

# Risk Factor of Plasmodium Infection in Endemic Area

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**Abstract**— *Malaria can no longer be considered as just a rural issue in the world where a significant and increasing proportion of the population lives in tropical and subtropical regions caused by plasmodium infection. In Penajam Paser Utara District, East Borneo, bordering Central Borneo and South Borneo, with nearly the same forest conditions, the mostly workers are forestry, agriculture, and plantation that needs to be done research on risk factors for Plasmodium infection in endemic areas. Plasmodium infection is influenced by several risk factors including education, knowledge, and breeding place. The aimed was to analyze the risk factors of education, knowledge, and breeding place affect Plasmodium infection in endemic areas in Penajam Paser Utara District, East Borneo. This studied methods was cross-sectional design with 43 sample. Collection data using interviews and microscopic method to looked for species of plasmodium carried. The result showed breeding place didnt effected on plasmodium infection ( $P$  value = 0,16), education effected on plasmodium infection ( $P$  value = 0,04), knowledge didnt effected of plasmodium infection ( $P$  value = 0,58) in Penajam Paser Utara District, East Borneo. Suggestion in this study, must be focus on human education. The expected, people would follow the educational program in their respective villages. So, could be minimise morbidity and mortality of malaria in endemic areas.*

**Keywords**— *Risk Factor, Plasmodium infection, endemic.*

## I. INTRODUCTION

Malaria is a one of public health problem case in the world, including in Indonesia. It has a widespread in tropical and subtropical regions. Half the world's population at a risk because more than 105 countries are still endemic. Immigrants and tourists and could lead who have a high risk population to an increase in cases of imported malaria in non-endemic areas. Usually, that cases make a outbreaks, broad impact on quality of life and economy, and finally lead to death (Soedarto, 2011).

Based on API in East Borneo three highest areas in 2012 are in Penajam Paser Utara District (11/1000,) Kutai Barat District (7/1000), and Kutai Timur District (4/1000) (Provincial Health Department Field P2PL, 2013).

In Penajam Paser Utara District, there are 3 health centers with incidence > 1/1000 and had been increased from 2013 to 2014. In Puskesmas Waru, the incidence increased by 127% with API 1.7 / 1000 population. In PHC Sepaku III, the incidence increased by 16% with API 7.9 / 1000 population. In health center Sotek, the incidence increased by 13% with an API of 17.7 / 1000 population. Based on the survey results of Health Office, Penajam Paser Utara District, that incidence increased caused by a reforestation company (PPU District Health Office of Disease Control Malaria, 2014).

The East Borneo, in Penajam Paser Utara District, bordering Central Borneo and South Borneo, with nearly the same forest conditions, the mostly workers are forestry, agriculture, and plantation that needs to be done research on risk factors for Plasmodium infection in endemic areas. Plasmodium infection is influenced by several risk factors including education, knowledge, and breeding place. The purpose of this study was to analyze the risk factors of education, knowledge, and breeding place affect Plasmodium infection in endemic areas in Penajam Paser Utara District, East Borneo.

## II. MATERIAL METHODS

This type of research is observational analytic cross-sectional design. The subject were 43 respondents who positive plasmodium infection in Sepaku and Penajam, in Penajam Paser Utara District, East Borneo.

Collection data using interviews with questionnaires and microscopic method to looked for species of plasmodium carried. The statistical test used was a bivariate chi-square test with  $\alpha = 0.05$  and the results used by drawn a conclusion that can answer hypothetical.

**III. RESULT AND DISCUSSION**

**3.1 The Breeding Place Effect Against Plasmodium Infection**

*Table 1. Chi Square Test of The Breeding Place Effect Against Plasmodium Infection*

Breeding Place	P. Vivax		P. Falciparum		Sum	%
	n	%	n	%		
> 4	7	70,0	14	42,4	21	48,8
≤ 4	3	30,0	19	57,6	22	51,2
Sum	10	100	33	100	43	100
p value = 0,16						

Table 1. showed that the responden on the incidence of P. vivax had breeding places of > 4 were 7 people (70,00%) and ≤ 4 were 3 people (30,00%). Whereas, the responden on the incidence of P. Falciparum had breeding places of > 4 were 14 people (42,40%) and and ≤ 4 were 19 people (57,60%). By Chi Square test, obtained P value > 0,05 (P value = 0,16) that means there was breeding place didnt effected on plasmodium infection in Penajam Paser Utara District, East Borneo. Actually breeding place affect plasmodium infection in theory, but in this situation didnt because that is local specific of areas. The result showed not significant caused by scores distribution of breeding place on the incidencee of P. Vivax and P. Falciparum had a similliar persentase.

Different study give opposite result, Breeding place around the homes of the respondents with an odds ratio (OR) = 5,03 and 95% CI = 2,65-9,56. Respondents who live around the breeding place at risk 5,03 times more likely to suffer from malaria compared to respondents who isnt (Hasyim, 2014). In other study, Marsa (2002) showed that breeding place which the distance less than 2 km from community residence had significant association with malaria incidence, with OR is 3,77 (95% CI : 1,96-7,21).

**3.2 The Education Effect Against Plasmodium Infection**

*Table 2. Chi Square Test of The Education Effect Against Plasmodium Infection*

Education	P. Vivax		P. Falciparum		Sum	%
	n	%	n	%		
High	0	0	11	33.3	11	25,6
Low	10	100	22	66.7	32	74,4

Sum	10	100	33	100	43	100
p = 0,04						

Table 2. showed that the responden on the incidence of P. vivax all of them who were education lower. Whereas, on the incidence of P. falciparum were 11 people (33,300%) who were education lower and were 22 people (66,70%) who were education lower. By Chi Square test, obtained P value < 0,05 (P value = 0,04) that means there was education effected on plasmodium infection in Penajam Paser Utara District, East Borneo.

The result of this study were consistent with Ernawati (2011) that showed the incidence of malaria infection by education shows that the lower the educational level the greater the risk for malaria infection with PR = 1,60. In this study, low education category is not school / elementary, secondary education category is junior / senior high school, and higher education category is the Academy / University

In study of Shaiku (2011) prevalence of malaria doesnt show a clear pattern when viewed from the level of education. The proportion of malaria incidence by education level of respondents in the highest group of cases is on the junior high-educated respondents (47,00%), whereas in the control group at the highest level of high school education (43,90%) (Maulidiyah Salim et al, 2012).

**3.3 Knowledge Effect Against Plasmodium Infection**

*Table 3. Chi Square Test of The Knowledge Effect Against Plasmodium Infection*

Know-ledge	P. Vivax		P. Falciparum		Sum	%
	n	%	n	%		
High	2	20	3	9,1	5	11,6
Low	8	80	30	90,9	38	88,4
n	10	100	33	100	43	100
p = 0,58						

Table 2. showed that the responden on the incidence of P. vivax were 2 people (20,00%) who were knowledgeable higher and were 8 people (80,00%) who were knowledgeable lower. Whereas, on the incidence of P. falciparum were 3 people (9,10%) who were knowledgeable higher and were 30 people (90,00%) who were knowledgeable lower. By Chi Square test, obtained P value > 0.05 (P value = 0,58) that means there was knowledge didnt effected of plasmodium infection in Penajam Paser Utara District, East Borneo. That can

happened because responden on the incidence of *P. vivax* and *P. falciparum* had a high uniformity data, in others words mostly responden had a knowledgeable lower so that the results obtained were not significant.

Knowledge is one of the factors that encourage diseases including malaria. The opposite study, Alamsyah *et al* (2001) states that people who are knowledgeable lower against malaria to be one of the causes of the high incidence of malaria in Aceh Islands cluster. Beside that, Ermawati (2011) state that knowledge of malaria is low in proportion to malaria infection (53.6%) and a good knowledge of the group (51.4%). Prevalence ratio is bad knowledge of the group with a good knowledge of 1.10. The incidence of malaria infection by knowledge indicates that more is bad level of knowledge about malaria, the greater risk of malaria infection.

#### IV. CONCLUSION

The conclusion of this study were :

1. Breeding place didnt effected on plasmodium infection, education effected on plasmodium infection and knowledge didnt effected of plasmodium infection.
2. The risk factor of plasmodium infection in endemic area is education.

#### V. SUGGESTION

Suggestion in this study, must be focus on human education. The expected, people would follow the educational program in their respective villages. So, could be minimise morbidity and mortality of malaria in endemic areas.

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