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Overview Of Malaria Diagnosis Methods At South Minahasa District Community Health Center

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ABSTRACT
Malaria remains a public health problem in Indonesia, including in South Minahasa Regency. Malaria diagnosis at primary healthcare facilities is crucial to support effective disease control and treatment. Objective: To describe the diagnostic methods for malaria in primary healthcare in South Minahasa Regency. Methods: This research is a descriptive study with a cross-sectional design. The sampling technique employed total sampling, involving 11 Community Health Centers that met the inclusion and exclusion criteria. Results: The results revealed that out of the 58 identified malaria cases, 81% were diagnosed using Rapid Diagnostic Tests (RDTs), while 19% were diagnosed through microscopic examination. In conclusion, this study indicates that RDT is more commonly used than microscopic examination.

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INTRODUCTION

Malaria remains a significant threat to public health worldwide. Malaria is a serious and life-threatening disease that attacks humans through mosquito bites.A female Anopheles is infected with a protozoan parasite of the genus Plasmodium. The five species of Plasmodium known to cause infection in humans are Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale, and Plasmodium knowlesi, with P. falciparum being the most dangerous.1

Based on data from World MalariaReport 2023, there are an estimated 249 million cases of malaria worldwide. According to the World Health Organization (WHO), malaria is still endemic in nine countries in Southeast Asia. In this region, three countries contribute 99.4% of the estimated cases, namely India with 66%, followed by Indonesia with 22% and Myanmar with 11%.2 The estimated positive cases of malaria in Indonesia were 304,607 in 2021 and increased to 415,140 in 2022.3 Malaria is still endemic in most provinces in Indonesia, especially in the eastern part such as Papua, Maluku, Nusa Tenggara, Kalimantan and Sulawesi.4 Data from the Malaria Information System (SISMAL) of North Sulawesi Province in 2023 showed that positive cases of malaria reached 938.5

Controlling and reducing the number of malaria cases based on indicators of decreasing morbidity rates is one of the development targets.Millenium Development Goals (MDGS). The

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Indonesian Ministry of Health is targeting malaria-free/elimination by 2030, and it is expected that the number of positive malaria cases (API) in Indonesia can gradually decrease to <1 per 1,000 people.4 A fast and accurate diagnosis can suppress the rate of malaria transmission in an area, therefore one of the keys to controlling malaria is establishing an accurate and fast diagnosis and providing therapy. Several laboratory examination methods that can be used to diagnose malaria include microscopic examination using thin and thick smears, examination of anti-Plasmodium antibodies through the immunochromatography method (Rapid Diagnostic Test/RDT), and examination of Plasmodium antigens through the Polymerase Chain Reaction (PCR) method.6

To identify the Plasmodium species and the number of parasites in the blood, microscopic diagnosis withBlood smear is still the gold standard.1 Every suspected malaria case should undergo malaria microscopy or RDT as recommended by WHO,9 because diagnosing malaria based on clinical symptoms alone is no longer relevant.8 In health facilities that do not yet have the capacity for microscopy, RDT can be used as an alternative method to diagnose malaria. This RDT use policy is implemented to avoid providing treatment without laboratory confirmation. This is very important because treatment without an accurate diagnosis can increase the risk of resistance to malaria drugs, which in turn can complicate the management of malaria cases in the future.10

Primary health services such as community health centers play an important role in the diagnosis and treatment of malaria. Therefore, it is very important to ensure that all community health centers can provide a rapid and accurate diagnosis. In South Minahasa Regency,Annual Parasite Incidence (API) increased from 0.27 in 2022 to 0.47 in 2023.7 This shows that the level of malaria spread in South Minahasa Regency is still quite high. The absence of research on malaria diagnosis methods in this area made the author interested in conducting research on the description of malaria diagnosis methods in health centers in South Minahasa Regency. The data obtained from this study can be useful for the development of malaria control programs in the future and can be useful for improving the quality of malaria diagnosis services in health centers, so that malaria control in South Minahasa Regency can be improved and have an impact on reducing the number of malaria cases.

RESEARCH METHODS

This type of research is descriptive research using a cross-sectional design.The sample in this study used a total sampling technique, namely all health centers in South Minahasa Regency that met the inclusion and exclusion criteria. Data were obtained through interview methods with questions covering the malaria diagnosis method used, the availability of tools and materials, and the obstacles faced in implementing malaria laboratory diagnosis.

RESEARCH RESULT

This study was conducted at the Minahasa Selatan Regency health center that reported malaria cases in January-July 2024, from 17 health centers in Minahasa Selatan Regency, a total sample of 11 health centers was obtained. The results of this study were obtained

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through interviews with the aim of describing the malaria diagnosis method used.

Table 1. Number of cases and malaria diagnostic methods used

No.	Health Center	Number of cases	Diagnostic methods used
1.	Tareran	19	RDT
2.	spill	5	Microscopic
3.	Gaze	3	RDT
4.	East Amurang	5	RDT
5.	Ongkow	4	Microscopic
6.	Motorcycling	5	RDT
7.	East Motoling	4	RDT
8.	West Motoling	4	RDT
9.	Poop	3	RDT
10.	New Tompaso	4	RDT
11.	The Journey	2	Microscopic

Based on table 1, there were 58 cases of malaria spread across 11 health centers in South Minahasa Regency during January-July 2024. The most cases were reported at the Tareran Health Center with 19 cases (32.8%), and the Maesaan Health Center reported the fewest cases, namely 2 cases (3.4%).

Table 2. Frequency distribution of malaria diagnostic methods used

Diagnosis Methods	Frequency	Percent
Microscopic	11	19
RDT	47	81
Total	58	100

Table 2showed that of the 58 malaria cases found in 11 health centers in South Minahasa Regency, 81% (47 cases) used RDT as a diagnostic method and only 9% (11 cases) used microscopic examination.

Table 3. Availability of tools

No.	Health Center	Microscope	Microscope Conditions	Reagent	RDT
1.	Tareran	There is	Functioning	There is	There is
2.	spill	There is	Functioning	There is	There is
3.	Gaze	There is	Damaged	There is	There is
4.	East Amurang	There is	Damaged	No	There is
5.	Ongkow	There is	Functioning	There is	There is
6.	Motorcycling	There is	Damaged	There is	There is
7.	East Motoling	There isn't any	-	There isn't any	There is
8.	West Motoling	There is	Damaged	There isn't any	There is
9.	Poop	There is	Damaged	There is	There is
10.	New Tompaso	There is	Functioning	There is	There is
11.	The Journey	There is	Functioning	There is	There is

Table 3showed variations in the availability of diagnostic tools, microscope conditions, reagents, and RDTs in 11 health centers that reported malaria cases in South Minahasa

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Regency. Of the 11 health centers, 10 health centers had microscopes, but 5 health centers reported damaged microscopes, namely Tatapaan Health Center, Amurang Timur Health Center, Motoling Health Center, Motoling Barat Health Center, and Poopo Health Center.

Table 4. Barriers to diagnosing malaria

No.	Health Center	Obstacle
1.	Tareran	No obstacles
2.	spill	No obstacles
3.	Gaze	Microscope is broken
4.	East Amurang	Microscope is broken
5.	Ongkow	No obstacles
6.	Motorcycling	Microscope is broken
7.	East Motoling	No laboratory, microscope, reagents
8.	West Motoling	Microscope is broken
9.	Poop	Microscope is broken
10.	New Tompaso	Don't have a lab assistant
11.	The Journey	No obstacles

Table 4shows that there are various obstacles in the malaria diagnosis method in health centers in South Minahasa Regency. Of the 11 health centers that reported malaria cases, 7 health centers experienced obstacles, while 4 health centers reported no obstacles. The obstacles found included damaged microscopes, lack of laboratory staff, and lack of reagents.

Based on the research conducted, the results obtained that RDT is the most widely used method because RDT examination is available in all health centers in South Minahasa Regency. The microscopic examination method is not evenly distributed in all health centers in South Minahasa Regency due to limited diagnostic tools and human resources. Health centers that have microscopic examination facilities such as Health CenterTareran, Tumpaan Health Center, Ongkaw Health Center, Tompaso Baru Health Center, and Maesaan Health Center conducted initial diagnosis using RDT, then confirmed positive results and determined the plasmodium species through microscopic examination. In health centers that only have RDT, namely Tatapaan Health Center, Amurang Timur Health Center, Motoling Health Center, Motoling Timur Health Center, Motoling Barat Health Center, and Poopo Health Center, referrals were provided to more adequate health facilities for further examination using a microscope when RDT showed positive results.

Reliance on RDT shows that the health service system is not yet optimal in supporting microscopic methods asgold standard. WHO emphasizes the importance of strengthening microscopic diagnostic capacity to ensure accuracy. Although RDT provides rapid results, this method has limitations in detecting specific plasmodium types, especially in patients with low parasitemia.11,13

In an effort to overcome the Extraordinary Event (KLB) of malaria in Rokan Hilir, the Ministry of Health provided RDT for rapid diagnosis of malaria, this shows the important role of RDT in situations with limited resources.[12]Of the 11 health centers studied, 10 had

microscopes but only 5 were functioning properly. The main obstacles identified included damage to microscopes and lack of reagents. This is in line with research conducted in Belu Regency, East Nusa Tenggara, which revealed that there were various obstacles in implementing microscopic malaria diagnosis. These obstacles included the use of used slides, poor blood smear staining results, lack of work experience, and minimal training for microscopic officers. Although this study did not specifically mention damage to microscopes and lack of reagents, the factors identified contributed to errors in microscopic malaria diagnosis. 14 Another obstacle was the lack of laboratory personnel such as in Motoling Timur Health Center and Tompaso Baru Health Center, which indicates the need for more equitable training and distribution of health workers. Health centers with adequate diagnostic facilities such as Tareran Health Center and Tumpaan Health Center were able to optimally implement microscopic methods. This shows that the availability of well-functioning equipment and skilled personnel can improve the quality of malaria diagnosis.

Limited facilities and human resources are the main challenges in implementing malaria diagnosis at the health center level. Although easy access to health centers allows communities to obtain early diagnosis using methods such as RDT and microscopy, existing limitations still affect the quality of services. Therefore, efforts are needed to increase capacity, both through the provision of adequate diagnostic tools and training of health workers, in order to improve the quality of malaria diagnosis. This step is important to support the success of the malaria eradication program as a whole.

CONCLUSION

Microscopic examination is not yet available in several health centers in Minahasa Selatan Regency, so only 19% of cases in Minahasa Selatan Regency health centers use this method. Meanwhile, RDT is available in all health centers in Minahasa Selatan Regency and this method is used to diagnose 81% of cases in Minahasa Selatan Regency health centers.

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