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Health and Environmental Perspectives



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**CORRELATION BETWEEN PHYSICAL ENVIRONMENT OF HOUSE,
NEIGHBORHOOD, CULTURAL AND SOCIAL ENVIRONMENT
WITH MALARIA OCCURRENCE
(Study in Sepaku Health Center, Penajam Paser Utara district)**

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ABSTRACT

Background: In Indonesia, 60% of approximately 210 million (more than 100 million) people live in endemic areas and have risk of contracting malaria. In Sepaku Health Center there was as many as 994 cases of malaria in 2012.

Method: This was a case control study. Sample was 182 respondents, consisted of 91 cases and 91 controls (ratio 1:1). Analysis used Chi Square and Odd Ratio.

Result: The result showed malaria significantly related to physical environment ($p < 0.0001$, OR=10.059), neighborhood environment ($p < 0.0001$, OR=12267), and socio-cultural environment ($p = 0.002$, OR=2.685).

Conclusion: Sepaku Health Center must pay attention to physical and socio-cultural environment that related to malaria occurrence.

Keywords: environment, malaria.

BACKGROUND

Malaria is an infectious disease caused by Plasmodium through Anopheles bite. There are four species of Plasmodium that cause malaria in human, *Plasmodium falciparum*, *P. vivax*, *P. malariae*, and *P. ovale* [1]. Indonesia is one of high risk countries of malaria. In 2007, Indonesia had 396 endemic areas out of 495 districts. Around 45 % population live in endemic areas and have risk of malaria infection. Number of malaria cases in 2006 was 2 million, which decreased in 2007 to 1.7 million [2]. Spreading of malaria is influenced by host (human), agent (Plasmodium) and environment [1]. The environment factors that influence malaria consisted of biologic, physical (temperature, humidity, rainfall, height, wind), and socio-cultural environment. Epidemiological data on those environments are needed to overcome malaria problem.

In East Kalimantan malaria progressively extended and flattened. Data from Health Office showed malaria have distributed to all areas or 14 districts/cities. The highest malaria cases based on Annual Parasite Incidence (API) was Penajam Paser Utara (PPU) district. In 2010, there was 1.368 positive patients out of 2.063 examination. In 2012, malaria spread to 11 health centers in 4 districts, with 705 positive cases out of 1.644 examination. Most cases was in Sepaku Health Center (297 cases), followed by Sotek Health Center (180 cases) and Maridan Health Center (110 cases).

METHOD

This was an analytic observational study with case control design, conducted in Sepaku 1 Health Center, PPU, on May 2013. Population was all clinical malaria patients in Sepaku 1 Health Center on January-December 2012. Sample consisted of 91 cases (malaria patients) and 91 controls (not malaria patients). Inclusion criteria for respondents of both group was willingness to engage with this study and have been living in Sepaku at least one year in a row. As to control group, respondents must live in same area with case, and distance from ricefield less than 2 km. Sample was taken using simple random sampling. Independent variable in this research was physical environment of house, neighborhood environment, and social culture environment. Dependent variable was malaria occurrence.

Collection of data used questionnaire on physical environment of house (hygiene, wall type, hole at wall, wall color, ventilation, wire netting, existence of ceiling, garbage, housewares), neighborhood environment (existence of rice field, brushwood, garden, forest, water pond, ditch, moat, fish pond, sewerage), and sociocultural environment (habit to use mosquito net, mosquito coils, mosquito spray, repellent, habit of going out or being outdoors at night). Physical environmental was categorized as clean and not clean, neighborhood environment was categorized as healthy and unhealthy, while sociocultural environments was categorized as supported and unsupported. Validity and reliability test of questionnaire was done prior to study.

RESULT

Our result showed proportion of malaria was higher in male than women (Table 1). Most cases was in age group of 18-25, while least cases was found in elderly (66-73 years). Table 2 showed there were significant relationship between physical environment ($p < 0.0001$), neighborhood environment ($p < 0.0001$) and sociocultural environment ($p = 0.002$) with malaria in Sepaku 1 Health Center.

Table 1. Distribution of malaria occurrence based on responden characteristics

Variables	Occurance of Malaria Disease				Σ	%
	Case	%	Control	%		
Age Classification						
10 – 17	7	7.7	2	2.2	9	4.9
18– 25	33	36.3	35	38.5	68	37.4
26 – 33	19	20.9	21	23.1	40	22
34 – 41	8	8.8	16	17.6	24	13.2
42 – 49	8	8.8	5	5.5	13	7.1
50 – 57	7	7.7	8	8.8	15	8.2
58 – 65	7	7.7	3	3.3	10	5.5
66 – 73	2	2.2	1	1.1	3	1.6
Gender						
Female	25	27.5	36	39.6	61	33.5
Male	66	72.5	55	60.4	121	66.5

Table 2. Relation between physical environment, neighborhood environment, sociocultural environment and malaria

Item		Occurance of Malaria Disease				Σ	%	P value	OR 95% CI
		Case	%	Control	%				
Physical	Risk	78	85,7	34	37,4	122	61,5	0,000	10,059
Environmental	Unrisk	13	14,3	57	62,6	70	38,5		
House									
Around of	Risk	84	92,3	45	49,5	129	70,9	0,000	12,267
Environmental	Unrisk	7	7,7	46	50,5	53	29		
House									
Social Culture	Risk	58	63,7	36	39,6	94	51,6	0,002	2,685
Environmental	Unrisk	33	36,3	55	60,4	88	48,4		
		91	100	91	100	182	100		

DISCUSSION

Relation between physical environmental and occurrence of malaria disease

Respondent with unhealthy physical environment had 10 times risk to get malaria. According to our observation result, one of factors that contributed was open ventilation. our result showed respondents living in house without wire netting on ventilation was 74.7 %. Type of ventilation in most respondents did not suit netting. Opened ventilation may facilitate mosquitoes enter into house, and this was similar to Husain (2007) [3].

Other factor was wall condition. Most respondents had embrasure wooden wall, so that mosquitoes can easily pass into the house. This result as according to result of research of Husain (2007) [3] also find that patient of malaria mostly lived in house with improper wall. According to Mukono [4] house construction with wall that is not tightly closed enabling malaria infection. Besides wall, ceiling also plays important role to avoid mosquitoes entering house. A study conducted by Widaryani (2006) showed malaria related to absent of ceiling. Likewise, Franklyn (2007) also proved lack of ceiling as a risk factor of malaria.

Third factor found in unhealthy house that owned too many housewares, and not regularly cleaned. The housewares were mostly not well maintained, and served as mosquitoes resting place. Fourth factor was less indoor lighting, because respondents seldom open their window during morning and daytime. Moreover, housewares also hindered to come into house. This condition of course can cause situation of humid and dark house, so that can become resting and propagation place of mosquito. According to Barodji, place take a rest mosquito of anopheles in general in place having high humidity and low light intensity. Besides, Harijanto revealed that humidity and temperature influence propagation of mosquito parasite [5]. According to Sudarman, Anopheles mosquitoes rest on wall, clothes, gauze, housewares, cupboard, and ceiling.

Based on this study, we concluded that most respondent did not meet standar of healthy house according to regulation of Ministry of Health (*Permenkes*) number 829 (1999).

Relation between neighborhood environment and occurrence of malaria

Our result showed unhealthy neighborhood environment increase risk 12 times higher to contract with malaria. In our case, 92.3 % respondents of our study lived in neighborhood environment that was not meet health requirement, consisted of rice field (55 respondents), plantation (59), forest (78), bushwood (87), big grove/moat (79), ditch (82), pool (56), and sewerage (77) as places for malaria vector propagation. This result similar to Parewasi in Makmur (2002), who also showed that malaria patient lived in coastal, marshy areas which surrounded by neighborhood environment such as forest and rice field.

Our results showed only 7.7 % case group lived in a healthy neighborhood environment. Most of respondents lived near rice field, forest in and pool. Rice fields usually serve as place for malaria vector propagation. According to MoH (2006), rice field is one of breeding places along with swamp, wellspring, pool, river estuary, brackish water pond, rainwater pond and river-based irrigation. Other factor, forests, may increase humidity. Harijanto stated humidity and temperature influence propagation of parasite in mosquitoes [5]. Pools also important as one of the breeding place of mosquito larva. Therefore, MoH suggested incorporating fishes into pool as predator to larvae.

The effort to keep environmental clean is important on ecosystem balancing in order to increase health status, prevent from disease, thus decreasing incidence. Lack of paying attention hygiene of environment about hand in glove residence of its bearing with willingness at society to do so because lack of awareness of society for the importance of hygiene of environment besides workload of society like going to cleaner which confiscating many their time which cause society less is paying attention of hygiene of environment. This matter as according to research of Prabowo (2004) where lessening breeding place of mosquito with activity of PSN around residence environment, killing to snap fingers and adult mosquito and also hygiene of environment represent one of the preventive effort in avoiding mosquito bite of malaria [7].

According to Fathi (2005), environmental interaction with disease development have a vice versa effect. Therefore, do not him of this condition of environment around settlement of responder very having an effect on to occurrence of existing malaria. The suggest of keep cleaning society will be environmental around by conducting sweeping to place - resort and breeding place of mosquito of anopheles like routine clean moat or ditch, cleaning bush, looking after fish eater of larva, and plant or look after plant which do not in taking a fancy to mosquito like Akar Wangi, Serai Wangi, Tapak Dara, Lavender, and orange tree. Besides can dissipate this crop mosquito also earn environmental estetic of house.

Relation between social culture environmental and occurrence of malaria

Respondents with unsupported sociocultural environment had 2.6 times risk in contracting malaria compare with the supported ones. One of dominant sociocultural factors that had effect on malaria occurrence was habit of being outdoors at night. Night time activity mostly done men, and related to their occupation. Bionomic of vector in Sepaku was exophilic and exophagic. Therefore, outdoor activities during night increased risk of mosquito's bite. Darmadi (2002) prove that outdoor activity between 09.00 to 10.00 pm (during mosquito's peak activity) was closely related to malaria

occurrence. Anopheles also tends to have exophagic character. Therefore, people with outdoors activities at night had greater risk to expose with mosquito bite. Yawan (2006) showed being outdoor at night increase risk 4,68 times to get mosquito bite that will lead to malaria.

Using bed net while sleeping at night may reduce risk of malaria, because Anopheles are mostly nocturnal that bite during night. Pranoto stated feeding habit of Anopheles mosquito vary depends on species, some bite from dusk until before midnight, some can bite all night long, some start to bite at 06.30 to 10.00 pm [8]. Bed net is one of ways to prevent mosquito bite. According to Sulistiyo (2006), bed net related to malaria occurrence. Besides bed net, anti-mosquito was also considered as useful to avoid malaria. Prabowo (2004) revealed one of actions to avoid mosquito bite of vital importance was use anti mosquito/repellent in form of repellent cream, spray, coils during night time prevent mosquito bite [7]. Husain (2007) also proved always using repellent cream when outdoor may prevent from malaria [3].

Other factor in Sepaku that may cause malaria was hanging clothes habit. Even in control group, 60.4 % respondents had the habit. Selly stated Anopheles likes dark places to rest after feeding, and usually choose hanging clothes. Franklin (2006) showed family with hanging clothes habit have higher risk of malaria occurrence (OR=16.923).

Limitation of Research

This research, there are some natural resistance or limitation by researcher is weather factor and residence factor. This research is conducted by at the rains so that researcher mobility pursued by when doing research like slippery and muddy road. Besides natural resistance by researcher is residence, this matter because in research area do not there are or lodging of stay for researcher to rest. So that researcher perforced to look for - citizen house searching which will in making place rest.

CONCLUSION

There are significant relationship between physical environment, neighborhood environment and sociocultural environment with malaria occurrence in Sepaku, Penajam Paser Utara. Population is expected to pay attention, improve, and repair their environment.

Based on this study, we expected to society in region work Puskesmas Sepaku 1 Sub-Province of Penajam Paser Utara to be can pay attention and improve; repair the condition of house environment like wiring gauze at house ventilation, improve; repairing resident house desain by changing wall type which there are hole or have is weak (jabuk) with ligneous strong and new board type of Kayu Ulin with installation which is meeting or change wall type with stronger materials like is made from cement, arranging to arrange situation of furniture regularly in order not to hinder sunlight which enter into housewares keep cleaning and house, using mosquito net and drug anti mosquito when bedtime between two lights, cleaning environment around of house by conducting sweeping to moat or ditch routinely hygiene goodness and also his current fluency. Besides Society can plant plant around which do not in taking a fancy to mosquito like Akar Wangi, Serai Wangi, Tapak Dara, Lavender, and orange tree. Killing wiggler by looking after eater fish snap fingers at (tin head, gupi, mujair) at

pool in around of house, rice field, swamp and and fish found which do not be looked after.

REFERENCES

1. Bruce-Chwatt, L.J. Essential Malariology. 2nd edition. London: William Heinemann Medical Books Ltd.; 1985.
2. Keputusan Minister for Public Health of RI No. 293/MENKES/SK/IV/2009. 28 April 2009 About Eliminasi Malaria of di Indonesia. Director General of P2PI. Depkes.
3. Husin, Amirsyah. 2002. Analysis Supplementary Factor Height of Insidens Malaria in Gugus Kepulauan Aceh. Jurnal Doctor of YARSI. Jakarta.
4. Mukono HJ. (1999). Principle of Environmental Base of Surabaya : Airlangga University Press.
5. Harijanto, P.N. 2000. Malaria, Epidemiology, Patogenesis, Manifestasi Klinis and Handling. Jakarta: EGC.
6. Erdinaldkk. 2006. Factor - Factor Related To Occurence Of Malaria in District Of Middle Left Camphor, Sub-Province Camphor, 2005 / 2006. Jurnal Kesehatan. Jakarta : Departemen Kesehatan Lingkungan, FKM UI 2006.
7. Prabowo, A. 2004. Malaria, Preventing and Overcoming. Jakarta: Puspaswara.
8. Pranoto. 1980. Some Behavioral Aspect of An. Farauti in Klademak II A, Shove. Mirror of Dunia Kedokteran. Jakarta.