

Malaria Prevention Behavior among Community Figures in Banyumas Regency, Central Java, Indonesia

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Received April 3, 2024; Revised June 10, 2024; Accepted July 21, 2024

Cite This Paper in the Following Citation Styles

(a): [1] Nisrina Hasna Naura, Dwi Sarwani Sri Rejeki, Siwi Pramatama Mars Wijayanti, Sri Nurlaela, Devi Octaviana, Saryono, Rosita Dwi Jayanti, "Malaria Prevention Behavior among Community Figures in Banyumas Regency, Central Java, Indonesia," *Universal Journal of Public Health*, Vol. 12, No. 4, pp. 644 - 649, 2024. DOI: 10.13189/ujph.2024.120403.

(b): Nisrina Hasna Naura, Dwi Sarwani Sri Rejeki, Siwi Pramatama Mars Wijayanti, Sri Nurlaela, Devi Octaviana, Saryono, Rosita Dwi Jayanti (2024). *Malaria Prevention Behavior among Community Figures in Banyumas Regency, Central Java, Indonesia*. *Universal Journal of Public Health*, 12(4), 644 - 649. DOI: 10.13189/ujph.2024.120403.

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Abstract Banyumas Regency is a receptive area with imported cases of malaria mainly due to the rate of migration. To prevent the transmission of imported malaria, migration surveillance is crucial and community figures play a vital role in raising public awareness concerning this necessity. This study aimed to describe malaria prevention behavior among community figures and identify the influential factors in Banyumas. An analytical cross-sectional study was employed among the community figures using a questionnaire. The samples included 115 community figures in the malaria-receptive areas of Banyumas using a total sampling technique. Variables studied included age, knowledge, attitude, education, income, access to healthcare services, information exposure, and behavior. The analysis involved univariate, bivariate with chi-square test, and multivariate with logistic regression. The results showed that the malaria prevention behavior among community figures was categorized as good at 54.8%. Knowledge, attitude, education, access to healthcare services, and exposure to information were related to prevention behavior. The most influential factor was poor knowledge ($p=0.000$; $POR=4.298$; $CI=1.701-10.860$), posing a 4.298 times greater risk of having inadequate prevention behavior. Community leaders should actively seek information related to malaria and disseminate this information to their community.

Keywords Prevention Behavior, Malaria, Community

Figures

1. Introduction

Approximately 229 million malaria cases were recorded worldwide in 2019, with Africa contributing about 94% (225 cases per 1000 population), while Southeast Asia contributed 3% (4 cases per 1000 population) [1]. The national malaria morbidity rate in 2018 was 0.84 per 1000 population in Indonesia [2]. Moreover, Central Java Province recorded an Annual Parasite Incidence (API) indicator of 0.012 per 1000 population, with some regencies, including Banyumas, Purbalingga, and Kebumen reporting malaria cases [3]. Banyumas Regency has several areas with a high risk of malaria, such as Sumpiuh, Tambak, Kebasen, and Kemranjen Districts [4]. Banyumas Regency continues to report imported malaria cases [5]. During the period 2013-2018, Sumpiuh was still classified as a Low Case Incidence (LCI) area [6]. Approximately 1,624 malaria cases were reported between 2010 and 2018 [3].

Human mobility, particularly migration, influences the increase in imported malaria cases [7], [8]. Seasonal migration can hinder the achievement of malaria elimination [9]. Therefore, surveillance is crucial as a

prevention effort. Challenges in implementing surveillance in Banyumas include the lack of involvement and capacity of human resources, ineffective village regulations, and a lack of public awareness in reporting malaria symptoms [10]. To reduce malaria cases, comprehensive efforts involving effective, efficient, and integrated prevention as well as control measures from various sectors, including healthcare services, the community, and the government, are essential. Malaria prevention is a collective responsibility involving local community figures. One of the roles of the government and its apparatus, including community figures, in empowering communities to control diseases is to engage them in discussions to identify health problems, determine solutions, reach consensus, and implement agreed-upon control programs [11]. The involvement of community figures has led to improvements in both human resource development and physical infrastructure in villages [12].

Community figures in the village can be divided into several elites, such as government apparatus including village chiefs and hamlet heads [13]. Hamlet as a leader in the lowest government unit plays an essential role in malaria prevention by taking individual actions and receiving reports from the local community regarding newcomers from receptive areas [14]. The prevention behavior of village chiefs and hamlet heads in Banyumas is still passive and tends to rely on guidance from health officers. Therefore, this study aims to identify factors influencing malaria prevention behavior among community figures in Banyumas.

This study was based on the behavioral theory by Lawrence Green, which included predisposing factors (such as age, knowledge, attitude, income, and education of community figures) and supportive factors (access to healthcare services and information related to malaria prevention). The findings are expected to aid relevant stakeholders in their efforts to prevent malaria in Banyumas.

2. Materials and Methods

This study employed a cross-sectional design and was conducted in Banyumas, specifically in malaria-receptive areas, namely Tambak and Sumpiuh Sub-districts. The respondents were community figures, including village chiefs and hamlet heads in the 2 sub-districts, with a total of 115 selected using a total sampling technique. The independent variables examined were age, knowledge about malaria and prevention, attitude, education, income, access to healthcare services, and exposure to information. Meanwhile, the dependent variable was malaria prevention behavior among community figures. Knowledge questions included definitions, causes, symptoms, malaria prevention measures in general, malaria prevention by making village regulations regarding malaria control, and malaria prevention programs by empowering the community in

carrying out environmental maintenance. Respondents who had a score ≥ 17 (median) were categorized as having good knowledge, while respondents who had a score < 17 (median) were categorized as having poor knowledge. The attitude questionnaire consisted of respondents' responses about the causes, symptoms, and measures of preventing malaria in general, preventing malaria by recording, reporting, and monitoring residents who migrate to and from malaria-endemic areas, as well as providing outreach by community figures. The good attitude category was aimed at respondents who got a score ≥ 35 (median), while the poor attitude category was aimed at respondents who got a score < 35 (median). Access to health services was assessed by respondents' ease of getting to health services (Public Health Center) as measured by distance, travel time, and ease of transportation. Respondents with a score of 6-8 were categorized as having good access to health services, while respondents with a score of 3-5 were categorized as having poor access to health services. Exposure to information was categorized as ever if the respondent admitted that they had received information about malaria and malaria prevention for a maximum of the last year, and categorized as never if the respondent admitted that they had never received information about malaria and malaria prevention for a maximum of the last year. Malaria prevention behavior among community figures in questionnaires included several aspects such as using mosquito repellent, spraying walls, protective clothing, limiting outdoor activities at night, using insecticide-treated bed nets, cleaning the home environment, recording, reporting, and monitoring residents who migrated to and from malaria-endemic areas, providing education to the community, and making village regulations related to malaria control. Respondents with a score of ≥ 18 (median) were categorized as having good behavior, while respondents with a score of < 18 (median) were categorized as having poor behavior. Data were collected through direct interviews using a validated and reliable questionnaire instrument. The univariate analysis was used to describe all variables and the results were presented in frequency distributions. Additionally, bivariate analysis with the Chi-square test and multivariate analysis with logistic regression were conducted. This study was approved by the Health Research Ethics Committee (KEPK) at the Faculty of Health Sciences, Jenderal Soedirman University, with number 776/EC/KEPK/VI/2022.

3. Results

Banyumas is one of the regencies in Central Java Province, Indonesia, located in the southwestern part and directly bordering West Java Province, with its capital being Purwokerto. Geographically, the regency lies between the East Longitude of $108^{\circ} 39.17$ to $109^{\circ} 27.15$ and the South Latitude of $7^{\circ} 15.05$ to $7^{\circ} 37.10$. The total area is approximately 1,327.59 km² with its terrain

consisting of both lowlands and mountains. The mountainous structure includes parts of the Serayu River valley for agricultural purposes, several highlands for settlements and yards, and mountains for plantations and tropical forests, situated on the southern slopes of Mount Slamet. Furthermore, the land and resources are considered to have great potential due to the presence of Mount Slamet, with its peak at approximately 3,400 meters above sea level (masl). Banyumas experiences a wet tropical climate as it is situated in the southern hemisphere of the equator. Banyumas has 22 hospitals as well as 40 public health centers [15].

The subjects in this study were community figures, including village chiefs and hamlet heads, in the malaria-receptive areas with a total of 115 individuals. The characteristics of the subjects are shown in Table 1.

Table 1. Frequency distribution of the respondent characteristics

Respondent Characteristics	Frequency	Percentage (%)
Age		
Adult	24	20.9
Elderly Seniors	74	64.3
	17	14.8
Education		
Basic Education (Elementary School, <i>Madrasah Ibtidaiyah</i> , Junior High School)	42	36.5
Secondary Education (Senior/Vocational High School)	58	50.4
Higher Education (Diploma, Bachelor, Master, Specialist, Doctor)	15	13
Income		
≥ Regency Minimum Wage (IDR 1,983,000)	64	55.7
< Regency Minimum Wage (IDR 1,983,000)	51	44.3
Total	115	100.0

Based on Table 1, the majority of respondents were in the elderly age group (64.3%), had secondary education (50.4%), and earned less than the regency minimum wage (44.3%).

As shown in Table 2, respondents exhibited good behavior (54.8%), knowledge (60%), attitude (57.4%), access to healthcare services (65.2%), and adequate access to information (62.6%).

Table 2. Frequency distribution of study variables

Variable	Category	Frequency	Percentage (%)
Behavior	Poor	42	45.2
	Good	63	54.8
Knowledge	Poor	46	40
	Good	69	60
Attitude	Poor	49	42.6
	Good	66	57.4
Access to Healthcare Services	Poor	40	34.8
	Good	75	65.2
Exposure to Information	Ever	72	62.6
	Never	43	37.4
Total		115	100.0

The summary of the bivariate analysis results between the independent and the dependent variables is presented as follows:

Table 3. Recapitulation of Bivariate Analysis

Variable	P-value	Description
Age	0.694	There is no relationship
Knowledge	0.000	There is a relationship
Attitude	0.000	There is a relationship
Education	0.002	There is a relationship
Income	0.358	There is no relationship
Access to Healthcare Services	0.033	There is a relationship
Exposure to Information	0.000	There is a relationship

Based on Table 3, the bivariate analysis results indicated that factors associated with the dependent variable included knowledge, attitude, education, access to healthcare services, and exposure to information. The associated variables with a p-value < 0.25 were then forwarded to multivariate analysis to determine the simultaneous influence of the independent variables on the dependent.

Table 4 shows that the most influential variable in malaria prevention behavior was knowledge. The analysis of the prevalence odds ratio (POR) for knowledge produced a value of 4.298. This indicated that respondents with poor knowledge were at 4.298 times higher risk of having poor prevention behavior compared to those with good knowledge.

Table 4. Final Multiple Logistic Regression Model

Variable	Sig.	α	POR	95% CI for Exp(B)	
				Lower	Upper
Knowledge (Poor)	0.002	0.05	4.298	1.701	10.860

4. Discussion

The results showed that knowledge significantly influenced malaria prevention behavior among community figures in Banyumas. This was because knowledge affected the formation of individuals' actions. Individuals with good knowledge tend to exhibit better prevention behavior [16], [17]. Their actions are more sustainable compared to those without knowledge. On the other hand, individuals with poor knowledge display inadequate prevention behavior due to the lack of understanding which leads to indifference towards necessary actions [18]. This finding is in line with the results of previous studies conducted in malaria-endemic rural areas in Ethiopia, Guinea, and Eritrea that inadequate knowledge about malaria resulted in poor malaria prevention practices [19], [20], [21]. Knowledge can be gained from health education such as routine health education for the community in Kenya which has been proven to be successful in significantly increasing community behavior in using mosquito nets to prevent malaria [22].

The knowledge of community figures was reflected in the behavior, which then served as a motivation to fulfill their roles in prevention efforts. One essential aspect of their role is providing support for prevention and control efforts [13]. This support can be categorized into emotional, appreciative, instrumental, and informative. Emotional support includes expressions of empathy, concern, and attention, while appreciation involves showing respect and encouragement to move forward. Instrumental support includes direct assistance based on the community's needs and informative support entails providing advice, guidance, suggestions, as well as feedback [23]. A study in Yogyakarta Indonesia shows that the community plays an active role in malaria vector control efforts by closing puddles, community service every week, and some people are already using nets [24]. Community empowerment is important to help control malaria [25].

The role of community figures was evident in their efforts to disseminate information about malaria and its prevention. Information was first spread among family members and extended to neighbors [13]. Additionally, information dissemination was achieved through village community forums for offering advice, instructions, and input by gathering volunteers and village officials using two-way communication and demonstration methods [23].

The results indicated that age did not influence malaria prevention behavior among community figures in Banyumas. In other words, higher age did not necessarily

guarantee better prevention behavior. This was attributed to the development process of respondents, including education, knowledge, and life experiences in interacting with their social environment [26].

Attitude had no significant influence on malaria prevention behavior among community figures. This is because attitude represents the subjective response of individuals to specific stimuli or objects, involving opinions as well as emotions, and might not align with behavior. According to a previous study, individuals may act differently from their attitude [27], [28], [29]. Education was also found to have no significant influence on malaria prevention behavior among community figures. Findings in Ghana and Ethiopia also show that in general the level of education did not influence malaria prevention practices [20], [30]. This is because behavior formation and changes are influenced by various internal and external factors [31]. Although the majority had only basic to secondary education, there was sufficient awareness regarding the details of malaria and its prevention.

Income had no significant influence on malaria prevention behavior among community figures. Although the majority of respondents had low incomes, there was an active engagement in prevention efforts by using mosquito repellents inside their homes during the night. Respondents engaged in this behavior because mosquito repellents were inexpensive and easily available in small shops. Economic status had a significant influence on malaria incidents, but it did not fundamentally change health behavior unless accompanied by prevention actions [32].

Access to healthcare services did not influence malaria prevention behavior among community figures in Banyumas. The village residents can reach public health centers within a maximum of 15-20 minutes with a distance of more than 5 km, using either two-wheeled or four-wheeled vehicles [32]. Exposure to information also had no significant influence on malaria prevention behavior among community figures. The malaria prevention interventions mainly involved information dissemination without adequate efforts to increase public awareness of preventing transmission [33].

The limitation of this study is that it was conducted on the island of Java, an area that has a low incidence of malaria.

5. Conclusions

In conclusion, the most influential variable in malaria prevention behavior among community figures in Banyumas was knowledge with a POR value of 4.298. This implied that respondents with poor knowledge were at 4.298 times greater risk of having poor prevention behavior compared to those with good knowledge. Further research on malaria prevention behavior among community figures needs to be carried out in eastern Indonesia, which is an area where malaria cases are still high. A study on the

effectiveness of health education interventions regarding malaria for community figures is also needed in the future. The study aimed to determine the effect of this intervention on changes in the behavior of community leaders.

Acknowledgments

The authors are grateful to the Research Institution and Community Service (LPPM), Universitas Jenderal Soedirman, Indonesia for providing funding to conduct this study and to all respondents in this study.

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