times greater.

## Discussion

The results showed that gender has an effect on the incidence of malaria. Malaria does not look at gender between men and women, but the incidence that occurs more in men can be caused by several factors such as work, population mobility, endurance. In some literature it is said that the immune system of women is higher than men and also at reproductive age women are more likely to sleep using mosquito nets. (Setiawan, Hamisah and Fahdhienie, 2021).

Other researchers have also mentioned that there is a male bias in the prevalence. The high prevalence of males is due to several factors including behavioral differences in alcohol and tobacco consumption that lead to increased attractiveness of mosquitoes to males, and sex-specific biological differences, including post-pubertal hormonal changes (Okiring et al., 2022).

The predominance of malaria incidence occurring in males has been reported by several cases but there is no scientific evidence to prove that the higher prevalence in males is related to gender because susceptibility to malaria is not influenced by gender, (SIMON-OKE, 2019). In the researcher's opinion, the high malaria rate in men could be caused by a combination of several other variables that cause and trigger the incidence of malaria to be high.

The results of this study indicate that the use of mosquito nets affects the incidence of malaria. This is consistent with previous research studies that the use of mosquito nets is very effective in preventing malaria incidence. Mosquito net utilization reduces clinical malaria attacks, Plasmodium infection and deaths from malaria. The use of bed nets reduces child mortality from all causes by 17%, which is equivalent to 5.6 lives annually for every 1000 children protected compared to those who do not use bed nets. In addition, bed net use reduces the incidence of recurrent uncomplicated *falciparum* malaria by almost half (Zerdo et al., 2020).

Mosquito nets can protect respondents from diseases not only from mosquitoes but from flies and other insects. The use of bed nets during sleep is very effective when compared to other prevention measures. Respondents who do not use mosquito nets when sleeping at night can have up to 6 times greater risk than those who use mosquito nets (Setiawan, 2023).

The location of the Tanjung Ria area, from coastal areas to hills, influences the emergence of suitable breeding sites for Anopheles sp. The results showed that in certain areas in Tanjung Ria Sub-district there are several types of mosquito breeding sites such as swamps and puddles. In these places, Anopheles sp larvae can breed well in habitats that are permanent or temporary (Suyono et al., 2021). (Suyono et al., 2021).

The flight distance of anopheles sp mosquitoes is at a radius of  $< 350$  meters from the larval habitat. In a study in Adama, there was a malaria incidence of 684.8 per thousand

population while with a distance of > 350 meters there was a malaria incidence of 65.7 per thousand population (Peterson et al, 2009). The flight distance can increase up to 2000 - 3000 meters when influenced by wind factors and population mobility. (Suyono et al., 2021).

The results of this study indicate that the distance of mosquito breeding does not have a significant relationship with the incidence of malaria in the working area of Tanjung Ria Health Center. In conducting the research, the author found that most of the mosquito breeding sites are temporary, such as puddles. This can be formed, among others, when entering a period of high rainfall. There are permanent mosquito breeding sites such as the swampy area along Kayu Batu Beach, which is a very good place for mosquitoes to breed and is a contributing factor to the incidence of malaria. In this study, the p-value did not show significant results on the incidence of malaria but the Prevalence Ratio of respondents who had a house distance to mosquito breeding sites < 300 meters had a risk of 1, 68 times greater than respondents whose residence was > 300 meters from mosquito breeding sites.

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