Analysis of Risk Factors Malaria Incidence in Indonesia

(Data Analysis of Basic Health Research 2018)

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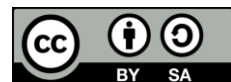[1,2,3,4]Faculty of Public Health, State Islamic University Of North Sumatera, Medan

Article Info

ABSTRACT

Malaria is still a problem in Indonesia and the world because the morbidity rate is still quite high, and its management is a commitment to the Sustainable Development Goals (SDGs) until 2030. The purpose of this study is to determine the risk factors for the incidence of malaria in Indonesia. This study uses a quantitative approach with a cross-sectional study design. Further analysis of Riskesdas 2018 data was carried out from January to August 2021. The location of this research is all provinces in Indonesia, as many as 34 provinces. The sample in this study is the total population based on the Rapid Diagnostic Test (RDT) in Indonesia as many as 26,657 samples. This study uses secondary data from Riskesdas 2018. The data analysis in this study is univariate analysis with descriptive analysis. The results of this study are respondents suffering from malaria aged >24 years as many as 14,769 (55.4%), female respondents suffering from malaria as many as 13,827 (51.9%), respondents having low education suffered from malaria as many as 19,926 (74.7%), respondents working suffered as much as 15,570 (58.4%), respondents living in rural areas suffer from malaria as many as 18,558 (69.6%), respondents who sleep without using mosquito nets suffer from malaria as many as 20,671 (77.5%), respondents do not use repellent suffer from malaria as many as 18,104 (67.9%), respondents do not use mosquito coils /spray/electric suffer from malaria as many as 14,059 (52.7%), respondents who do not use mosquito netting on home ventilation suffer from malaria as many as 22,369 (83.9%), and respondents suffer from malaria in Indonesia as many as 8,076 (30.3%). It is hoped that the Indonesian Ministry of Health will monitor the program for using repellents and distributing insecticide-treated mosquito nets to malaria-endemic areas. It is hoped that the District/City Offices should be more effective in providing counselling or education on malaria prevention to the public as a malaria prevention measure.

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1. INTRODUCTION

Malaria is still a problem that needs to be fixed in Indonesia and the world because the morbidity rate is still quite high (WHO, 2017). It is estimated that as many as 660 thousand people die each year due to malaria, which attacks mainly children under five by 86%, as many as 320 thousand of them are in Southeast Asia such as Cambodia, Malaysia, Myanmar, Thailand and including Indonesia (Sucipto, 2015). The 2015 World Malaria Report stated that the number of positive malaria cases was 211 million cases with 438.000 deaths (WHO, 2015). Meanwhile, in 2017 the number of positive malaria cases in the world was 219 million, with several deaths of 435.000 (WHO, 2018). Plasmodium falciparum is the most common malaria that causes high morbidity and mortality rates and gives a lot of socioeconomic losses to humans in the world (WHO, 2018).

Based on the 2007 Basic Health Research (Riskesdas) results, malaria prevalence in Indonesia is 1.9%. However, based on the 2013 Basic Health Research (Riskesdas) results, the prevalence of malaria increased to 6.0%. The five provinces with the highest prevalence of malaria were Papua (28.6%), East Nusa Tenggara (23.3%), West Papua (19.4%), Central Sulawesi (12.5%) and North Maluku (11.3%). 3%) (Riskesdas, 2013). Nationally, the malaria incidence rate from 2009 to 2017 showed a downward trend from 1.8 per 1.000 population in 2009 to 0.99 per 1.000 population in 2017. Papua is the province with the highest Annual Parasite Incidence (API) rate of 59.00 per 1.000 population. . The other three provinces with Annual Parasite Incidence (API) per 1.000 are West Papua 14.97, East Nusa Tenggara Province API rate 5.76 per 1,000 population, and Maluku province API rate 2.30 per 1.000 population. As many as 90% of cases come from Papua, West Papua, and East Nusa Tenggara (Kemenkes RI, 2018).

Based on the 2010 Basic Health Research (Riskesdas), the prevalence of malaria in Indonesia based on the Rapid Diagnostic Test (RDT) results was 0.6%. Riskesdas in 2013, the prevalence of malaria in Indonesia based on the Rapid Diagnostic Test (RDT) results increased to 1.3%. However, based on the 2018 Riskesdas, the malaria prevalence rate in Indonesia based on the Rapid Diagnostic Test (RDT) results decreased to 0.6% (Kemenkes RI, 2018).

In 2016 positive malaria cases in Indonesia were 218,450 (96%) with an API number of 0.84 per 1,000 population. However, in 2017 malaria cases experienced an increasing trend to 261.617 (95.74%) positive cases with an API of 0.99 per 1,000 population (Kemenkes RI, 2017). Provinces in Indonesia that are included as malaria red and yellow zones are Papua and West Papua, East Nusa Tenggara (NTT), West Nusa Tenggara (NTB), Maluku, North Maluku, Central Kalimantan, West Sulawesi and Gorontalo (Kemenkes RI, 2017).

Approximately 65% of Indonesia's population is a malaria-endemic area, and 45% of the population in this area is at risk of contracting malaria (Lubis et al., 2021). Environmental factors cause the high incidence of malaria in Indonesia because 35% of the population suffers from malaria in areas at risk of contracting malaria. In contrast, many as 38,000 deaths are reported annually (Sucipto, 2015).

Malaria is an infectious disease, and its control has become part of the commitment to the Sustainable Development Goals (SDGs) until 2030 (Kemenkes RI, 2017). To reduce malaria outbreaks, the Indonesian government, especially the Ministry of Health of the Republic of Indonesia, has worked hard to eradicate malaria by 2030. In 2016 the number of districts/cities for malaria elimination was 247 from the target of 245. In 2017, out of 514 districts/cities in Indonesia, 266 (52%) are malaria-free areas, 172

districts/cities (33%) are low endemic areas, 37 districts/cities (7%) are moderately endemic, and 39 districts/cities (8%) are high endemic. While the 2018 target of 285 districts/cities succeeded in eradicating malaria, and in 2019 it reached the elimination of 300 districts/cities. In addition, the government also targets that there will be no more malaria-endemic areas by 2030 (Kemenkes RI, 2019).

The emergence of malaria is caused by various influencing factors so that Anopheles sp mosquitoes can survive due to adapting to the existing environment (Pratama, 2015). Based on John Gordon and La Richt's theory, the onset of a disease is caused by humans (host), causes (agent). In the environment, disease arises due to an imbalance between agent and human, the state of balance depends on the nature and characteristics of the agent and host. Where the characteristics of the agent and host will interact, interaction will be directly related to the natural state of the environment, such as the physical, social, economic, and biological environment .

Behaviour and environment are the dominant factors for malaria incidence; behavioural factors that can increase the risk of malaria transmission are doing a lot of outside activities that can increase contact between malaria vectors and individuals (Mayasari et al., 2016). A supportive physical and biological environment can cause disease; environmental factors can trigger the occurrence of malaria, namely climate, temperature and rainfall, water temperature, water depth, water flow, humidity, wind, altitude, sunlight, pH, salinity. Water, dissolved oxygen, aquatic plants and animals (Willa RW, 2015). Malaria can cause death that attacks all age groups, both men and women (Kemenkes RI, 2016). Malaria directly causes morbidity and mortality to increase to reduce work productivity (Nurmaulina et al., 2018).

Based on previous research by Wibowo (2017), it was stated that those aged >20 years were more at risk of contracting malaria than those aged <20 years; this was because those aged >20 years did more work activities and had high mobility outside the home. Research Wardani (2016) stated that males are more at risk of contracting malaria than females. Research Babo (2020) states that the lower a person's level of education, the less knowledge they have about malaria, so the greater the risk of suffering from malaria.

Research Wibowo (2017) results from a state that people with risky jobs (fishermen, farmers, gardeners, and miners) have a higher risk of contracting malaria than low-risk jobs. The results of research Sutarto & Cania (2017) state that living in rural areas are more at risk of contracting malaria than living in urban areas. Arief's research results (2020) state that sleeping without using a mosquito net without insecticide is more at risk of suffering from malaria than someone who sleeps using a mosquito net.

The results of research (|Trapsilowati et al., (2016) stated that people who do not use mosquito repellent (repellent) have a higher risk of getting malaria compared to people who use repellent. The results of research Melisah & Nuryani (2016) stated that people who do not use mosquito repellent are more at risk of getting malaria compared to people who use mosquito repellent. The results of research Saputro & Siwiendrayanti (2015) state that people who do not install gauze on home ventilation are more at risk of contracting malaria than people whose houses are installed with gauze on ventilation.

Malaria diagnostic enforcement in detecting malaria can be done through the Rapid Test Diagnostic (RDT) examination, one of which is the immunochromatographic method; this examination is recommended for all patients suspected of suffering from malaria. This method of checking is especially useful in areas with complex infrastructure. This test detects malaria antigens based on antigen-antibody reactions

through nitrocellulose paper. The antigen-antibody complex is conjugated to colloidal gold, and a positive result is seen as a red or purple-red line (Istiana et al., 2021).

Based on the background and the data above, the authors are interested in analyzing the risk factors for the incidence of malaria in Indonesia. This study aimed to determine the risk factors for the incidence of malaria based on the Rapid Diagnostic Test (RDT) in Indonesia.

2. RESEARCH METHODE

This study uses a quantitative approach with a cross-sectional study design because this study was conducted at the same time measuring the independent and dependent variables. The independent variables in this study were gender, education, occupation, place of residence, mosquito nets without insecticides, repellent, mosquito coils/spray/electric, and mosquito netting on the house's ventilation. At the same time, the dependent variable in this study is the incidence of malaria. This study aims to determine the risk factors for the incidence of malaria in Indonesia. Further analysis of the 2018 Riskesdas data was carried out from January to August 2021. The locations in this study were all 34 provinces in Indonesia.

The definition of a case in this study is someone who has clinical symptoms and when the Rapid Diagnostic Test (RDT) examination shows (+) plasmodium by health workers (doctors/nurses/midwives). The population of this study is the total population of all individuals who were examined by the Rapid Diagnostic Test (RDT) in Indonesia as many as 26,657. The sample in this study is 26,657 of the population who underwent Rapid Diagnostic Test (RDT) examinations in Indonesia.

The type of data used in this study is secondary data which is secondary data from Riskesdas 2018. The data collection in this study is using individual questionnaires conducted with structured interviews. Data analysis in this study is a descriptive univariate analysis using the SPSS version 22 program.

3. RESULT AND ANALYSIS

The following is a description of the distribution of risk factors for the incidence of malaria in Indonesia, which can be seen in the table. 1 below:

Table.1 Distribution of Malaria Risk Factors in Indonesia

Variable	n	%
Age		
<24 Year	11.888	44.6
>24 Year	14.769	55.4
Gender		
Male	12.830	48.1
Female	13.827	51.9

Education		
Low	19.926	74.7
High	6.731	25.3
Profession		
Work	15.570	58.4
Does't Work	6.731	41.6
Place		
Rural	18.558	69.6
Urban	8.099	30.4
Use of Mosquito Nets		
No	20.671	77.5
Yes	5.986	22.5
Repellent Use		
No	18.104	67.9
Yes	8.553	32.1
Use of Mosquito Repellent Burn/Spray/Electric		
No	14.059	52.7
Yes	12.598	47.3
Use of Mosquito Netting in Home Ventilation		
No	22.369	83.9
Yes	4.288	16.1
Malaria incident		
No	8.076	30.3
Yes	18.581	69.7

Based on Table 1, it is known that the majority of respondents aged >24 years are 14.769 (55.4%), the majority of respondents are 13.827 women (51.9%), while male respondents are 12.830 (48.1%), the majority of respondents have low education as much as 19.926 (74.7%), the majority of respondents work as much as 15.570 (58.4%), the majority of respondents live in rural areas as much as 18.558 (69.6%), the majority of respondents sleep without using mosquito nets as much as 20,671 (77.5%), the majority of respondents do not use repellent as much as 18.104 (67.9%), the majority of respondents did not use mosquito coils/spray/electric as many as 14.059 (52.7%), the majority of respondents did not use mosquito netting on home ventilation as many as 22.369 (83.9%). Respondents suffered from malaria in Indonesia as many as 8.076 (30.3%).

According to Gunawan everyone can get malaria; the difference in prevalence according to age is related to the immunity of exposure to mosquito bites (Gunawan, 2000). The results of this study indicate that the proportion of the majority of respondents aged >24 years is 14.769 (55.4%), while respondents aged <24 years are 11,888 (44.6%).

According to Ruliansyah stated that gender is one of the factors that influence the incidence of malaria because it has a relationship with the habit of going out and working (Ruliansyah, 2020). This study indicates that the proportion of female sex with malaria incidence in Indonesia is 13.827 (51.9%); this percentage is higher than the proportion of male sex with malaria incidence in Indonesia as much as 12.830 (48.1%).

Based on Istiana men have a habit of going out and working at night, so they will be more easily in contact with mosquitoes and more susceptible to malaria (Istiana et al., 2021). According to Farihatun men tend to have more activities at night, such as fishing, patrolling, playing cards, and staying in the fields or fishermen's barracks. Hence, men are more at risk of contracting malaria than women, who do more activities only at home (Farihatun & Mamdy, 2016).

Men are more at risk of being bitten by Anopheles mosquitoes, so they will be easier to suffer from malaria; this is because men are more active in working with risky jobs outside the home so that they are easier to contact with malaria. The mobility of men outside the home is higher than women who only stay at home (Tarigan, 2020; Meutia, 2020).

The results of this study indicate that the proportion of majority of respondents has a low education of 19.926 (74.7%) and a higher education of 6.731 (25.3%). Based on research Susanti (2014), it is stated that people with low levels of education are more at risk of contracting malaria than people with high levels of education. Someone with low education is usually difficult to absorb and receive information about health problems than people with higher education.

Based on Dimi, work that is not sedentary or high mobility is at greater risk of malaria, such as official duties in endemic areas for long periods to many years, for example, medical officers and military officers, missionaries, miners, and others (Dimi et al., 2020). This study indicates that the proportion of the majority of respondents working is 15.570 (58.4%), while respondents who do not work are 6,731 (41.6%).

Types of workers such as PNS/TNI/Polri/BUMN/BUMD, private employees, entrepreneurs, farmers, fishers, labourers/drivers/household assistants, and others are at risk of contracting malaria; this is because if these jobs are located in malaria-endemic areas, they have great opportunities. Contact with Anopheles mosquito bites so that they are more susceptible to malaria, it is recommended that work that is at risk of contracting malaria is carried out at night or when leaving the house wearing protective clothing (long-sleeved shirts and trousers) and using anti-mosquito repellent/lotion to minimize direct contact between Anopheles mosquito vectors and humans.

The number of river flows, small springs, climate, and topographic conditions supports the existence of mosquito breeding places (Sucipto, 2015; Agustina, 2021). According to Irawan et al., (2014), the rural natural environment, which has the characteristics of forest and rice fields with stagnant water, is a potential location for breeding and spreading malaria vectors through the Anopheles mosquito.

This study indicates that the proportion of the majority of respondents living in rural areas is 18.558 (69.6%), while respondents who live in urban areas are 8.099 (30.4%). Urban and rural areas have different forms of an environment as mosquito habitats, which affects the density of mosquitoes carrying the Plasmodium parasite. In rural areas, malaria infection cases are higher than in urban areas (Khariri, 2019).

People who live in rural areas should prevent contact with Anopheles mosquito bites in preventing malaria, for example, using closed clothes (trousers, long sleeves) and using repellent when going out of the house and working, sleeping using insecticide-treated mosquito nets, not being in the house. Outside the house at night, using mosquito coils, installing wire netting on the house's ventilation, and keeping cattle pens away from the house.

Arief et al., (2020) stated that using mosquito nets at night can reduce the risk of contact between humans and mosquito vectors. Mosquito nets during sleep is an effective effort to prevent and avoid contact between Anopheles mosquitoes and healthy people while sleeping at night. According to Lewinsca et al., (2021) stated that mosquito nets that are not damaged or have no holes can hold or prevent a person from being bitten by mosquitoes, in addition to using mosquito repellent. So it is necessary to prevent malaria incidence, especially in malaria-endemic areas, by using mosquito nets.

This study indicates that the proportion of the majority of respondents sleeping without using mosquito nets was 20.671 (77.5%), while respondents who slept using mosquito nets were 5.986 (22.5%). Not using mosquito nets is more at risk of getting malaria than people who use mosquito nets, this is because someone who has the habit of sleeping without using mosquito nets at night will have the opportunity to be bitten by Anopheles mosquitoes and can cause malaria than someone who uses mosquito nets while sleeping as a malaria prevention measure.

According to Haqi, it is stated that not having the habit of using mosquito repellent similar to this can make it easier for someone to contract malaria because the body is not protected from the bites of the Anopheles mosquito as a vector of malaria (Haqi & Astuti, 2016). Darmawansyah et al., (2019) stated that one of the prevention efforts against malaria-carrying mosquito bites is to use mosquito repellent or anti-mosquito lotion when going outside at night.

This study indicates that the proportion of the majority of respondents who do not use repellents is 18.104 (67.9%), while respondents who use repellents are 8.553 (32.1%). Not using repellent or mosquito lotion is at risk of contracting malaria; this is because not using repellent when inside the house and when leaving the house is easier to contact with Anopheles mosquitoes and has a greater chance of suffering from malaria.

Based on Engka et al., (2017) stated that the use of mosquito coils (Fumigan), mosquito repellent spray (Aerosol), electric mosquito repellent (Electrik) and mosquito repellent (Repellent) can prevent malaria. Many sleepers do not use mosquito coils or spray because it makes them uncomfortable and causes shortness of breath. Many people ignore the use of mosquito coils or sprays (Stevie & Lario, 2016).

This study showed that the proportion of the majority of respondents who did not use mosquito coils/spray/electric as many as 14.059 (52.7%). In comparison, respondents used mosquito coils/spray/electric as many as 12,598 (47.3%). Not using mosquito coils/spray/electric is at risk of getting malaria compared to someone who uses mosquito repellent; this is because it can facilitate direct contact with Anopheles mosquitoes to contract malaria. After all, the body is unprotected from Anopheles mosquito bites as vectors of malaria carriers.

According to Ruliansyah (2020), the absence of mosquito netting in the ventilation of the house will make it easier for Anopheles spp mosquitoes to enter the house at night. This, of course, will facilitate contact between residents of the house and mosquitoes that transmit malaria. It will increase the risk of malaria transmission higher than in houses with mosquito netting installed.

The results of this study indicate that the proportion of the majority of respondents who do not use mosquito netting on home ventilation is 22.369 (83.9%), while respondents using mosquito netting on home ventilation are 4.288 (14.1%). Not installing mosquito netting on the ventilation of the house is related to the occurrence of malaria, this is because a house that is not installed with a screen on the ventilation of the house will make it easier for mosquitoes to enter the house and come into contact with Anopheles mosquitoes which will

bite human skin. We recommend installing wire netting on the house's ventilation as a preventive measure in limiting the entry of mosquito vectors into the house.

4. CONCLUSION

This study concludes that the majority of respondents suffer from malaria aged >24 years as many as 14.769 (55.4%), female respondents suffer from malaria as many as 13.827 (51.9%), respondents have low education suffer from malaria as many as 19,926 (74.7%), respondents work suffer as much as 15.570 (58.4%), respondents living in rural areas suffer from malaria as much as 18.558 (69.6%), respondents who sleep without using mosquito nets suffer from malaria as many as 20.671 (77.5%), respondents who do not use repellent suffer from malaria as many as 18.104 (67.9%), respondents do not use mosquito coils/spray/electric suffer from malaria as many as 14.059 (52.7%), respondents who do not use mosquito netting on home ventilation suffer from malaria as many as 22.369 (83.9%), and respondents suffer from malaria in Indonesia as many as 8.076 (30.3%).

It is recommended for the public to use insecticide-treated mosquito nets at bedtime to reduce the risk of Anopheles sp mosquito bites; it is recommended for the public to use repellants when inside the house and when leaving the house to reduce the risk of Anopheles sp mosquito bites, it is recommended for the public to use mosquito coils/spray/ electricity when inside the house and while sleeping to reduce the risk of Anopheles sp mosquito bites, and it is recommended for the public to use wire netting on every home ventilation to reduce the risk of Anopheles sp mosquito bites. The government and the District/City Health Service should provide health education on the risk of malaria and malaria prevention so that all Indonesian people, especially those living in malaria-endemic areas, know the risk of malaria transmission and its prevention so that it can be controlled according to the management of risk factors.

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