BKM Public Health & Community Medicine
Berita Kedokteran Masyarakat

Volume 41 **Number** 6, 2025, **Pages** e21207
DOI: 10.22146/bkm.v41i06.21207

Behavior determinants of malaria incidence in endemic areas of Kaligesing District, Purworejo Regency

Dwi Fitriani[1]*, Mursid Raharjo[2]

Submitted:
May 2nd, 2025
Accepted:
June 24th, 2025
Published:
June 30th, 2025

[1]Department of Environmental Health, Faculty of Public Health, Universitas Sriwijaya, Palembang, South Sumatra, Indonesia

[2]Department of Environmental Health, Faculty of Public Health, Universitas Diponegoro, Semarang, Central Java, Indonesia

***Correspondence:**
dwi_fitriani@fkm.unsri.ac.id

Abstract

Purpose: The purpose of this study is to analyze the behavior of the community with the incidence of malaria in Kaligesing District. **Methods:** Using quantitative methods that were analyzed observationally with case-control studies. Sampling employed purposive sampling techniques, involving a total of 80 respondents, comprising 40 case group respondents and 40 control group respondents each. The instrument used is a questionnaire. **Results:** The results showed that the case group had lower knowledge (52.5%), which was higher compared to the control group (30%), as determined by the chi-square test with a p-value of 0.069. Negative attitudes were more prevalent in the case group (52.5%) compared to the control group (40%), as indicated by a chi-square test with a p-value of 0.370. Low action was found in the case group (50%) compared to the control (17.5%) and based on the chi-square test obtained a value of p=0.005, OR=4.714 and 95% CI OR (1.693 – 13.131) meaning that people who have less action on malaria prevention and control are 4.714 times more at risk of developing malaria than with people who have good measures on malaria prevention and control. **Conclusion:** There is no relationship between knowledge and attitudes with the incidence of malaria, and there is a relationship between actions and the incidence of malaria.

Keywords: actions; attitudes; knowledge; malaria

INTRODUCTION

Malaria is one of the life-threatening diseases and is still a target for the world to achieve elimination. Globally, in 2023, there will be an estimated 263 million cases of malaria and 597,000 deaths due to malaria in 83 countries. This number increased by approximately 11 million more cases than in 2022, with a similar number of deaths [1]. Vulnerable groups such as infants, toddlers, and pregnant women are at higher risk of infection.

Indonesia remains a champion of national malaria elimination, which is targeted for achievement by 2030. It is recorded that in 2023, there are eight provinces whose entire districts or cities are designated as malaria-free areas. Additionally, there are still highly endemic areas and those that are low endemic. There was a 1.5 increase in API per 1,000 population in 2023, with a total of 418,546 positive cases [2].

Central Java Province itself remains at a low endemic level, with malaria cases still being found in the district of Purworejo. After previously failing to obtain an elimination certificate due to a surge in retransmission cases in 2021, in 2023, there were 13 cases of malaria in Purworejo and 36 indigenous cases [3].

Lawrence Green stated that a person's health is influenced by two factors, behavioral causes and nonbehavioral causes. Behavior is formed from three factors: predisposing factors or internal factors of individuals, such as knowledge, attitudes, beliefs, and values. Supporting factors, such as the physical environment and the availability of health facilities, as well as driving factors, including the attitudes and behaviors of health workers, friends, and parents, who serve as reference groups for community behavior [4].

Previous research stated that the people of Purworejo have behaviors that have the potential to transmit malaria such as going out of the house at night to worship, not using personal protection from mosquito bites [5], most people do not use mosquito nets at night, do not use gauze wire in house ventilation [6], and have the habit of going to endemic areas [7]. This is due to the low public knowledge about malaria, and there are still many people who consider malaria to be normal [8]. The purpose of this study is to identify the determinants of community behavior, including knowledge, attitudes, and actions, regarding the incidence of malaria in malaria-endemic areas of Kaligesing District and Purworejo District.

METHODS

This study employs a quantitative method to investigate the relationship between community behavior, encompassing knowledge, attitudes, and actions, and the incidence of malaria. This variable was analyzed observationally through a case-control study, comparing the case group and the control group based on their exposure status. The case population consists of all malaria patients recorded in the work area of the Kaligesing Health Center in 2022, while the control population comprises all individuals residing in the work area of the Kaligesing Health Center who do not suffer from malaria. Calculation of the hypothesis test formula Odds ratio (OR) with P1, P2, and OR values from previous research. The results of the sample calculation were obtained with a total of 80 respondents, with 40 case group respondents and 40 control group respondents each.

Sampling employs purposive sampling techniques with specific criteria [9]. The inclusion criteria for the case group include living in the work area of the Kaligesing Health Center, being registered as a malaria patient based on examination results at the Kaligesing Health Center in 2022, and being willing to participate as a research respondent until completion. The control group comprises individuals residing in the work area of the Kaligesing Health Center who have never experienced malaria, as determined by the results of malaria examinations conducted at the Health Center or Hospital. Meanwhile, the exclusion criteria for the case group include not being present at the location during the study and the subject being ill. The control group did not reside in the area during the study, and the subjects were sick.

The instrument used was a questionnaire consisting of 15 questions for the knowledge variable, 15 questions for the attitude variable, and 14 questions for the action variable. The questionnaire has been tested for validity and reliability in a similar area where the research was conducted, Purworejo Regency, but in a different sub-district. The Validity test utilizes Pearson correlation and reliability analysis, as measured by Cronbach's alpha.

Data collection was conducted through interviews using questionnaires with selected samples. After the data is collected, it is processed with the stages of editing, coding, entry, cleaning, and tabulating. Data analysis was conducted using univariate analysis to describe the frequency distribution and bivariate analysis to examine the relationship between community behavior and malaria incidence, employing the chi-square test.

RESULTS

Respondent characteristics

The characteristics of the respondents in this study included gender, age, education, occupation, and income. The study's results were obtained through questionnaire interviews. The following is an overview of the characteristics of the respondents in this study. Based on Table 1, it is evident that the respondents in the case group and the majority of the control group are male. The percentage of male cases in the case group was 67.5%, representing a 10% difference compared to the control group, which was 57.5%.

Characteristics of respondents based on age in the case group and the control group were individuals over 40 years old. The percentage of individuals aged 40 years or older in the case group was 70%, the same as that of the control group. Characteristics of respondents based on education in the case group and the majority of elementary school (SD) controls. The percentage of individuals aged 40 years or older in the case group was 70%, the same as that of the control group. Characteristics of respondents based on education in the case group and the majority of elementary school (SD) controls. The percentage of

elementary school education in the case group was 60%, with a 5% difference compared to the control group, which was 55%. The characteristics of the respondents, based on their work in the case group and the majority control, were primarily farmers. The percentage of farmers in the case group was 47.5%, with a 15% difference compared to the control group, which was 32.5%. Characteristics of respondents based on income in the majority case and control group 1,000,000 – 2,500,000. The percentage of respondents with an income of 1,000,000–2,500,000 in the case group was 70%, a 20% difference compared to the control group of 50%.

Knowledge

The knowledge in this study refers to the level of expertise of respondents regarding the incidence of malaria, encompassing the definition of malaria, its causes, the biology of the malaria vector, and malaria prevention and control efforts. Based on the results in Table 2, it is evident that most respondents provided appropriate answers to both positive and negative questions. However, there are still many who answered that they did not knowsome questions, such as plasmodium is the cause of malaria as many as 51 people (63.8%), installing gauze wire in house ventilation can prevent malaria transmission by 20 people (25.0%), Anopheles sp. mosquito biting activity in the morning as many as 18 people (22.5%).

Table 1. Respondent characteristics

Variable	Case		Control	
	n	%	n	%
Gender				
Man	27	67.5	23	57.5
Woman	13	32.5	17	42.5
Age (years)				
<20	9	22.5	8	20
20-40	3	7.5	4	10
>40	28	70	28	70
Education				
No school	3	7.5	0	0
Not finishing elementary school	0	0	1	2.5
Elementary school	24	60	22	55
Junior high school	5	12.5	7	17.5
Senior high school	8	20	7	17.5
College	0	0	3	7.5
Work				
Not working	2	5	0	0
Farmer	19	47.5	13	32.5
Housewives	5	12.5	11	27.5
Self employed	2	5	5	12.5
Student	8	20	7	17.5
Laborer	2	5	3	7.5
Merchant	2	5	1	2.5
Income (Rp)				
<1.000.000	9	22.5	8	20
1.000-0000-2.500.000	28	70.0	20	50
>2.500.000	3	7.5	12	30

Table 2. The description of knowledge (n=80)

No	Knowledge	Yes		No		Don't know	
		f	%	f	%	f	%
1	People of all ages can get malaria	73	91.3	3	3.8	4	5
2	Another name for malaria is dengue fever	30	37.5	39	48.8	11	13.8
3	Malaria is not a contagious disease	22	27.5	50	62.5	8	10
4	Plasmodium is the cause of malaria	17	21.3	12	15	51	63.8
5	Malaria is transmitted through the bite of the mosquito Anopheles, Sp	70	87.5	1	1.3	9	11.3
6	Anopheles, Sp mosquitoes breed in puddles, swamps, rice fields	63	78.8	4	5	13	16.3
7	Activity of biting Anopheles mosquitoes, Sp in the morning	15	18.8	47	58.8	18	22.5
8	Malaria can be prevented by using mosquito nets while sleeping at night	70	87.5	7	8.8	3	3.8
9	Installing gauze wire on home ventilation can prevent malaria transmission	35	43.8	25	31.3	20	25
10	Using mosquito repellent can prevent malaria transmission	66	82.5	11	13.8	3	3.8
11	Wearing open clothes when going out at night can prevent the transmission of malaria	26	32.5	48	60	6	7.5
12	Going to malaria-endemic areas can put one at risk of malaria transmission	52	65	20	25	8	10
13	The presence of larvae-eating fish in ponds is one of the efforts to control malaria	71	88.8	5	6.3	4	5
14	Covering puddles around the house is one way to control malaria	71	88.8	6	7.5	3	3.8
15	Cleaning the sewer environment is one way to control malaria	75	93.8	1	1.3	4	5

Table 3. The description of attitude variables (n=80)

No	Attitude	Strongly agree		Agree		Hesitate		Disagree		Strongly disagree	
		f	%	f	%	f	%	f	%	f	%
1	Malaria is not a dangerous disease and cannot be transmitted	2	2.5	26	32.5	5	6.3	43	53.8	4	5
2	Malaria is a curse and cannot be prevented	0	0	6	7.5	7	8.8	62	77.5	5	6.3
3	Only children can develop malaria	0	0	11	13.8	5	6.3	59	73.8	5	6.3
4	Malaria is transmitted through the bite of the Anopheles mosquito infected with plasmodium	17	21.3	54	67.5	8	10	1	1.3	0	0
5	The time to bite a malaria mosquito is at night	22	27.5	33	41.3	17	21.3	8	10	0	0
6	Malaria mosquito larvae can be found in swamps, stagnant water, and rice fields	13	16.3	55	68.8	10	12.5	2	2.5	0	0
7	Malaria control is a shared responsibility	20	25.0	46	57.5	3	3.8	11	13.8	0	0
8	Standing water around the house can cause the presence of malaria mosquito larvae	10	12.5	62	77.5	4	5	3	3.8	1	1.3
9	If there are swamps around the house, we must clean the moss or aquatic plants in the swamps regularly	6	7.5	69	86.3	3	3.8	2	2.5	0	0
10	Mutual cooperation in malaria mosquito control is not my job	1	1.3	20	25.0	4	5.0	49	61.3	6	7.5
11	The use of mosquito nets, mosquito repellent drugs, and repellent can prevent you from mosquito bites, Anopheles, and Sp	18	22.5	54	67.5	5	6.3	3	3.8	0	0
12	To keep the room free of mosquitoes, one way is to leave clothes hanging	1	1.3	14	17.5	28	35	35	43.8	2	2.5
13	Must always wear closed shoes when outside the house, especially at night	7	8.8	61	76.3	5	6.3	7	8.8	0	0
14	Installing gauze at home is one way to prevent malaria	1	1.3	35	43.8	32	40	11	13.8	1	1.3
15	Going to endemic areas does not affect malaria transmission	3	3.8	22	27.5	29	36.3	25	31.3	1	1.3

Table 4. The description of the action variable

No	Action	Always		Often		Sometimes		Never	
		f	%	f	%	f	%	f	%
1	Getting health counseling about malaria	1	1.3	16	20	45	56.3	18	22.5
2	Using mosquito nets while sleeping at night	34	42.5	11	13.8	13	16.3	22	27.5
3	Using burning/spraying mosquito repellent	4	5	4	5	14	17.5	58	72.5
4	Wear repellent	3	3.8	6	7.5	33	41.3	38	47.5
5	Going out at night	1	1.3	16	20	45	56.3	18	22.5
6	Wearing open clothes when going out at night	5	6.3	9	11.3	31	38.8	35	43.8
7	Hanging clothes in the house	6	7.5	43	53.8	17	21.3	14	17.5
8	Installing gauze on house vents	6	7.5	1	1.3	2	2.5	71	88.8
9	Closing doors and windows at night	64	80	14	17.5	1	1.3	1	1.3
10	Participating in mutual cooperation in malaria control	5	6.3	44	55	21	26.3	10	12.5
11	Covering standing water around the house	4	5	18	22.5	21	26.3	37	46.3
12	Cleaning the gutters of the house	1	1.3	11	13.8	37	46.3	31	38.8
13	Cleaning the cattle barn	1	1.3	20	25	35	43.8	24	30
14	Go to malaria-endemic areas	6	7.5	26	32.5	31	38.8	17	21.3

Attitude

The respondents' reaction to the prevalence of malaria prevention and control is the attitude in this study. Table 3 shows that, although the respondents' attitude variables are generally positive, many of their responses remain unfavorable. Negative statements like "It's not my job to control malaria mosquitoes" (61.3%) and “Malaria is not a dangerous disease and cannot be transmitted (53.8%) were answered "yes" by respondents. One method of keeping the room mosquito-free is to hang clothes, which is suitable for approximately 35 people (43.8%). The statement that "installing gauze at home is one way to prevent malaria in up to 32 people" was met with hesitancy by respondents (40%).

Actions

The actions in this study refer to the responses or measures that respondents typically take to prevent and control malaria. Based on Table 4, it shows that malaria prevention and control measures in the respondents are still not reasonable because there are still respondents who answered that 58 people (72.5%) have never used mosquito repellent/spray, 38 people have never used repellent (47.5%), 72 people have never installed gauze wire in house ventilation (88.8%), and 37 people (46.3%) have closed puddles around the house. Wearing open clothes when going out at night was reported by 35 (43.8%) individuals. Additionally, respondents reported occasionally going out at night with as many as 45 people (56.3%).

The relationship of knowledge, attitudes, and actions with the incidence of malaria

In the bivariate analysis of the relationship between knowledge, attitudes, and actions and the incidence of malaria, based on statistical calculations, the following table is presented in Table 5. The relationship between the knowledge variable and the incidence of malaria in the working area of the Kaligesing Health Center revealed that the response rate among those with less knowledge in the case group (52.5%) was higher than in the control group (30%). Still, based on the chi-square test, a value of p = 0.069 (> 0.05) was obtained, indicating that there was no significant relationship between knowledge and the incidence of malaria in the work area of the Kaligesing Health Center.

The relationship between attitude variables and the incidence of malaria in the work area of the Kaligesing Health Center revealed that the response with a negative attitude in the case group (52.5%) was higher than in the control group (40%). Based on the Chi-Square test, a value of p=0.370 (>0.05) was obtained, indicating that there was no significant relationship between attitude and the incidence of malaria in the working area of the Kaligesing Health Center.

The relationship between the action variable and the incidence of malaria in the working area of the Kaligesing Health Center showed that the response with less action in the case group (50%) was higher than the control (17.5%) and based on the chi-square test, a value of p=0.005 (<0.05) was obtained indicating that there was a significant relationship between action and the incidence of malaria in the work area of the Kaligesing Health Center. The result of the risk magnitude was OR=4.714 and 95% CI OR (1.693 – 13.131), meaning that people who had less action on malaria prevention and control were 4.714 times more likely to get malaria compared to people who had good actions on malaria prevention and control with a 95% confidence range between 1.693 – 13.131.

Table 5. Bivariate analysis results

Component	Malaria incidence				p-value	OR 95% CI
	Case		Control			
	f	%	f	%		
Knowledge						
Less	21	52.5	12	30	0.069	-
Good	19	47.5	28	70		
Total	40	100	40	100		
Attitude						
Negative	21	52.5	16	40.0	0.370	-
Positive	19	47.5	24	60.0		
Total	40	100	40	100		
Action						
Less	20	50	7	17.5	0.005	4.714
Good	20	50	33	82.5		(1.693-13.131)
Total	40	100	40	100		

DISCUSSION

One of the efforts to reduce the risk of malaria transmission is through prevention efforts. Based on the research results, the community in Kaligesing District has a generally good understanding of the basic concepts of malaria transmission and the importance of prevention, including the use of mosquito nets and environmental control measures. However, a knowledge gap still exists in certain aspects. Many respondents were unaware that Plasmodium was the cause of malaria (63.8%), and some were also unaware of the importance of installing gauze wire in home ventilation.

This finding aligns with research conducted in Oku and Lahat Regencies, as well as in Malawi, where public knowledge is relatively high regarding symptoms, modes of transmission, and prevention of malaria from mosquito bites [10,11]. As for the causes of malaria, most of them are stated to be caused by mosquitoes. The results of the study in Tanzania indicated that most respondents attributed the cause of malaria to mosquitoes [12]. The results showed that the level of knowledge in the case group was not significantly different, with 52.5% having less knowledge and 47.5% having good knowledge. As for the control group, most of them had good knowledge, with approximately 70% having good knowledge and the remaining 30% having less knowledge.

The results of the bivariate analysis revealed no significant relationship between knowledge level and malaria incidence (p = 0.069). These findings align with research conducted by Chrysty, Tanumihardja, and Handayani (2019), which suggests that there is no relationship between knowledge and malaria prevention. Good knowledge does not mean that it can shape public awareness in malaria prevention [13].

Knowledge is a risk factor for malaria incidence because the knowledge a person has can serve as a motivational driver to take action. A person with good knowledge about matters related to malaria will be motivated to behave and act in a manner that promotes malaria prevention [14]. However, according to Green, increased knowledge does not necessarily lead to a change in behavior [4].

The attitude presents a latent psychological response of the individual to a stimulus. In everyday life, attitudes are generally reflected as an emotional reaction to a social stimulus received. Based on the theory of planned behavior, attitudes are seen as an individual's predisposition in forming intentions that lead to specific behaviors [15].

Based on the study's results, the attitude of respondents in Kaligesing District tends to be positive towards malaria prevention behavior; however, doubts and misperceptions persist among respondents. For example, as many as 61.3% of respondents agreed with the negative statement that cooperation in malaria control was not their responsibility, and 53.8% considered malaria to be not a dangerous disease. The attitude of hesitation is also reflected in the understanding of the importance of installing gauze at home. These results align with research conducted in Purworejo and Hanura Regencies, where most respondents have a positive attitude towards supporting malaria prevention and control activities [16].

Statistical analysis revealed no significant relationship between attitude and malaria incidence (p = 0.370). These results align with the research of Madayanti, Raharjo, and Purwanto (2022) in Jayapura City, which found no relationship between attitude and malaria incidence (p = 0.697). This reinforces the theory that a positive attitude without real action is not necessarily able to prevent disease. The attitudes that are formed are often influenced by personal and social experiences, and are not always directly manifested in actions [17].

If connected, respondents may answer the question positively, but their attitude is not reflected in their actual actions [18]. A positive attitude can facilitate the adoption of healthy behaviors, which can have a profoundly positive impact on a person's overall health. A person with a positive attitude but not accompanied by good preventive practices can still contract diseases [19].

In contrast to knowledge and attitudes, respondents' actual actions in malaria prevention efforts showed a significant relationship with malaria incidence. Many respondents did not consistently take preventive measures, such as not using mosquito repellent (72.5%), not using repellent (47.5%), and not installing gauze wire in house ventilation (88.8%).

Bivariate analysis revealed that action was significantly less associated with malaria incidence (p = 0.005), with an odds ratio (OR) of 4.714. This means that individuals with fewer preventive measures are 4.7 times more likely to develop malaria compared to those who take preventive measures well.

This study supports the findings of Jarona's (2021) research, which indicates a significant relationship between preventive measures and the incidence of malaria (p = 0.014) [14]. Based on the theory of B.Kar in Notoatmodjo states that a person's health behavior is

determined by his intention towards the object of health, the presence or absence of support from the surrounding community, the presence or absence of health information, the freedom of the individual to make decisions or act in situations that allow him to behave and act [20].

Various malaria prevention and control efforts have been implemented by the Purworejo Regency Health Office, including the provision of Village Malaria Agents (JMD) for each sub-district, periodic community education, and collaboration among JMD, Puskesmas, the Health Office, and cross-sectoral partners. This supports the local community's knowledge, which is generally good regarding malaria. It's just that, because malaria is a disease that has existed for a long time in Purworejo Regency, many people underestimate this disease.

CONCLUSION

This study concluded that the lack of knowledge in the case group (52.5%) was higher than in the control group (30%). Negative attitudes in the case group (52.5%) were higher than in the control group (40%). The proportion of less action in the case group (50%) was higher than in the control group (17.5%). Based on bivariate tests, it was shown that there was no significant relationship between knowledge (p = 0.069) and attitude (p = 0.370) with malaria incidence. There was also a significant association between action and malaria incidence (p = 0.005, OR 95% CI = 1.693-13.131).

It is hoped that the Purworejo Health Office will further enhance community education, particularly in schools, and involve cross-sectoral partners, such as the Tourism Office and Education Office, in providing education to the community.

REFERENCES

1. World Health Organization. World malaria report 2024. Geneva: WHO; 2024.
2. Kementerian Kesehatan RI. Profil kesehatan Indonesia 2023. Jakarta: Kemenkes RI; 2023.
3. Dinas Kesehatan Provinsi Jawa Tengah. Profil kesehatan Jawa Tengah. Jawa Tengah: Dinkes Provinsi Jateng; 2024.
4. Notoatmodjo. Teori lawrence green. promosi kesehatan dan ilmu perilaku. Jakarta: Rineka Cipta; 2010.
5. Muliawati PE, Supargiyono, Murhandarwati EH. Gambaran jenis pekerjaan dan perilaku keluar rumah pada malam hari serta kejadian malaria pada penduduk di Dusun Tepansari dan Dusun Kembaran Kecamatan Loano Kabupaten Purworejo [Thesis]. Yogyakarta: Universitas Gadjah Mada; 2020.
6. Keptiyah S, Martini M, Saraswati L. Gambaran faktor perilaku dan faktor lingkungan di daerah endemis malaria (Studi di daerah endemis rendah dan daerah endemis tinggi Kecamatan Bagelen Kabupaten Purworejo tahun 2015. Jurnal Kesehatan Masyarakat. 2017;5(2):64–9.
7. Wijayanti EPN, Martini M, Hestiningsih R, Wuryanto MA, Yuliawati S, Mawarni A. Case study of malaria patients: Distribution of cases and maps of Anopheles sp. breeding place in Kaligesing sub-district, Purworejo district. Journal Physics: Conference Series. 2020;1524(1).
8. Ikawati B, Isnani T, Wijayanti T, Wahyudi BF, Raharjo J, Sunaryo S, et al. Peran lintas program, lintas sektor, dan masyarakat dalam eliminasi malaria di Kawasan Bukit Menoreh. Vektora: Jurnal Vektor dan Reservoir Penyakit. 2020;12(2):119–32.
9. Sugiyono. Metodologi penelitian kuantitatif, kualitatif dan R&D. Bandung: CV Alfabeta; 2013.
10. Yahya Y, Santoso S, Salim M. Pengetahuan, sikap, dan perilaku masyarakat tentang malaria di Kabupaten Ogan Komering Ulu Dan Lahat. Jurnal Bahana Kesehatan Masyarakat. 2022;6(1):15–23.
11. Sixpence A, Nkoka O, Nkoka O, Chirwa GC, Milanzi EB, Milanzi EB, et al. Levels of knowledge regarding malaria causes, symptoms, and prevention measures among Malawian women of reproductive age. Malaria Journal. 2020;19(1):1–13.
12. Mathania MM, Kimera SI, Silayo RS. Knowledge and awareness of malaria and mosquito biting behavior in selected sites within Morogoro and Dodoma regions, Tanzania. Malaria Journal. 2016;15(1):1–9.
13. Christy K, Tanumihardja TN, Handayani YS. Hubungan pengetahuan dan sikap tentang malaria dengan perilaku pencegahan pada kehamilan pada ibu hamil di Desa Muara Siberut dan Desa Maillepet, Mentawai, Indonesia. Cermin Dunia Kedokteran. 2019;46(5):339–44.
14. Jarona MM. Hubungan pengetahuan, sikap, dan tindakan pencegahan malaria dengan kejadian malaria di Kampung Pir 3 Bagia Distrik Arso Kabupaten Keerom Tahun 2021. Bidan Prada Jurnal Publik Kebidanan. 2021;13(1):93–100.
15. Fertman C. Health promotion program: from theory to practice. 2nd ed. San Francisco: Jossey-

-Bass Inc. Pub; 2016.
16. Trapsilowati W, Pujiyanti A, Wigati W. Gambaran pengetahuan, sikap dan tindakan masyarakat pada peningkatan kasus malaria di Kabupaten Purworejo Tahun 2015. ASPIRATOR - Journal of Vector-borne Disease Studies. 2018;10(1):9–14.
17. Madayanti S, Raharjo M, Purwanto H. Faktor risiko yang mempengaruhi kejadian malaria di Wilayah Distrik Jayapura Selatan Kota Jayapura. Jurnal Kesehatan Lingkungan Indonesia. 2022;21(3):358–65.
18. Santy S, Fitriangga A, Natalia D. Hubungan faktor individu dan lingkungan dengan kejadian malaria di Desa Sungai Ayak 3 Kecamatan Belitang Hilir, Kabupaten Sekadau. eJournal Kedokteran Indonesia. 2014;2(1).
19. Notoatmodjo S. Promosi kesehatan dan ilmu perilaku. Jakarta: PT. Rineka Cipta; 2007
20. Notoadmodjo S. Ilmu kesehatan masyarakat prinsip-prinsip dasar. Jakarta: PT. Rineka Cipta; 2012.