

Prevalence Rates Reduction Efforts of Malaria Cases among Health Students in Endemic Area

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ABSTRACT

Background: Many cases of malaria among students related to the health department are not explored or dealt with through structured efforts, which pose a high risk, particularly in endemic areas. **Objectives:** This study aimed to investigate the elevated incidence of malaria among health students in Papua and examine their coping mechanisms. **Methods:** Quantitative method with a descriptive design. The research was conducted from July 2022 to August 2022 after receiving the approval letter from the ethical committee of the Jayapura Health Polytechnic of the Ministry of Health, Papua, Indonesia. The population was health students (n=167 people). Primary data was obtained from a questionnaire. The dependent variable was the respondent's characteristics, and the independent variables were the presence of exposure, symptoms, place of treatment, length of suffering, drugs consumed, and the side effects. Secondary data were obtained from reputable journals for the last five years and government official documents. They were analyzed univariately and descriptively. **Results:** The most common conventional therapy was Dihydroartemisinin or DHP (n=46 or 27.5%), without side effects (n=134 or 80.2%) and using herbals (n=66 or 39.5%). **Conclusion:** The findings recommended empowering the potential of health students' knowledge and experiences during college time to reduce the high prevalence of malaria cases in endemic areas.

Keywords: Endemic Areas; Health Students; Malaria

INTRODUCTION

In 2020, it was estimated that there were 241 million malaria cases worldwide, and 627,000 (0.26%) of them resulted in death (Guntur *et al.*, 2021). Thus, signifying a significant and concerning prevalence. Indonesia, ranked second in Southeast Asia, reported the highest number of malaria cases in the region, as highlighted in the World Malaria Report 2020 by the World Health Organization (Ghosh & Rahi, 2019). The trend of malaria cases in Indonesia tends to stagnate from 2014-2019 (Sroyer *et al.*, 2022). The trend of positive cases of malaria and the number of malaria sufferers (Annual Parasite Incidence/API) shows a high concentration of malaria endemic districts or cities in Eastern Indonesia (Ipa *et al.*, 2020). Four of Indonesia's 34 provinces (11.8%) are declared to have eliminated malaria (DKI Jakarta, East Java, Bali, and Banten), and another 30 provinces (88.2) are still struggling to eradicate it (Rahmasari *et al.*, 2021). Around 86% of malaria cases occurred in Papua Province, with a total of 216,380 cases in 2019 (Patriani *et al.*, 2019). Followed by East Nusa Tenggara with 12,909 cases and West Papua Province with 7,079 cases (Guntur *et al.*, 2021). There are still high endemic areas in central Indonesia, precisely in North Penajaman Paser Regency, East Kalimantan Province (Istiana *et al.*, 2021). Three hundred districts and cities (58%) that have entered the elimination category, or about 208.1 million people (77.7%) live in malaria-free areas, and 69 million people still have to try to eliminate it (Bandzuh *et al.*, 2022).

Many studies have stated that weather factors are one of the main causes of the spread of malaria in eastern regions (Aberese-Ako *et al.*, 2019). The rainy season lasts for several months, and sometimes intense heat can cover the regions, making people's bodies more susceptible to malaria (Wanzira *et al.*, 2017). Symptoms of malaria, which are similar to symptoms of mild illness, also make it difficult for people in high-endemic areas to identify that they are infected with malaria, thus making medical treatment longer (Yasuoka

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et al., 2018). Difficulties in identification also make the source of the infection late to handle, and transmission to many people already occurs, such as in water reservoirs as a nest for mosquitoes carrying parasites that are still consumed (Dalaba *et al.*, 2018). Those who have been infected and recovered are also easily re-infected with malaria due to not taking precautions (Yogi & Kabak, 2023). Community settlements that have a lot of puddles of water during high rainfall, coupled with a less clean environment, make them vulnerable to being surrounded by mosquito nests (Dhewantara *et al.*, 2019).

Health students in Papua province come from various areas that are still prone to malaria, including the districts of Keerom, Mimika, Jayapura, Sarmi, and Boven Digoel (Watofa *et al.*, 2018). In those five areas, malaria is very high, where the Annual Parasite Incidence (API) indicator is approximately 67 percent. The intervention in those five vulnerable areas is said to be able to reduce 50% of the malaria burden in Papua. There are four districts with low malaria endemicity, namely Lanni Jaya, Jayawijaya, and Biak Numfor districts (Manangsang *et al.*, 2021). Although many studies related to malaria have been carried out in those areas, there has not been any related research on health students (Debora *et al.*, 2018; Patriani *et al.*, 2019). That is what distinguishes this research from the previous ones. Our quantitative study focuses on health students and aims to explore the status of malaria infection in health students in Papua as an endemic area and how they cope when exposed. The implication of this research will be to assist in the formulation of malaria elimination strategies by empowering students as part of an educated community.

METHODOLOGY

This research based on quantitative approach and a descriptive analysis design, was conducted at the Poltekkes campus of the Ministry of Health, Jayapura. The research was carried out from July to August 2022. The data was collected through a survey. The population consists of students majoring in health diploma III and IV programs in five classes of 40 students each, or a total of 200 students. The ones who participated in the study were 167 students (83.5%). Primary data were obtained directly from 167 students studied, namely those who were actively attending lectures. They were the inclusion criteria. The exclusion criteria were non-health student programs and outside Poltekkes of the Ministry of Health of Jayapura. Data were obtained through a questionnaire, which contained demographic data (respondent identity) and the variables studied. The dependent variables were the respondent's characteristics, while the independent variables included the presence of exposure, symptoms, place of treatment, length of suffering, and drugs consumed. Secondary data were obtained from official documents from the Ministry of Health of the Republic of Indonesia, the World Health Organization, and reputable journals for the last 5 years (2017-2022). The data collected were analyzed by univariate analysis, presenting the results of the data collection both in tables and graphs. The research was started after obtaining approval from the Poltekkes Ethics Committee of the Jayapura Ministry of Health.

Ethical Consideration

This research received ethical clearance from the health research ethics committee of Poltekkes Kemenkes Jayapura, Indonesia with Ethical Approval No. 43/KEPK-J/VI/2022 on July 10, 2022.

RESULTS

Data Demographic

Table 1: Demographic Data of Health Students

No.	Gender	Σ	%	Age	Σ	%	History of Exposure	Σ	%
1	Male	38	22.7	17-20	66	39.5	Yes	75	44.9
2	Female	129	77.3	> 20	101	60.5	No	92	55.1
Total		167	100		167	100		167	100

Table 1 above shows that female students dominate malaria cases (77.3%), the majority are over 20 years old and 44.9% have been exposed to malaria.

Table 2: Place of Treatment, Signs and Symptoms

No	Sign and Symptoms	Place of Treatment						Σ
		Hospital	Health Center	Medical Practitioner	Herbal	Nurse Practitioner	Self-Treatment	
1	Fever, chills, sweating, aches and pains, nauseous vomit	44 (26.3%)	55 (32.9%)	17 (10.2%)	19 (11.4)	4 (2.4%)	28 (16.8%)	167 (100%)
2	Fever, chills, aches and headaches	57 (34.1%)	47 (28.1%)	20 (11.9%)	10 (5.9%)	7 (4.2%)	26 (15.6%)	167 (100%)
3	Slight fever	30 (17.3%)	42 (25.1%)	14 (8.4%)	15 (8.9%)	5 (2.9%)	61 (36.5%)	167 (100%)

Table 2 shows that more students who experienced symptoms of fever, along with chills, aches, and headaches than other symptoms went to the hospital (57 students or 34.1%) followed by the health center (47 students or 28.1%). However, there are also quite a lot of people who do self-treatment (herbs) (28 students or 16.8%).

Table 3: Medicine and Side Effects

No.	Medicine Name			Side Effect		
	Medicine	Σ	%	Side effect	Σ	%
1	Atovaquone	14	8.4	No side effect	134	80.2
2	Dikosiklin	17	10.2	Less appetite	21	12.6
3	Klorokuin	24	14.4	Bloated	7	4.2
4	Primaquine	46	27.5	Diarrhea	3	1.8
5	Herbal	66	39.5	Skin reaction	2	1.2
	Σ	167	100	Σ	167	100

The table above shows that the majority of students received conventional treatment with Primaquine (46 or 27.5%) although many used traditional herbs (66 or 39.5%).

Table 4: Length of Sickness and Ability to Attend Lectures

No	Length of Sickness			Ability to Attend Lectures		
	Period	Σ	%	Ability	Σ	%
1	Less than 1 week	107	64.1	Able	61	36.5
2	1-2 weeks	25	14.9	Unable	40	23.9
3	>2 weeks	35	20.9	Sometimes	66	39.5
		167	100		167	100

The table above shows the majority of the healing is less than 1 week (107 or 64.1%) and sometimes they can attend college courses (66 students or 39.5%).

Analysis

Endemic is a disease that appears and becomes characteristic in a certain area (Hasyim *et al.*, 2019). Our research found that malaria is prevalent among health students in Papua (75 students, or 44.9%) of the total study population, which is relevant concrete evidence. Female students dominate (77.3%), aged over 20 years, and 44.9%. The prominent symptoms included fever, chills, aches, and headaches, and they went to the hospital (57 students, or 34.1%) followed by the health center (47 students, or 28.1%). However, there are also quite a lot of people who do self-treatment (herbs) (28 students, or 16.8%). The most common conventional treatment was primaquine (46, or 27.5%) without side effects (134 students, or 80.2%), although many used traditional herbal methods (66, or 39.5%). Most felt healed in less than 1 week (107, or 64.1%), and sometimes they were still able to

attend lectures on campus (66 students, or 39.5%)

Study Limitation

In Papua, there are 9 health campuses with various health departments spread over 29 districts (Tukayo *et al.*, 2021). Five of the 29 districts are endemic areas (Sroyer *et al.*, 2022). The population of this study cannot represent Papua as an endemic area due to the limited number of students involved. More such research on different populations from diverse areas is needed. For this purpose, more funds, time, and energy are needed, especially because Papua is geographically challenging in terms of its infrastructure and information technology (Januar, 2019). Therefore, it is recommended that future research be more specific about malaria from a health education perspective. However, this research has provided a novelty that is different from previous research, which focuses more on the causative factors, general treatment, and treatment (Doi, 2018; Mbengue *et al.*, 2017; Morakinyo *et al.*, 2018).

DISCUSSION

The findings obtained in this study include the high number of malaria cases among health students (44.9%), taking more herbal medicine (39.5%) as a fairly dominant intervention, although, on the other hand, they adopt conventional treatment with Primaquine (27.5%) and they live in the region that is endemic (100%). Students living in malaria-endemic areas are at risk, especially if they are in an environment prone to vector growth and spread, as happened in Papua (Yankson *et al.*, 2019). Several studies on traditional medicine in the treatment of malaria have been carried out (Aberese-Ako *et al.*, 2019). It's just that as a health student, where conventional therapy is getting more recognition that can be measured, what is expected is the same approach. Specifically, applying the knowledge gained on campus and being able to provide the same health education to the community. Except what is taken is traditional health education, which is linear with knowledge. In essence, the problem faced is how to control vectors and reduce endemic status in health students in particular and in society in general.

The spread of malaria in endemic areas depends on the interaction between the agent, the host, and the environment (Kahar *et al.*, 2023). Environmental factors such as Jayapura are generally very dominant as a determinant of its incidence in a malaria-endemic area. Vulnerable environments such as large puddles of water or other unhygienic physical and biological environments play an important role in mosquito bionomics (Dhewantara *et al.*, 2019). The physical and biological environment will regulate the balance of the population in nature (Yasuoka *et al.*, 2018). Regulations by the environment did not occur, resulting in an explosion in population density (Morakinyo *et al.*, 2018). As an infectious disease, malaria can move from one area to another through population mobility as a source of transmission and commodities as a vehicle for transmission. One area with high malaria cases will spread malaria to other areas. This is because the flight distance of malaria mosquitoes is 2-5 km, so mosquitoes can easily move without regard to administrative boundaries (Cribellier *et al.*, 2018). Recommendations from experts regarding the prevention and control of malaria in endemic areas require an overview of the dynamics of transmission (Ndiaye *et al.*, 2019; Yankson *et al.*, 2019). The main thing that needs to be understood to control malaria vectors is an understanding of mosquito bionomy, where environmental factors play a role. For those reasons, research is needed to get an overview of the influence of the environment on the incidence of malaria on the campus and surrounding areas so that they can collaborate in malaria prevention. The advice on preventing malaria highlights that it's crucial to avoid mosquito bites as the primary defense, especially if taking medication. Since no malaria treatment is completely fool proof, nurses should stress the significance of preventing insect bites and adopting other measures to prevent malaria (Grieve, 2023). The primary obstacles within the national healthcare system involve deficiencies in social capital and viable funding mechanisms for sustained health. These challenges are amplified by inadequate allocations towards health education, encompassing insufficiently trained healthcare professionals, uneven availability of fundamental medical and nursing education, and substandard health education for those fortunate enough to have access (Lacey *et al.*, 2023). The research findings affirm that the improvement of community health is contingent upon the vital role of Community Nursing (Dahiru, Musa, & Jella, 2020).

In summary, the short-term strategy to overcome malaria in health students requires the integration of courses

on malaria that can be included in local content lecture materials that do not require large funds, except for module modifications. In the medium term, it is necessary to promote research on malaria among lecturers and students so that malaria control becomes part of the campus learning culture. In the long term, it is necessary to provide dormitory facilities for students so that their healthy environment can be maintained and controlled. The three strategies in the future can be used as a concrete step to empower health students. Through their experience, students can apply the steps after completing their education and having worked in the community.

CONCLUSION

The results of this study project are efforts to eliminate malaria that occurs in students in endemic areas. The three problems underlined in this study are the high prevalence of cases among students, most of their treatment using traditional (herbal) methods, and their occurrence in endemic areas. These three issues require short, medium, and long-term strategies. The importance of cross-sectorial cooperation is recommended. However, the main thing is the campus management, lecturers, and students, both from the curriculum approach, learning materials, lifestyle, and the provision of campus facilities and infrastructure. However, a healthy environment and lifestyle need to be prioritized to eliminate malaria cases in endemic areas. In the future, research related to the short, medium, and long-term prevention of malaria is suggested in healthy students must be considered.

Conflict of Interest

The authors declare that they have no conflict of interests.

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