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The Relationship of Preventive Behaviors with the Incidence of Malaria in the Working Area of the Liukang Kalmas Health Center Pangkep District

Nurhayati[1]

[1]D-3 Nursing Study Program, Sekolah Tinggi Ilmu Kesehatan Makassar

*Corresponding Author: Nurhayati

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Abstract

The aim of this research was to determine the relationship between preventive behavior and the incidence of malaria in the working area of the Liukang Kalmas Community Health Center Pangkep Regency. This research used analytical observational research, with a cross-sectional design. Based on the results of research on the relationship between preventive behavior and the incidence of malaria in the work area of the Liukang Kalmas Health Center, Pangkep Regency , it was concluded that ; (1) Malaria prevention behavior among families at the Liukang Kalmas Community Health Center, Pangkep Regency, was mostly good, namely 113 people (83.1%) ; (2) The incidence of malaria in families at the Liukang Kalmas Community Health Center, Pangkep Regency, was mostly positive, namely 72 people (52.9%) ; (3) There is a relationship between prevention behavior and the incidence of malaria in the Liukang Kalmas Health Center Working Area, Pangkep Regency.

Introduction

Indonesia is currently in the middle of an epidemiological transition where infectious diseases still exist, but non-communicable diseases are increasing drastically. Indonesia is also among the ten countries in the world with the largest number of diabetes sufferers. At the same time, infectious and parasitic diseases are the cause of around 22% of deaths. This increase in non-communicable diseases occurs in many developing countries because their economic development begins to increase. Because of this, there is a shift in the form of disease that must be faced, namely from infectious and infectious diseases to non-infectious and chronic diseases (Halim et al., 2022).

Malaria is an infectious disease that is still a public health problem in Indonesia with high morbidity and mortality rates, and often causes Extraordinary Events (KLB) (Ministry of Health of the Republic of Indonesia, 2013).

Malaria is a disease that has been known since Greek times (Packard, 2021; Boualam, et al., 2021). This disease is distinctive, easy to recognize, with fever that rises and falls regularly and is accompanied by chills. This disease can cause the lymph to enlarge and harden or splenomegaly (Sorontou, 2018). Apart from that, malaria can cause death, especially in high-risk groups, namely infants, toddlers and pregnant women (Ministry of Health of the Republic of Indonesia, 2014).

Although malaria has been known for a long time, its cause is unknown (White, 2022). Malaria is often found in swamp areas which emit a foul smell around them (von, 2020). In the 19th century it was known that malaria was caused by *Plasmodium* which was transmitted by mosquitoes which were often found in swamp areas (Sorontou, 2018).

Malaria is a disease with a very wide spread and occurs almost throughout the world in both tropical and sub-tropical climates (Varo et al., 2020). There are 109 countries where malaria is endemic, with 45 countries in the African region (Kolawole et al., 2023). The remainder of malaria spreads in Asia, Latin America, the Middle East and several European countries. The

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spread of malaria is largely determined by 3 chain of transmission factors, namely *intermediate host* (human sexual cycle), *definitive host* (mosquito sexual cycle), agent (*Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale,* and *Plasmodium malariae*), and the environment which includes; physical environment, chemical biology, and socio-cultural (Halim et al., 2022).

World Malaria Report (2015), states that malaria has attacked 106 countries in the world. The global commitment places efforts to eradicate malaria as one of the common goals that must be achieved by 2015 through the seventh goal, namely eradicating HIV/AIDS, malaria and tuberculosis (Ministry of Health of the Republic of Indonesia, 2016).

According to the World Health Organization (WHO), morbidity and mortality rates due to malaria tend to decrease in the 2005-2015 period. Despite this, there are still approximately 3.2 billion people or almost half of the world's population who are at risk of contracting malaria. In 2015, WHO estimates that there were around 214 million new cases of malaria with the deaths of around 438,000 people worldwide. of all deaths due to malaria in the world, around one third or 306,000 occurred in children under five (Ministry of Health of the Republic of Indonesia, 2016).

In Indonesia, malaria is still the main environmentally based infectious disease (Ipa et al., 2020). The development of sophisticated technology and transportation as well as the movement of people from one area to another can accelerate the development of malaria (Ribeiro et al., 2021; Mouratidis et al., 2021). The death rate due to severe malaria is closely related to drug resistance, early diagnosis, and inadequate patient management (Sorontou, 2018).

Nationally, the malaria morbidity rate in 2013 was 1.38/1,000 people at risk. Meanwhile, the Ministry of Health's Strategic Plan target for malaria morbidity (API/ *annual parasite incidence)* in 2013 is <1.25/1,000 population at risk. Thus, the 2013 API coverage did not reach the 2013 Strategic Plan target (Ministry of Health of the Republic of Indonesia, 2014). In 2014, 0.99/1,000 residents were at risk. Meanwhile, the Ministry of Health's Strategic Plan target for malaria morbidity (API/ *annual parasite incidence)* in 2014 is <1/1,000 population at risk. Thus, the 2014 API coverage reaches the 2014 Strategic Plan target (Ministry of Health of the Republic of Indonesia, 2015). Meanwhile, in 2015 as many as 0.85/1,000 residents were at risk. Meanwhile, the Ministry of Health's Strategic Plan target for malaria morbidity (API/ *annual parasite incidence)* in 2015 is <1/1,000 population at risk. Thus, the 2015 API coverage reaches the 2015 Strategic Plan target (Ministry of Health of the Republic of Indonesia, 2016).

The results of the 2013 Riskesdas, the incidence of malaria in the population of South Sulawesi in 2013 was 3.1%, an increase compared to 2007 (1.4%), except that East Luwu Regency and Selayar Regency experienced a slight decrease in the number of malaria sufferers. Malaria prevalence in 2014 was 8.1%. The five regencies/cities with the highest incidence and prevalence are Bantaeng Regency (6.8% and 15.0%), Sinjai Regency (6.7% and 15.3%), Tana Toraja Regency (5.5% and 20.3 %), Bulukumba Regency (5.2% and 12.1%), and Luwu Regency (5.2% and 13.2%). Of the 24 regencies/cities in South Sulawesi, 15 regencies/cities have malaria prevalence above the national figure (South Sulawesi Provincial Government Health Office, 2015).

In Pangkep Regency, according to reports from the Community Health Center, 117 cases of malaria (+) were recorded, and 3,123 people had clinical malaria (Pangkep District Health Office, 2009). Data obtained from the Disease Control Section of the Provincial Health Office. South Sulawesi in 2013 in Pangkep Regency, 395 cases of malaria were found, 145

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people (36.71%) were positive for malaria (South Sulawesi Provincial Government Health Office, 2014).

Malaria Extraordinary Events (KLB) still occur frequently, in 2012 there were two malaria outbreaks, namely in North Sumatra Province with 57 cases and in Yogyakarta Province with 85 cases. This is due to environmental changes, high population mobilization and suboptimal vigilance (Ministry of Health of the Republic of Indonesia, 2013).

The malaria control program is focused on achieving malaria elimination which is carried out in a comprehensive and integrated manner by the government, regional governments together with development partners and the community (Lindblade et al., 201; Cao et al., 2021; Perera et al., 2022). Malaria elimination is carried out in stages from districts/cities, provinces, from one island to another throughout Indonesia, according to the malaria situation and the availability of existing resources (Ministry of Health of the Republic of Indonesia, 2013).

The degree of health of an individual, group or community is influenced by 4 main factors, namely; environment (physical, social, cultural, economic, political, etc.), behavior, health services and heredity (HL Blum, 1974, quoted in Notoatmodjo, 2012). Health behavior is a form of a person's response to stimuli in the form of; illness and disease, food and drink, the environment and also health services. Preventive behavior greatly contributes to the occurrence of infectious and non-communicable diseases (Notoatmodjo, 2014).

The most fundamental challenge in dealing with major infectious diseases such as malaria is getting individuals to adopt and maintain disease prevention behaviors. Often people assume that this behavior will appear when health services and health interventions are available. However, the reality in the field does not show this, so efforts are needed in the form of communication and social mobilization to attract the attention of the public so that they can make efforts to prevent malaria (Hartono, 2011).

The biggest and most difficult determinant to improve individual health status is community or family behavior. Behavior in the form of action is a response to stimulation or stimulus in real form which can be observed directly through interviews and respondent activities (Arsin, 2012).

The recommended behavior in an effort to prevent malaria is to maintain a clean environment, protect yourself by wearing full clothing, sleeping using a mosquito net, not hanging clothes indoors, using anti-mosquito medication, and avoiding visiting malaria endemic areas (Naserrudin et al., 2023; Zou et al., 2023). Apart from that, it can also reduce activities outside the home from dusk until dawn when *Anopheles mosquitoes* generally bite, keeping livestock outside the home, so it is hoped that mosquitoes will get blood from livestock and not from using insecticides (Halim et al., 2022).

The results of research conducted by Bagau et al. (2022), with the research title "The Relationship between Prevention Behavior and Malaria Incidence in the Working Area of the Sorong City Health Center, West Papua Province in 2015", showed that respondents who had good prevention behavior (54.5%) were more many more than respondents with poor prevention behavior (45.5%). A person's behavior can influence their level of health, for example, people who behave well in maintaining their health can avoid various diseases. The results of *the Chi-square* test obtained a p value of 0.000 (<0.005), where there was a relationship between healthy clean-living behavior and the incidence of malaria in the working area of the Sorong City Health Center, West Papua Province in 2015.

An initial survey conducted at the Liukang Kalmas Community Health Center, Pangkep Regency, obtained data on the incidence of malaria in 2014 with a total of 1,013 cases, 340

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people (34%) of whom were positive for malaria, in 2015 the number of cases was 332 people, 139 people (42%) of them were positive for suffering from malaria, and in 2016 the number of cases was 205 people, 119 people (58%) of whom were positive for suffering from malaria (SP2TP Puskesmas Liukang Kalmas Pangkep Regency, 2017).

Method

The researchers implemented an analytical observational study design using a cross-sectional method to analyze the link between preventive behavior elements and malaria infection patterns. The research took place in the operational region of the Liukang Kalmas Community Health Center in Pangkep Regency. The research utilized a cross-sectional design since this methodology enables researchers to examine variables and their associations simultaneously at a particular time for analyzing health behavior and disease occurrence patterns.

A total of 205 families from the working area of the Liukang Kalmas Community Health Center participated in this research since they evidenced malaria symptoms. The researchers recruited 136 individuals through purposive sampling methods from the selected population of subjects with malaria symptoms and an interest to participate in the study.

Professional research staff obtained interview responses from participants using questionnaires which demonstrated both clarity and reliability during pre-testing. The research instrument contained questions which recorded both preventive measures (independent variable) alongside confirmed malaria occurrences (dependent variable). The evaluation of preventive behavior relied on examining mosquito net adoption and personal protective attire, indoor cleanliness standards, and the deployment of insect repellents and the correct handling of water storage containers. Health center verification of patient medical diagnosis determined malaria incidence status.

The data analysis consisted of conducting both univariate tests and bivariate comparisons. The study used univariate analysis to present statistical information depicting the frequency and percentage distributions of each research variable. Bivariate analysis showed the relationship status between preventive behaviors of respondents and their risk levels for malaria infection. The hypothesis test relied on the Chi-square (χ^2) evaluation while using a significance level of $p < 0.05$. Results showing a p-value under this threshold level revealed statistical significance in terms of variable relationships.

The study started by obtaining consent from each research participant before starting and kept all participant information confidential while the research was in progress. The observations conducted for this research study followed the guidelines that apply to public health observational procedures.

Result and Discussion

Understanding the relationship between individual health behavior and disease incidence is vital for effective public health interventions, particularly in regions where malaria remains endemic. This study aimed to investigate how preventive behaviors among families in the working area of the Liukang Kalmas Community Health Center in Pangkep Regency are associated with the occurrence of malaria. Using a cross-sectional design, this research collected data from 136 participants and analyzed the relationship between preventive behaviors such as the use of mosquito nets, personal protective practices, and environmental sanitation and laboratory-confirmed malaria cases. The following section presents the results

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of this analysis, detailing the prevalence of preventive practices and malaria incidence among respondents, as well as the statistical relationship between the two variables.

Preventive Behavior

Table 1. Description of Malaria Prevention Behavior in Families in the Working Area of the Liukang Kalmas Health Center Pangkep Regency

Preventive Behavior	n	%
Bad	23	16.9
Good	113	83.1
Amount	136	100.0

Source: Primary Data

Table 1 shows that the majority of respondents had good behavior towards preventing malaria, namely 113 people (83.1 %) , while respondents who had bad behavior towards preventing malaria were 23 people (16.9 %) .

Malaria Occurrence

Table 2. Description of the incidence of malaria in work areas Liukang Kalmas Health Center Pangkep Regency

Malaria Occurrence	n	%
Positive	72	52.9
Negative	64	47.1
Amount	136	100.0

Source: Primary Data

Table 1 shows that respondents who were positively diagnosed with malaria at the Liukang Kalmas Community Health Center, Pangkep Regency namely 72 people (52.9 %) , and 64 people (47.1 %) were negative or did not suffer from malaria.

Bivariate Analysis

Relationship between preventive behavior and the incidence of malaria

Table 3. Relationship between preventive behavior and the incidence of malaria in the Liukang Kalmas Community Health Center Working Area, Pangkep Regency

Preventive Behavior	Malaria Occurrence				Amount		p-Value
	Positive		Negative				
	n	%	n	%	n	%	
Bad	19	82.6	4	17.4	23	**100.0**	0.002
Good	53	46.9	60	53.1	113	**100.0**	
Amount	72	52.9	64	47.1	136	100.0	

Source: Primary Data

Table 3 shows that there were 23 respondents who had bad attitudes towards preventing malaria, most of the respondents were positively diagnosed with malaria, namely 19 people (82.6%), and 4 people (17.4%) were negative or did not suffer from it. malaria disease. Meanwhile, there were 113 respondents who had good behavior towards preventing malaria, the majority of respondents were negative or did not suffer from malaria, namely 60 people (53.1%), and 53 people (46.9%) were positively diagnosed with malaria.

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chi square test obtained a value of p = 0.002 < 0.05, which means there is a relationship between preventive behavior and the incidence of malaria in the Liukang Kalmas Health Center Working Area, Pangkep Regency.

Relationship between preventive behavior and the incidence of malaria

Malaria prevention behavior is community vigilance in preventing the risk of malaria by preventing mosquito bites as well as vector control and chemoprophylaxis. The results of the study showed that there were 23 respondents who had bad attitudes towards preventing malaria, most of the respondents were positively diagnosed with malaria, namely 19 people (82.6 %). This is due to the lack of knowledge of respondents about efforts that can be taken to prevent malaria. This is proven in the results of the questionnaire answers, where more than half of the respondents do not wear long-sleeved clothes when leaving the house, do not use blankets when sleeping, often hang dirty clothes in the room, do not use mosquito repellent at home, and are still active frequently.

Outside the home, rarely draining the bathtub and covering used items, as well as respondents' lack of knowledge about the benefits of keeping livestock outside the home. However, the results of the study found that 4 people (17.4 %) were negative or did not suffer from malaria even though they had bad attitudes towards preventing malaria. This is because malaria is a disease that is transmitted by mosquitoes, and this disease is endemic so that even though the respondent has made good prevention efforts, if the respondent often visits malaria endemic areas, then a person will be at risk of being bitten by the mosquito that causes malaria.

Meanwhile, there were 113 respondents who had good behavior towards preventing malaria, the majority of respondents were negative or did not suffer from malaria, namely 60 people (53.1 %). Knowledge plays a very important role in shaping a person's behavior, where good knowledge about preventing malaria will also form good behavior in preventing the incidence of malaria, for example: using mosquito nets, the habit of going out at night, and using anti-mosquito medication so that respondents who have good behavior has a lower risk of suffering from malaria, compared to respondents who have poor prevention behavior. However, the results of the study found that 53 people (46.9 %) were positively diagnosed with malaria even though they had good behavior towards preventing malaria. This is because malaria can not only be prevented with good behavior, malaria can also be caused by unhealthy environmental factors in society, for example the large amount of rubbish in the area where you live which can cause mosquitoes to nest.

The results of *the chi square* test obtained a value of p = 0.002 < 0.05, which means there is a relationship between preventive behavior and the incidence of malaria in the Liukang Kalmas Health Center Working Area, Pangkep Regency. Respondent behavior is closely related to the incidence of malaria, where the better the respondent's behavior in preventing malaria, the lower the risk of suffering from malaria. This is in accordance with the theory put forward by Maryunani (2013) , stated that behavior is a person's actions/actions and words which can be observed, described and recorded by other people who do them . Meanwhile, malaria prevention behavior is by increasing awareness of the risk of malaria, preventing mosquito bites, vector control and chemoprophylaxis (Ministry of Health of the Republic of Indonesia, 2014).

The results of this research are in line with research conducted by Bagau et al. (2022), with the research title " The relationship between preventive behavior and the incidence of malaria in the Working Area of the Sorong City Health Center, West Papua Province in 2015 ", obtained a p value of 0.000 (<0.005), so it was concluded that there is a relationship between

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healthy clean living behavior and the incidence of malaria in the working area of the Sorong City Health Center, West Papua Province in 2015.

The results of another study conducted by Papilaya et al. (2015), with the research title " The relationship between behavioral factors and the incidence of malaria in the Remu Health Center Working Area, Sorong City", obtained a value of p=0.003 α < 0.05, meaning that there is a relationship between behavior and use. anti-mosquito materials and the use of mosquito nets with the incidence of malaria.

The degree of health of an individual, group or community is influenced by 4 main factors, namely; environment (physical, social, cultural, economic, political, etc.), behavior, health services and heredity (HL Blum, 1974, quoted in Notoatmodjo, 2014). Health behavior is a form of a person's response to stimuli in the form of; illness and disease, food and drink, the environment and also health services. Preventive behavior greatly contributes to the occurrence of infectious and non-communicable diseases (Notoatmodjo, 2014).

Community behavioral problems are the cause of various health problems, one of which is the cause of malaria. Public health experts agree that to overcome community behavior, efforts are needed in the form of public health promotion, so that through this process it is hoped that changes in behavior will occur in the community . In this process of change, changes in attitudes need to be supported so that they become real deeds (actions) with support from family, close friends or the surrounding community so that behavior can be realized that can prevent the incidence of malaria (Benih, 2014).

The recommended behavior in an effort to prevent malaria is to always maintain a healthy environment, namely by throwing rubbish in the right place , protecting yourself by wearing complete clothing that covers your arms and legs when leaving the house to reduce the risk of mosquito bites, sleeping using a mosquito net. will provide protection against mosquito bites which can cause malaria, not hanging clothes indoors will prevent mosquitoes from nesting, using anti-mosquito medication can reduce the possibility of malaria mosquito bites. Apart from that, reducing activities outside the home from dusk until dawn can increase a person's risk of being bitten by mosquitoes because *Anopheles* mosquitoes generally bite from dusk to dawn. Based on the discussion presented above, the researcher concludes that the better the respondent's behavior in preventing malaria, the lower the risk of suffering from malaria.

Conclusion

Based on the results of research on the relationship between preventive behavior and the incidence of malaria in the work area of the Liukang Kalmas Health Center, Pangkep Regency , it was concluded that ; (1) Malaria prevention behavior among families at the Liukang Kalmas Community Health Center, Pangkep Regency, was mostly good, namely 113 people (83.1%) ; (2) The incidence of malaria in families at the Liukang Kalmas Community Health Center, Pangkep Regency, was mostly positive, namely 72 people (52.9%) ; (3) There is a relationship between prevention behavior and the incidence of malaria in the Liukang Kalmas Health Center Working Area, Pangkep Regency.

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