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Research Article

The Relationship between Mobility and Prevention Practices with Malaria Incidence in Purworejo District

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A B S T R A C T

The high mobility of migrants and their prevention practice was associated with a high incidence of imported malarial diseases. This study was undertaken to analyze the relationship between the mobility factor of migrants and their prevention practices of malaria. This study used a case control study and chi-square statistical test with a co-efficient level of 95%. The sampling technique that was used was purposive sampling, that determine respondents based on inclusion and exclusion criteria. The sample size in this study was 200 respondents. The results show that there was a relationship between the the type of migration area (p=0.001), the use of insecticide-treated bed nets (p=0.047) and the use of chemoprophylaxis (p=0.023) with malaria. There was no relationship between the frequency of mobility (p=0.118), length of stay in the migration area (p=0.130), use of mosquito repellent (p=<1.000), use of long clothes at night (p=0.128) and use of wire gauze (p=<1.000) with malaria. It can be concluded that there is no relationship between the frequency of mobility, the use of mosquito repellent, the use of long clothes and the use of wire gauze with malaria.

Keywords: Mobility, Insecticide-Treated Bed Nets, Mosquito Repellent, Chemoprophylaxis, Long Clothes, Wire Gauze, Malaria

Introduction

In Indonesia, Malaria is one of the infectious diseases transmitted by the Anopheles mosquito through either Plasmodiumvivax, Plasmodium falciparum, Plasmodium malaria, or Plasmodium ovale.[1] Clinical symptoms such as fever and chills are determined by a person's immunity.[2,3] In addition, research conducted in Kaligesing District added the symptoms of night sweats. Based on the 2019 World Malaria Report, the distribution of malaria cases in Southeast Asia was 8 million cases, 30% of which were in Indonesia.[5] Although the weight of Annual Parasite Incidence (API) in Indonesia decreased from 0.88 to 0.84 per 1,000 population from 2016 to 2018, malaria cases in Indonesia have been the concern. Indonesia has a target for Malaria Elimination by 2030.[6]

Malaria elimination in 2030 is one of Indonesia's goals in the Sustainable Development Goals (SDG's), in which every region throughout Indonesia has a target to be free of malaria by 2030. The terms of conditions for being free

from malaria are that every district/ city must be free from the transmission of indigenous malaria where its transmission occurs with in the local area.[1]

Purworejo, one of the regencies in Central Java Province, has not received the title of Malaria Elimination because it has imported malaria cases. A preliminary study found that in 2015 the number of imported malaria cases in the Purworejo Regency was 53 cases, 0 cases during 2016-2017, and 27 cases in 2019.[7] Purworejo Regency is a low-endemic area of malaria but malaria cases, especially the imported ones are a priority for prevention.

According to imported malaria cases, are positive malaria cases in an area where it is transmitted from other regions resulting from people having a history of traveling to malaria-endemic areas in the last four weeks before becoming sick.[8] In addition to mobility to malaria-endemic areas, positive imported malaria cases can occur due to a person's lack of prevention practices during the migration. If someone is positive for malaria returns to his/ her area of origin, it is feared that new cases will occur in that area. The presence of these new cases might delay the malaria elimination target. Therefore, the aim of this study was to analyze the relationship between mobility and prevention practices and the incidence of malaria in the Purworejo Regency.

Method

This observational research with a case-control study design analyzed people of Purworejo Regency who undertook mobility to malaria-endemic areas as migrant workers in 2015-2019. The sample size was calculated using a purposive sampling technique by considering the inclusion and exclusion criteria to obtain a sample of 200 respondents. Data was collected through interviews with structured questionnaires and analyzed using chi-square with a coefficient of 95%.

Result and Discussion

Table 1, shows that of the 200 respondents, the majority is 35 years old (65.0%), male (87.0%), high school/MA/ vocational high school education (54.5%), and have malaria-related risky jobs (94.0%).

Table 1.Distribution of Respondents Characteristics

S. No.	Respondents Characteristics	Freq. (n = 200)	Pct (%)
1.	**Age**		
	≤ 35 years	130	65,0
	> 35 years	70	35,0
2.	**Gender**		
	Male	174	87,0
	Female	26	13,0
3.	**Education**		
	Not Attending School	13	6,5
	Primary School/MI	54	27,0
	Junior High School MTs	22	11,0
	Senior High School/MA/ SMK	109	54,5
	Diploma/PT	2	1,0
4.	**Type of Work**		
	Malaria Risk Jobs	188	94,0
	Malaria Risk-Free Jobs	12	6,0

Table 1, shows that the age of the respondents highest incidence of migration is 35 years old; the largest age group migrating is 25-29 years. People aged 35 years are still idealistic in determining problems, and they have an essential role in development activities. In terms of gender variables, the majority of the respondents are male because most of them participate in working. The participation of men is higher in doing work, especially as migrant workers compared to what women do.[9] 9 On the variable of education level, the majority of the respondents have senior high school education, which follows the expected number of years of schooling in Purworejo Regency of 13.49 years.[10] On the variable type of work, the majority of the respondents have types of work that are at risk of contracting malaria, i.e. military/police officer, farmers, and miners. This type of work has a more frequent intensity to be exposed to malaria vectors compared to the work that is not at risk of malaria (project workers and traders).[11]

Table 2, shows that respondents with malaria travel more to high endemic areas (67.0%). This is related to the type of work of the respondents, the majority of whom work as military/police officerwho migrate to Papua. Based on the Indonesian Health Profile, the Papua region is a high endemic area for malaria with an API value of 64.03 per 1,000 population.[1]

Statistical analysis showed the relationship between the type of migration area and the malaria incidence (p=0.001). At 95% CI, the OR value was 3.17, meaning that people who traveled to high malaria-endemic regions have a 3.17 times higher risk of contracting malaria than people who traveled to low malaria-endemic areas. This finding was in line with the one conducted by Anggraini that the variable type of migration area is a risk factor for malaria incidence (OR=5.38).[12] However, a different result found by Santi and Halim showed no relationship between the type of migration destination and the incidence of malaria (p=<1,000). In their study, they explained that in high

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malaria-endemic areas, the majority of the respondents do not suffer from malaria.[13]

In the variable frequency of mobility, respondents with malaria migrated with a low frequency of 1-2 times a year (84.0%). Statistical analysis showed no relationship between the frequency of mobility and the incidence of malaria (p=0.118). This result was not significant because most of the respondents worked as military/police officer sor farmers and had lived in that area for a long time. In addition, the existence of the insignificant results was also related to the respondent's expenditure on transportation costs.[14]

In Zambia, the result showed differently; the relationship between the frequency of mobility and the malaria incidence occurred (p=0.017). In that study, people traveled to malaria-endemic areas more than once with an average number of trips four times which allowed very high imported malaria transmission.[15] Travel history and preventive measures. Travel history was used as a proxy to classify cases as either imported or local. Residency was also used as a secondary proxy for importation to compare characteristics of residents vs non-residents in relation to malaria importation. Logistic regression was used to determine factors associated with malaria importation among residents of Lusaka district. Results: Out of 260 cases, 94.2% were classified as imported cases based on participants' travel history. There were 131 (50.4%).

In the variable length of stay in the migration area, respondents with malaria lived in the migration area for 3 months (96.0%). The statistical analysis concluded that there was no relationship between the length of stay in the migration area and the incidence of malaria (p=0.130). The results were not significant because respondentsmobility while staying for 3 or 1-2 months almost had the same risk of contracting malaria. This was related to the type of work of the respondents who were at risk of malaria (farmers, military/police officer, mining workers) because they are related to the forest, plantation, and mining environment.[11]

However, different results showed that the length variable of staying in the migration area is related to the incidence of malaria (p=0.034). In addition, respondents who stayed longer in malaria-endemic areas may have a 1.848 times greater risk of contracting malaria than those who did not. This is due to the frequency of respondents who are more often exposed to malaria in these endemic areas.[16]

Table 2.The Relationship between Mobility and Malaria Incidence

S. No.	Mobility Variable	Malaria incident				P-value	OR	95% CI
		Yes		No				
		freq.	Pct%	freq.	Pct%			
1.	**Type of Migration Area**							
	High Endemic	67	67,0	39	39,0	0,001	3,17	1,78<OR<5,66
	Low Endemic	33	33,0	61	61,0			
2.	**Mobility Frequency**							
	High (≥3 times)	16	16,0	26	26,0	0,118	0,54	0,27<OR<1,08
	Low (1-2 times)	84	84,0	74	74,0			
3.	**Length of Stay in Migration Area**							
	Long (≥3 bulan)	96	96,0	100	100,0	0,130	-	-
	Not Long (1-2 bulan)	4	4,0	0	0,0			

Table 3.Relationship of Preventive Practices with Malaria Incidence

S. No.	Preventive Practice Variables	Malaria Incident				P-value	OR	95% CI
		Yes		No				
		f	%	f	%			
1.	**Use of Insecticide-Treated Mosquito Nets**							
	Yes	55	55,0	40	40,0	0,047	1,83	1,04<OR<3,21
	No	45	45,0	60	60,0			

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2.	**Use of Anti-Mosquitorepellent**							
	Yes	86	86,0	87	87,0	<1,000	0,91	0,48<OR<2,06
	No	14	14,0	13	13,0			
3.	**Use of Chemoprophylaxis**							
	Yes	40	40,0	24	24,0	0,023	2,11	1,14<OR<3,88
	No	60	60,0	76	76,0			
4.	**Wearing Long Clothes at Night**							
	Yes	92	92,0	84	84,0	0,128	2,19	0,89<OR<5,38
	No	8	8,0	16	16,0			
5.	**Using Wire Netting**							
	Yes	20	20,0	19	19,0	<1,000	1,06	0,52<OR<2,14
	No	80	80,0	81	81,0			

It can be seen in Table 3, that the majority of the respondents with malaria used insecticide-treated mosquito nets (55.0%). Statistical analysis showed that the use of insecticide-treated mosquito nets was associated with the incidence of malaria (p=0.047). At 95% CI, the OR value was 1.83, meaning that people who did not use insecticide-treated mosquito nets had a 1.83 times higher risk of contracting malaria than people who used insecticide-treated mosquito nets.

Further analysis identified that malaria sufferers admitted using insecticide-treated mosquito nets when sleeping at night, yet some occasionally did not. This irregularity might cause many respondents who used insecticide-treated mosquito nets to suffer from malaria. This finding was in line with other studies that in the younger age group, a person is less concerned with the use of insecticide-treated mosquito nets because of high mobility from the area of origin to the area of migration.[17]

In the variable of using mosquito repellent, the majority (86.0%) of the respondents with malaria used mosquito repellent. Statistical analysis showed that the use of mosquito repellent was not associated with the malaria incidence (p=<1,000). The results were not significant because the majority of both the malaria sufferers and non-malaria sufferers used mosquito repellent but not used it routinely.

Research conducted by Harmendo showed no relationship between the use of mosquito repellent and the incidence of malaria (p=0.253). This study found that mosquito repellent is a risk factor for malaria incidence.[18] The result of this study was supported by the one conducted by Anjasmoro, where respondents usually use mosquito repellent placed in the bedroom while the contact between mosquitoes and respondents are not only in the bedroom but also outside the bedroom.[19]

In the variable of using chemoprophylaxis, the majority of the respondents (60.0%) with malaria did not use chemoprophylaxis. Mean while, statistical analysis showed that the use of chemoprophylaxis was associated with the incidence of malaria (p=0.023). At 95% CI, the OR value was 2.11, meaning that people not taking chemoprophylaxis had a 2.11 times higher risk of getting malaria than those who did not take chemoprophylaxis.

The significant results suggested that the use of chemoprophylaxis was one of the respondents' initial prevention practices to reduce the risk of being infected with malaria so that they do not experience severe clinical symptoms.[20] In line with previous research, there is a relationship between the use of chemoprophylaxis and the incidence of malaria (p=0.004). The study showed that some respondents took chemoprophylaxis to prevent malaria, but it was not under the recommended dose, so it did not provide optimal protection.[12]

In the variable of wearing long clothes at night, the majority of respondents with malaria wore long clothes at night (92.0%). However, based on the statistical analysis, the use of long clothes at night was not associated with the incidence of malaria (p=0.128). There were no significant results related to the use of mosquito repellent. The majority of respondents used topical mosquito repellent. Due to the hot weather in the migration area, respondents with malaria were forced to roll up their sleeves. So it generates exposure to malaria vectors.

This study was in line with the research conducted by Widyasari (p=0.145).[21] The results were not significant because many respondents suffering from malariadid not

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routinely wear long clothes at night. Therefore, wearing long clothes at night is not the only way to prevent malaria mosquito bites. Research by Samino et al also supports this statement because even though you have worn long clothes, it does not guarantee that a person will avoid being bitten by malaria mosquitoes.[22]

In the variable of installing wire gauze, the majority of respondents with malaria did not install wire gauze (81.0%). Based on statistical analysis, the installation of wire gauze is not associated with the incidence of malaria (p=<1,000). The results were not significant because the respondents did not care about the installation of the wire netting so it resulted in many respondents who did not install the wire netting. However, the variable of installing wire netting is a risk factor for the incidence of malaria in which respondents who do not install wire netting have a 1.06 times greater risk of suffering from malaria compared to respondents who install wire gauze.

This study was in line with Ahmadi's where there is no relationship between the installation of wire gauze and the incidence of malaria (p=<1,000).[23] The results are not significant because the majority of people do not understand the importance of using wire netting as an effort to prevent malaria disease. Other studies also revealed that the results were not significant due to the lack of knowledge and level of public awareness of malaria prevention.[24]

Conclusion

There was a relationship between the type of migration area (p=0.000), the use of insecticide-treated mosquito nets (p=0.047), and the use of chemoprophylaxis (p=0.023) with the incidence of malaria. There was no correlation between the frequency of mobility (p=0.118), use of mosquito repellent (p=1,000), use of long clothes at night (p=0.128), and the installation of wire gauze (p=1,000) with the incidence of malaria. It is recommended for health officer or related agencies to increase knowledge and understanding of the community, especially regarding prevention practices while in migration areas to reduce positive cases of imported malaria in Purworejo Regency.

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