The Mapping of the Spread of Malaria in Giri Mulya Village Bengkulu Utara District

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Abstract— Malaria was an acute or chronic infectious disease caused by Plasmodium marked with symptoms such as recurrent fever, chills, sweat, weakness, anemia and hepatosplenomegali. The transmitted exclusively through the bites of Anopheles mosquitoes. The intensity of transmission of malaria highly depends on factors related to the host (human and the vector (Anopheles mosquitoes), the agent (Plasmodium, theparasite), and the environment (pysical, chemical, biological an social environments). This research was to create a mapping of the spread of malaria in in Giri Mulya Village Bengkulu Utara District. This research was descriptive observational research by cross sectional approach. The sampling technique was use simple random sampling by the sample size of 42 positive malaria people. Data were collected through questionaire, interviews and observations. The Result of this research shows the pattern of the malaria incidence revealing 64,3% aged < 18 years old, 54,8% were women, 38,1% were in high school graduates, 50% were farmers, 83,3% had less of knowledge about malaria, 66,7% had go out at night habits, 90,5% did not put up mosquito netting wire on the ventilation, 69,0% did not apply any repellents, 97,6% assumed that there were less of efforts of health workers in preventing malaria, and the NNI calculation was 0,75738 and had a clustered pattern. The conclusion that the density of the spread of malaria incidence in Giri Mulya Village was clustered (group). It was suggested that a prevention efforts (malaria promotion) performed by health workers, organizing village malaria Teams, organizing environment observers of Anopheles mosquitoes breeding places.

Keywords— Mapping and The Spread of Malaria.

I. INTRODUCTION

Malaria is a life-threatening disease caused by Plasmodium (the parasites) that are transmitted to people through the bites of infected Anopheles mosquitoes. The disease is prevalent in more than 100 of tropical and sub-tropical countries. Indonesia is likely one of the countries having the risk of ongoing malaria transmission, since the morbidity and mortality number are high, especially of the islands excluded from Java and Bali. The islands at risk of having malaria transmission are Papua, Maluku, Nusa Tenggara, Sulawesi, Kalimantan and Sumatera, since they are transmigration area with a mixed population of endemic and non-endemic malaria and frequent outbreaks or deadly plague occured.

Giri Mulya Village is a transmigration area out of Java-Bali and an malaria endemic area. Stratification shows that 10 of its districts has Annual Parasite Incidence (API), 5 districts: Lebong, Kepahiang, Rejang Lebong, Bengkulu Tengah and Kaur, has Low Case Incidence (LCI) with API < 1 / 1000; 3 districts: Kota Bengkulu, Seluma and Bengkulu Selatan has Medium Case Incidence (MCI) with API 1 – 5 / 1000; 2 districts : Bengkulu Utara and Mukomuko has High Case Incidence (HCI) with API >5 / 1000 (Profil Dinkes Provinsi Bengkulu Tahun 2013).

The highest Annual Parasite Incidence (API), of year 2011 to 2013 was in Bengkulu Utara district, and one of malaria endemic area. In 2011, the API 19,39 per 1000 population, in 2012, the API 23,24 per 1000 population, and in 2013, the API 13,42 per 1000 population (P2PL Dinkes Provinsi Bengkulu Tahun 2013). Bengkulu Utara district has 21 Public Health Centers, 11 of the Public Health Centers stated as malaria endemic area with 81 malaria endemic villages.

Puskesmas Air Bintunan has 6 working areas, and one of them is Giri Mulya Village. It is the highest malaria endemic village with API and a palm and rubber tree plantations area. Transmission of malaria is associated with environmental informations such as climatic conditions that may affect the number and survival of mosquitoes, such as tophography, rainfall patterns, temperature and humidity, land cultivation and people movement. For the reason that it has a great place and time variations, the use of SIG as a tool is needed, to determine the density distribution of malaria incidence in

Giri Mulya Village, Bengkulu Utara district, Bengkulu province.

II.   MATERIAL METHODS

Type of the research is descriptive observational with cross-sectional framework, since both of the observation and measurements towards the variables of the research was held at a time.

Population of the research was malaria incidence in 2014 in Giri Mulya Village, Giri Mulya sub district, Bengkulu Utara district, Bengkulu province. The sample was 42 respondents, was obtained from the calculation of the sample size and using simple random sampling techniques.

Primary data collections were obtanied through questionaire and interviews to discover the characteristic of respondents and the socio-cultural environment of the community. A tool called as GPS Garmin 62 S was used to create mapping and determine the waypoint of malaria incidence, as well as performing the calculation of nearest neighbor index (NNI) to determine the density level

III.   RESULT AND DISCUSSION

Research result of the mapping of malaria incidence in Giri Mulya Village, Giri Mulya sub district, Bengkulu Utara district, Bengkulu province as follows :

Table 1. Age distribution of malaria incidence in Giri Mulya Village

No.	Age	Frequency	Percentage (%)
1.	< 18 years old	27	64,3
2.	≥ 18 years old	15	35,7
	Total	42	100

Source: Primary Data of 2015

Table 1. shows that 64,3% of 42 malaria incidence were people of <18-years old. Malaria is not associated with age in common, but it is stated that children are more susceptible to malaria infections. Gunawan (2000) stated that malaria prevalence differences based on age and sex of the population is associated with the immunity degree to malaria for variation of exposure to mosquito bites.

Table 2. Sex distribution of malaria incidence in Giri Mulya Village

No.	Sex	Frequency	Percentage (%)
1.	Man	19	45,2
2.	Women	23	54,8
	Totaly	42	100

Source : Primary data of 2015

Table 2. shows that 54,8% of 42 malaria incidence were women, while 45,2% of 42 malaria incidence were men. Refer to the Yulianti research result showed that sex is not associated with malaria incidence. The research is also showing that Anopheles mosquitoes bites/attack both of the sexes, men and women.

Table 3. Education Level distribution of malaria incidence in Giri Mulya Village

No.	Education	Frequency	Percentage (%)
1.	Not School	2	4,8
2.	Primary School	5	11,9
3.	First High School	10	23,8
4.	Senior High School	16	38,1
5.	University	9	21,4
	Totaly	42	100

Source : Primary data of 2015

Table 3. shows that 38,1% of 42 malaria incidence were high school graduates as their last education. People with higher level of educations tend to easily absorb any new informations including malaria prevention, because there are abundant information available in the community, as well as leaflets, posters and health workers promotions (Baderuddin, 2002).

Table 4. Occupation distribution of malaria incidence in Giri Mulya Village

No.	Occupation	Frequency	Percentage (%)
1.	Not Work	10	23,8
2.	agricultural workers	21	50,0
3.	Entrepreneur	5	11,9
4.	Government employees	2	4,8
5.	Honorer Staff	4	9,5
	Totaly	42	100

Source : Primary data of 2015

Table 4. shows that 50% of 42 malaria incidence are plantation workers. Refer to the Budarja (2001) research result, agricultural workers have twice higher risks suffer from malaria than non agricultural workers.

Table 5. Knowledge about malaria distribution of malaria incidence in Giri Mulya Village

No.	Knowledge	Frequency	Percentage (%)
1.	Less	35	83,3
2.	Good	7	16,7
	Totaly	42	100

Source : Primary data of 2015

Table 5. shows that 83,3% of 42 malaria incidence has less information about malaria. Knowledge is one of the factors that increases the disease incidence, as well as in malaria. Husin, Alamsyah, et al. (2001) also stated that respondents having less knowledge about malaria is one the causes of the high malaria incidence in the cluster of islands of Aceh.

Table 6. The socio-cultural environment of the community based on go out at night habits in Giri Mulya Village

No.	go out at night habits	Frequency	Percentage (%)
1.	Yes	28	66,7
2.	No	14	33,3
	Totaly	42	100

Source : Primary data of 2015

Table 6. shows that 66,7% of 42 malaria incidence has go out at night habits because there is routine-weekly spiritual activities such as praying and yasinan, as well as praise the lord activity for Christians. The activities carried out from 19.00 to 21.00 pm. Handayani (2008) research result shows that people who has go out at night habits tend to have 3,76 times higher possibility to suffer from malaria than the opposite.

Table 7. The socio-cultural environment of the community based on putting up mosquito netting wire on the ventilation in Giri Mulya Village

No.	putting up mosquito netting wire	Frequency	Percentage (%)
1.	Yes	4	9,5
2.	No	38	90,5
	Total	42	100

Source : Primary data of 2015

Table 7. shows that 90,5% of 42 malaria incidence did not put up mosquito netting wire on the ventilation. The physical condition of the houses are highly related to malaria incidence, for the ease of mosquitoes get into the house. An non netting wire ventilations makes the mosquitoes get into the house easily.

Table 8. The socio-cultural environment of the community based on the application of any repellents in Giri Mulya Village

No.	application of any repellents	Frequency	Percentage (%)
1.	Yes	13	31,0
2.	No	29	69,0
	Totaly	42	100

Source : Primary data of 2015

Table 8. shows that 69,0% of 42 malaria incidence did not apply any repellents. Ristadeli (2013) research result shows that lack of application of any repellents habits increases the risk of suffer from malaria 2,1 times higher than the opposite.

Table 9. The socio-cultural environment of the community based on Health workers efforts in Giri Mulya Village

No.	Health workers efforts	Frequency	Percentage (%)
1.	Less	41	97,6
2.	Good	1	2,4
	Totaly	42	100

Source : Primary data of 2015

Table 9. shows that 97,6% of 42 malaria incidence said that there were less of efforts of health workers in preventing malaria. Taopan (2012) research result shows that one of the causes of malaria incidence in Oebobo village, Batu Putih sub district, Timor Tengah Selatan district, Nusa Tenggara Timur Province was the facts that the health workers never held promotions about how to prevent and eradicating malaria within two years, because of the less of specific health workers handling malaria.
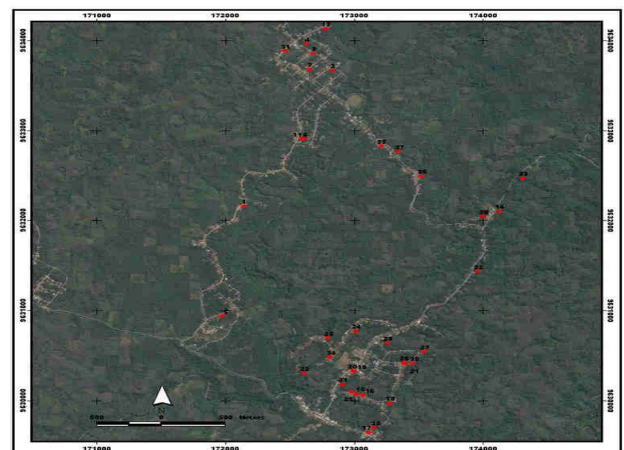

Fig. 1. Distribution pattern of Waypoint of malaria incidence in Giri Mulya Village

Density level of malaria incidence in Giri Mulya Village as shown in table 10.

Table 10. Density level of malaria incidence in Giri Mulya Village

malaria incidence	A (m^2)	n	robs	R	Analysis of NNI
Artificial Vegetation environment	19.250.000	39	266,054	0,75738	R<1 (Clustered Pattern)

Information :

A = Area of study (m2)

n = number of malaria incidence

robs = Average Nearest Distance (m)

R = Nearest Neighbour index

Nearest Neighbour index (NNI)

If R < 1, then clustered pattern (group)

If R = 1, then scatter pattern (spread)

If R < 1, then regular pattern (uniform)

Table 10 shows that the density level among malaria incidence in manmade vegetation is 0,75738, showing that R<1 has a clustered pattern.

IV.   CONCLUSION

According to the reasearch, there are conclusions as follows :

Most of the malaria incidence, 64,3% were 18 years old, 54,8% were women, 38,1% were high school graduates, 50% were plantation workers, and 83,3% had less of knowledge;

Most of the socio-cultural environment of the community, 66,7% had go out at night habit, 97,6% assumed that there were less of efforts of health workers in preventing malaria;

Nearest Neighbour Index (NNI) was 0,75738 thus causing a clustered pattern of malaria incidence.

V.   SUGGESTION

It is suggested that a prevention efforts such as malaria promotions performed by health workers, organizing some Juru Malaria Desa Teams, acting as the environment observers of Anopheles mosquitoes breeding places.

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