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The role of midwives in preventing malaria in pregnant women: qualitative study from South-West Sumba Regency, Indonesia

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ABSTRACT

Pregnant women in Indonesia, particularly in the Southwest Sumba Regency are faced with high malaria incidence. To overcome the challenge, midwives play a crucial role in integrating malaria services into maternal and child health (MCH) program. Therefore, this study aimed to examine the role of midwives in the implementation of integrated MCH services in the Southwest Sumba district. The location and participants were carefully selected and data collection was performed using the semi-structured interview method, which was divided into three sections. These included i) understanding of midwives regarding malaria and dangers to pregnant women, ii) the implementation of integrated malaria services for the MCH program, and iii) the role of midwives. The collected data were thematically analyzed and narratively presented based on the themes. The results showed that midwives in North Kodi District had a limited understanding of malaria. Consequently, the implementation of integrated MCH services, including specialized preventive education for pregnant women, was not at the optimal level. This phenomenon showed the need for malaria education, preparation of service standards, facilitative supervision, and cross-sectoral collaboration.

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1. INTRODUCTION

Malaria is a prevalent and life-threatening disease caused by Plasmodium protozoan parasites, particularly in tropical and subtropical regions of sub-Saharan Africa and Southeast Asia [1], [2]. According to the World Health Organization (WHO), there are 249 million malaria cases in 85 malaria-endemic countries, with 608,000 deaths. Among these cases, Southeast Asia, including Bangladesh, Indonesia, and Myanmar, has the second highest incidence rate. The vulnerable populations, including pregnant women and children under five, face high susceptibility due to inadequate nutrition, unique epidemiological, environmental, and social factors [3], [4]. At the initial stage, the *P. falciparum* parasite targets red blood cells, leading to impaired blood circulation and placental insufficiency, which can cause complications for pregnant women and fetus [5]–[7]. This high susceptibility among vulnerable populations shows the need for universal access to malaria prevention technologies, such as insecticide-treated nets, antenatal care visits with intermitten preventive therapy- *Sulfadoxine Pyrimethamine* (IPTp-SP), and indoor residual spraying. Moreover, fast and effective confirmatory diagnosis and treatment are recommended in case of failure [8]–[10].

Sumba Island, in East Nusa Tenggara Province, has the highest malaria cases in the region, accounting for approximately 87%. Despite having the highest prevalence rate, the district's low screening coverage below

50% has resulted in undetected cases, as only 58 pregnant women passed through screening in 2021. To overcome this challenge, Indonesia has initiated the integration of malaria with maternal and child health (MCH) service program in 2019 to prevent malaria in pregnant women by providing screening, insecticide-treated nets, and *Dihidroartemisine Piperaquine* (DHP) therapy. Although the implementation of this program has been facilitated by midwives, the achievement is still suboptimal, with low access to antenatal care (ANC) services (50%), reduced screening coverage (24.7%), and decreased use of mosquito nets (70.3%). This shows the need to identify the role of midwives in implementing MCH to prevent and manage malaria cases, particularly in pregnant women.

Several studies have focused on preventing malaria in pregnant women globally according to WHO recommendations by maximizing the use of insecticide nets and *Sulfadoxine Pyrimethamine* (SP) [11], [12]. However, in Indonesia, only a few investigations have been carried out, exploring the use of single screening and treatment as an ineffective method of prevention [13]. Another study examined the attitudes of health workers and pregnant women, showing concern regarding the availability of rapid diagnostic tests (RDTs) as a malaria screening tool. Moreover, pregnant women were observed to receive comprehensive services, including antimalarial treatment for self-protection and fetuses from infection [14]. However, no specific reports have explained the extent of the role of midwives in preventing malaria among pregnant women.

Midwives are essential healthcare providers, playing a crucial role in providing prenatal care, assisting with childbirth, and offering postnatal support to mothers and infants, particularly in remote areas where access to healthcare facilities is limited. To enhance the coverage of integrated MCH services in malaria-endemic regions, midwives need to understand the nuances of the program [15], [16]. Therefore, this study aimed to explore the role of midwives providing antenatal care services in the implementation of integrated MCH services in high malaria-endemic areas to prevent malaria in pregnant women. The results were expected to provide valuable information to develop complementary programs capable of improving the implementation of integrated MCH services, as well as preventing malaria among vulnerable populations, particularly pregnant women and children under five.

2. METHOD

2.1. Study location

The study was conducted between July to September of 2023, in South-west Sumba, a district with a high prevalence of malaria. This location was determined purposefully, having a total of eleven subdistricts and 12 community health centers. Among these subdistricts, North Kodi district was reported to have the highest malaria incidence in 2021, with 21 villages, two government-owned, and one private health center. The two Community Health Centers in the districts, namely Kori and Billacenge have very low coverage for the first ANC visit. Therefore, North Kodi district was selected as the study location due to its extensive malaria prevalence and central South-west Sumba, with an Annual Parasite Incidence (API) of 11.96 per 1,000 inhabitants in 2021. According to the Indonesian Ministry of Health classification, an API greater than five is considered high endemic. Additionally, there were 16 cases of malaria reported in pregnant women, accounting for 27.5% of cases in the South-west Sumba Regency This sub-district has the largest area, with 243.82 square kilometers, and elevation ranging from 0 to 300 meters above sea level. The wide and high altitude of the North Kodi district is a suitable habitat for the development of malaria. The abundance of API and the high prevalence of malaria among pregnant women have prompted the regional government, specifically the South-west Sumba District Health Service, to prioritize the malaria elimination program. Therefore, in November 2020, this sub-district became the first to socialize with the program.

2.2. Study participant

Participants were deliberately selected to investigate the specific aspects of how midwives can prevent malaria in pregnant women. The inclusion criteria were determined based on discussions with policymakers, malaria specialists, and public health experts. These included direct engagement in integrated MCH services, serving in the North Kodi district work region, as well as antenatal care and malaria services. This study also included all midwives, consisting of 20 participants in North Kodi District, with their characteristics presented in Table 1. Table 1 shows that the participants have a diverse range of characteristics, with the majority primarily aged between 36 and 45 years. These participants possessed a Diploma level of education and had served for a period of 5 to 10 years.

2.3. Study design

The study used a qualitative method, considered superior in facilitating comprehensive exploration of individuals' experiences as well as insights into their values, motives, attitudes, and behaviors. This method is highly efficient for providing a more comprehensive analysis of a phenomenon or event [17]. Therefore, this

study was carried out to examine and acquire a thorough comprehension of the viewpoints of midwives, malaria managers, and village malaria interpreters regarding infections among pregnant women. The results were expected to provide valuable information to midwives to understand their role in preventing malaria and the perceived difficulties during the implementation of MCH services, as part of government initiatives.

Table 1. Characteristics of the study participants

Characteristics	Number (person)
Age	
25-35	8
36-45	10
45-55	2
>55	0
Educational level	
Associate Degree	4
Bachelor Degree	16
High school	0
Length of service	
<5 years	3
5-10 years	9
11-15 years	6
>15 years	2

2.4. Data collection

In-depth interview was conducted with midwives for data collection, lasting for approximately 40-50 minutes. The data were collected based on interview guide developed following integrated MCH service guidelines published by the Indonesian Ministry of Health in 2019. After the preparation, the interview guide was evaluated to verify compliance with the study objectives. The content of this instrument was validated by Public health specialists from the Faculty of Public Health, University of Indonesia, and Malaria specialists from the Indonesian Ministry of Health. These specialists also verified the interview transcripts and identified the study's themes, followed by revision and another consultation. After approval, this instrument was tested in other Community Health Center regions that had also been informed about integrated MCH service. The testing was conducted by the Wallandimu Community Health Center in Kodi Bagedo District. The outcomes were slightly modified, where certain terms were substituted with language that was more widely used in the field. The experiment results also evaluated the duration and effectiveness of conducting interviews. After the modification process, this study further used the instrument for data collecting.

The study team interviewed all participant regarding their knowledge of malaria prevention in pregnancy as well as the integrated MCH services. The interview guide contained three sections of questions regarding, first, malaria disease, such as knowledge of participants about causes, symptoms, and impact on pregnant women. The second question was about integrated MCH service, comprising the policy supply logistics for malaria elimination particularly for pregnant women, the implementation in their work field, and malaria workshop for midwives. Moreover, the third question focused on the role of midwives including the assessment of procedure standards, and supervision.

2.5. Ethical clearance

Ethical approval was obtained from the Public Health Department of Universitas Indonesia, Ethical Research Commission with the registration number Ket- 618/UN2.F10.D11/PPM.00.02/2023, following the principles of the Helsinki Declaration. Informed consent was obtained from all participants including for audio recording, and using excerpts in publications. After explaining the intentions, advantages, and possible risks of participating in this study, informed consent was acquired. Participants had the freedom to discontinue their inclusion at any point without facing any penalties. Additionally, the results from the data obtained were further analyzed and made publicly available. Based on willingness to participate, the informed consent document was required to be completed by all participants.

2.6. Trustworthiness/rigor

The study assessed the trustworthiness and reliability of interview data using credibility, transferability, dependability, and conformability. The experience of participants was verified through triangulation which emphasized the results generalization and member-checking [18], [19]. Dependability was ensured through auditing the study process, while conformability testing was conducted by communicating study methods to the head of the South-west Sumba district health service. The study was carried out by selecting participants from the Community Health Center in the North Kodi district area to obtain the required

data. Member checking was used to ensure conformity, and clarification was conducted with participants regarding the transcript. Subsequently, triangulation was used, including the head of the community health center in North Kodi District and the malaria program manager at the district level, to validate the data and ensure reliability for further analysis.

2.7. Data analysis

The interview results were evaluated thematically and all sessions were recorded digitally, followed by verbatim transcription. Subsequently, the accuracy and reliability of interview results were confirmed through a process of validation with participants (member check). After reaching a mutual understanding of the given information, a transcript was created in Indonesian. The answers were assigned a code based on the participant's provision, followed by the application of an analytical framework for the data obtained with a predetermined code in each question section according to the interview guide. Recent ideas that occurred during the interview process were also considered, while the data were further analyzed by reading and re-reading the transcripts to identify concepts and main issues related to the objectives and framework of the study. Numerical codes were assigned for each identified answer, relationships were established, and a thematic matrix was created. The themes were further interpreted to address the formulated questions.

The association between the themes of each interview identified was investigated Initially, the process of coding and searching for themes was conducted manually, followed by verification and re-checking of results by the first author. During the analysis, all authors gathered and engaged in discussions regarding the dominance and similarity of the themes. The final theme was translated and interpreted with the selected quotations into Indonesian, which was translated into English for publication. The sources of citations in the results section were identified by using the provided abbreviations. Furthermore, the transferability of the study was ensured by thoroughly explaining the analysis and phases to the participants.

2.8. Study limitation

The study presented a comprehensive examination of the significant role of midwives in the prevention of malaria among pregnant women. The method used was highly effective in acquiring a thorough understanding of midwives' engagement and the implementation of integrated MCH services. However, the study was limited to the views of health service providers and did not explore the perspective of pregnant women and families. The analysis also focused on a region with the highest prevalence of malaria, accounting for 27% of cases in the South-west Sumba Regency.

3. RESULTS AND DISCUSSION

A total of three themes were identified from the thematic analysis, related to the role of midwives in preventing malaria during pregnancy. The initial theme refers to the general understanding of malaria that midwives possess. The Kodi Utara District's implementation of the malaria prevention program for pregnant women in Indonesia is the subject of the second theme. The third theme relates to the role of midwives in the implementation of the malaria prevention program for pregnant women as shown in Table 2.

Table 2. Theme and dimension

Theme	Dimension
Knowledge about malaria in pregnancy	General knowledge about malaria in pregnancy (cause, vector, and symptoms) Impact of malaria on pregnant women and their fetus
Implementation of integrated malaria and MCH services	Derivative regulations are available for malaria services during pregnancy. The implementation of integrated MCH services is in progress. Efforts to improve the skills of midwives regarding malaria are followed by midwives.
Midwife role in malaria prevention	The role of midwives in preventing malaria in pregnancy through integrated MCH services

3.1. Theme 1: knowledge about malaria in pregnancy

The study showed that participants had a limited understanding of malaria during pregnancy. Midwives recognized the negative effects of the disease on both pregnant women and fetuses, including severe maternal illness, anemia, low birth weight babies, abortion, prolonged labor, and death. However, there was no awareness about the potential spread of malaria beyond the *Anopheles* mosquito, which could occur through infected family or community members. The study also showed the high incidence of mosquito-borne diseases,

although some struggled to distinguish between malaria and dengue hemorrhagic fever, as provided in the statement.

> *"Malaria is indeed a dangerous disease, in our place, there have been several deaths due to malaria. But there is also dengue hemorrhagic fever, which results in more deaths. The cause of both diseases is mosquitoes …."* (M.3)

> *"… the most common complication is anemia. Besides, when an infected woman recovers and gives birth, several complications tend to occur, such as prolonged labor and low-birth-weight babies. There are also spontaneous abortions and premature births."* (M.7, M.10)

> *"……..This disease can also kill both the mother and her baby."* (M.4,M.5, M.13)

The results showed that midwives faced challenges in identifying the symptoms of malaria due to the similarity between symptoms and early signs of pregnancy. However, pregnant women infected with malaria typically experience symptoms such as nausea, vomiting, loss of appetite, chills, and intermittent fever.

> *"Symptoms of malaria in pregnant women are difficult to recognize because the symptoms are similar to early pregnancy symptoms."* (M4)

> *"… We are often mistaken, thinking pregnant women just feel unwell, but it turns out they have malaria."* (M5, M2, M.1, M.20)

> *" Usually the mother complains of severe vomiting and inability to eat, such as emesis gravidarum. However, this is accompanied by intermittent chills and fever."* (M.6, M.9)

Since November 2020, South-west Sumba Regency has been committed to malaria elimination, with the Indonesian Ministry of Health launching the Integrated Services for Malaria with MCH Services. The program has five priorities, namely i) to eliminate malaria in pregnant women, ii) screening during the first antenatal visit, iii) use of long-lasting insecticidal nets (LLINs) throughout the pregnancy period, iv) threat management for those diagnosed positively through home visits, and health promotion about malaria prevention for family and community. In this program, midwives are mandated to collaborate with other health practitioners such as doctors, sanitarians, and laboratory analysts, particularly focusing on vulnerable populations, including pregnant women and children under five [20].

This study investigated the engagement of midwives in integrating malaria services into MCH programs. The results showed the significant role of midwives in providing ANC, ensuring the well-being of pregnant women, malaria screenings, distributing insecticide-treated nets, and providing education on malaria [21]. Although there has been global advancement, the implementation of malaria in pregnancy (MiP) services through ANC is still relatively sluggish. Therefore, midwives must possess a comprehensive understanding of the disease, including transmission, prevention, treatment, and consequences for the pregnant women, fetus, and family [22], [23]. In rural regions, health providers need to have a thorough understanding of pregnancy-related malaria to ensure effective implementation, both independently and collaboratively.

The results showed a significant decrease in knowledge about malaria from midwives. Despite successfully conveying the information that the disease was caused by the plasmodium parasite, spread by mosquitoes, and could lead to complications in both the mother and fetus, the symptoms in pregnant women were not recognized, resembling those of early pregnancy. Additionally, midwives did not have a clear understanding of the mechanism of transmission for this disease.

MiP prevention has been achieved through various methods, with screening being a crucial factor in protecting pregnant women. According to WHO, malaria prevention could be achieved through three essential measures as implemented by ANC services, namely the use of insecticide bed nets, screening and preventive medication, as well as case management [24]. A previous study stated that there was a strong relationship between the level of ANC and optimal malaria prevention methods due to the provision of health services or workers, socioeconomic conditions, and individual behavior [25]. The low acceptance and compliance with MiP prevention could be attributed to insufficient awareness among healthcare practitioners and limited understanding, thereby requiring intervention from healthcare providers and community service groups. Enhancing the understanding and attitudes of healthcare providers could be conducted by optimizing communication about MiP, and enhancing the availability of services [26]. Furthermore, increasing awareness of ANC attendance played an important role in influencing the provision, access, and use of prevention interventions in pregnancy [27]. Midwives were also recommended to adhere to established standards for ANC, conduct malaria screenings during the initial pregnancy check-up, educate pregnant women about malaria

prevention, distribute insecticide-treated mosquito nets, explain their proper use, collaborate with other healthcare professionals for laboratory tests, and malaria treatment in pregnant women [28], [29]. These results emphasized the need for coordinated efforts to overcome the identified obstacles, which was a crucial implication. The study also showed that a lack of knowledge about malaria among midwives posed a significant obstacle to the prevention of malaria during pregnancy. Therefore, the government should implement immediate action to enhance the knowledge and awareness of midwives regarding the prevention of MiP. Streamline training is also essential for health workers to develop clear messages about malaria prevention in pregnant women.

3.2. Theme 2: implementation of the integrating malaria services into maternal and child health program

The results showed several challenges in implementing integrated MCH service at the study location. Specifically, the district failed to adjust operational procedures to ensure proper implementation, resulting in numerous challenges in implementing the program for pregnant women and children under five. The service lacked consistency as there were no specified operational standards for service procedures. Several issues were also identified with malaria logistics, specifically regarding the availability of malaria rapid diagnostic test (mRDT) screening equipment. Based on the result, not all pregnant women had the opportunity to pass through malaria testing during first visit due to a shortage of mRDTs and a high prevalence of malaria among the general population. Screening was only given to pregnant women who showed symptoms and insecticide-treated bed nets were given in a community-based health center during check-ups. The implementation of integrated MCH service in North Kodi District did not adhere to the guidelines and standard operating procedures were not established. Additionally, there was variation in the implementation process across community health centers. as described in the statement:

> *" ...We do not test all pregnant women here for malaria because test kits are limited ..."* (M.8, M.11)

> *"Lack of RDT for these three months makes all pregnant women unable to carry out malaria test."* (M.18, M.6)

> *"No, we don't have any specific standard operational procedures for this service."* (M.7, M.1)

> *"I don't know, but in ANC services, we used to do 10 standard ANC procedures with no malaria assessment in it. but I don't know how in other community health centers."* (M.12)

The study found that midwives had not received any specific training related to malaria, as only the coordinator was given socialization regarding integrated MCH services. The socialization was found inadequate, failing to equip midwives with the required skills and knowledge about malaria and prevention in vulnerable populations. Additionally, midwives lacked the method of evaluate the potential malaria risk for pregnant women during their antenatal visits, as stated:

> *"We have not received any training regarding malaria ..."* (M.2, M.4, M6)

> *"We did not have any training specifically, but we often hear about it from the nurses when they talk about malaria."* (M.5, M9)

> *"Yes, in November 2021, malaria integration services with KIA will be implemented. But we are not equipped with malaria screening methods."* (M1, M11)

Appropriate delivery of malaria services to pregnant women depends on the presence of adequate guidelines, human resources, supplies, and logistical support at healthcare facilities. This study discovered that there were no regulations for derivatives, such as standard operational procedures for integrated MCH service in both Community Health Center and limited mRDT logistics. Therefore, not all pregnant women were screened during their first ANC visit. The government's efforts to provide training on malaria in pregnancy were limited, and not all midwives were informed about the integrated MCH service. In North Kodi District, this program could not be implemented in accordance with the guidelines provided by the Indonesian Ministry of Health.

According to a study conducted in Burkina Faso, the supply and logistics of malaria-related resources should be prioritized, including insecticide-treated bed nets, antimalarial drugs, malaria diagnostic tools, and malaria prophylaxis therapy for pregnant women. This is necessary to ensure the successful implementation of

maternal malaria prevention and treatment programs. Additionally, the program can be enhanced by engaging community health workers who have received training to improve the efficacy of successful malaria prevention initiatives targeting pregnant women [30]. WHO also emphasizes that ANC plays a crucial role in delivering integrated health services for pregnant women, including the management of infectious diseases such as human immunodeficiency virus (HIV), syphilis, and malaria. The ANC service should prioritize offering respectful, personalized, and patient-centered care during every interaction. This includes implementing effective clinical practices, providing relevant and timely information, offering psychosocial and emotional support, as well as ensuring excellent clinical and interpersonal skills of healthcare practitioners. Although WHO suggests the widespread distribution of insecticide-treated bed nets to pregnant women through campaigns and antenatal services. This method requires the provision of comprehensive guidelines, service standards, and sufficient supplies of malaria logistics to ensure optimal coverage [31]. A previous study suggests that effective malaria preventive programs require motivation from healthcare practitioners, frequent training sessions, facility-based workshops, and precise patient counseling for successful eradication [32]. Based on the description above, several factors contribute to the successful implementation of prevention efforts, including good health regulations and systems, adequate supply and logistics of malaria services, the availability of training and workshops for health workers, as well as the motivation to carry out prevention of malaria in pregnancy.

3.3. Theme 3: midwives' role in integrating malaria services into maternal and child health program

The study showed that the integration of malaria services into MCH in North Kodi District was not implemented in line with the established recommendations. Interview results showed that expectant pregnant women who had enrolled in ANC would attend the MCH polyclinic to be examined by midwives. When malaria symptoms were identified, such as fever, chills, and headache, midwives would recommend a doctor for blood tests. Moreover, pregnant women were able to obtain mosquito nets by accessing health services through the Community Health Center or community-based health post (Posyandu). The responsibility of midwives in the execution of integrated MCH services was to assess pregnant women for indications, as stated:

> *"Only pregnant women with symptoms are examined…"* (M.1)

> *"We help distribute mosquito nets to pregnant women at Posyandu or community health centers."* (M3, M5,M7)

> *" …. We distribute mosquito nets to every pregnant woman who comes to visit the Puskesmas or Posyandu for the first time."* (M1, M.2, M.4, M.13, M.18, M.12)

The results showed that midwives did not provide education about malaria to pregnant women, with topics such as nutrition, personal hygiene, and environmental cleanliness. Additionally, there was an emphasis on the significance of prenatal checks during pregnancy, as described:

> *"We usually only provide education about nutrition for pregnant women…"* (M.1, M.13)

> *" ….. education about personal hygiene and environmental cleanliness or complaints felt by the mother at that time. We have not provided education about malaria."* (M11)

Based on these results, the role of midwives in integrating malaria services into MCH in North Kodi district was very limited. Midwives were only responsible for the initial evaluation and allocation of insecticide-treated bed nets, which were distributed exclusively through Community Health Centers or Posyandu. However, malaria screening was not performed, and midwives lacked the required equipment. Malaria managers typically focus on addressing the educational aspect at the Community Health Center level, without specific emphasis on prevention. Education was provided on nutrition, personal, and environmental hygiene, but did not cover the preventive measures.

According to the integration of malaria service into MCH guidelines, midwives have the roles of recognizing disease risk, monitoring treatment for those receiving anti-malarial drug therapy, educating pregnant women to always sleep in insecticide-treated mosquito nets, and eating nutritious food. In addition to malaria, mothers and families should be educated about other pregnancy complications. Midwives are required to keep records of pregnant women who receive malaria screening with mRDT, mosquito nets, therapy, and adhere to treatment. A study conducted in Myanmar found that the successful implementation of malaria prevention during pregnancy was attributed to the significant collaboration between the National Malaria Control Program and implementing partners, along with sufficient human and financial resources. An important contributing factor is the expertise of frontline health workers in reactive surveillance and the presence of basic health staff.

The knowledge of frontline health workers regarding malaria prevention plays a crucial role for successful implementation, despite the need for an improved recording and reporting system [33].

A study conducted in Ghana showed significant results in preventing malaria during pregnancy through insecticide-treated bed nets distributed during ANC visits and child welfare clinics [34]. Other contributing factors include effective oversight and surveillance are crucial for frontline health workers to follow prescribed rules, as the lack of supervision can lead to ambiguity in *Sulfadoxine Pyrimetamine* (SP) and IPTp-SP guidelines. Educating pregnant women and incentivizing healthcare providers to deliver malaria prevention services are also important strategies [35]. Additionally, there is a need to enhance the awareness of pregnant women regarding malaria during pregnancy, showing the significant role of midwives as primary healthcare providers [36]. However, the results were not in line with previous studies, showing the minimal engagement of midwives in preventing malaria among pregnant women in North Kodi district. This was attributed to the lack of training and socialization, leading to low coverage of integrated MCH service, increasing the susceptibility of mothers to complications during pregnancy and childbirth.

4. CONCLUSION

In conclusion, this study showed that the problem of preventing malaria among pregnant women had been neglected. Although the Indonesian government established guidelines for integrated MCH services, there was no significant attempts by local governments to provide specific implementation of technical guidance, considering cultural practices and available human resources. In malaria-affected areas, midwives, who were the main leaders in MCH services, tended to have little impact on preventing malaria in pregnant women and children under five. The results showed the limited engagement of midwives due to the lack of understanding regarding malaria in pregnant women included in vulnerable populations. However, midwives showed full responsibility for carrying out initial anamnesis and distributing insecticide-treated mosquito nets at Community Health Center. The lack of standard operational procedures for malaria services, as well as limited logistical availability, limited the program's ability to identify and screen pregnant women for malaria risk.

Screening, treatment, and education were identified as important factors that could be carried out collaboratively by health workers and the community in preventing and treating malaria in pregnant women. Based on the results, the role of midwives in implementing integrated malaria and MCH services in South-west Sumba district remained suboptimal. This was because midwives were only limited to initial screening based on symptoms, without guidelines, tools, and supply of mRDT. Therefore, significant efforts must be focused on strengthening the roles of midwives as health professionals closest to pregnant women. These efforts included i) reviewing midwifery service standards in the context of integration with malaria services, ii) developing standard operational procedures as guidelines in providing integrated MCH program, iii) advocating for proper implementation at the ministerial, regional, as well as local levels, and iv) promoting professional organizations, such as the Indonesian Midwives Association and the National Malaria Control Organization.

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