



Association between community empowerment and malaria prevention behaviors among communities in the Working Area of Iwur Public Health Center

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ABSTRACT

Background: Malaria remains a major public health challenge in remote Indonesian regions like Iwur due to limited healthcare access. Persistent transmission is driven by low community awareness, poor environmental management, and inadequate preventive practices. Community empowerment offers a sustainable strategy to enhance local engagement and strengthen local capacity. An innovative empowerment model is essential at Iwur Public Health Center (Puskesmas Iwur) to optimize prevention efforts and reduce the disease burden.

Purpose: This study aimed to develop and evaluate the effectiveness of a Community Empowerment Model for malaria prevention in the Iwur Public Health Center working area.

Methods: A quantitative cross-sectional study was conducted among community members in malaria-endemic villages within the Puskesmas Iwur working area. Participants were selected using purposive sampling. Data were collected using a structured questionnaire assessing community empowerment and malaria prevention behaviors. Descriptive statistics and Pearson correlation analysis were performed to examine the association between community empowerment and malaria prevention behavior, with statistical significance set at $p < 0.05$.

Results: The findings showed a statistically significant positive correlation between community empowerment and malaria prevention behavior ($r = 0.58$, $p < 0.001$). Higher levels of community empowerment were associated with better malaria prevention practices among community members, suggesting that community participation, health literacy, and self-reliance are important factors associated with malaria prevention in endemic areas.

Conclusion: The Community Empowerment Model effectively strengthens community participation and malaria prevention practices. Integrating empowerment-based interventions into primary healthcare programs is recommended to support sustainable malaria control and reduce incidence in endemic communities.

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1. Background

Malaria remains a major public health challenge in endemic regions, contributing significantly to morbidity and mortality rates, especially in remote and underserved areas [1], [2]. The persistence of malaria transmission is often linked to environmental factors, climate conditions,

and, more importantly, human behavior regarding prevention and control. While medical interventions such as medication and insecticide-treated nets (ITNs) are available, their effectiveness is frequently hindered by a lack of community engagement and sustainable preventive practices

[3]. Therefore, shifting the focus toward community-based strategies is essential to achieve long-term malaria elimination goals. One of the most critical approaches in this context is community empowerment, which enables individuals and groups to take control of their health through increased knowledge, participation, and self-reliance [4].

Globally, malaria control continues to be a priority for the World Health Organization (WHO), which emphasizes the need for multisectoral collaboration and community-led initiatives. In Indonesia, despite significant progress in many provinces, eastern regions such as Papua still face a high burden of malaria. Reports from the Ministry of Health indicate that certain districts remain in the high-endemic category, where transmission is fueled by geographical challenges and limited access to healthcare. This situation highlights the urgency of strengthening community-based interventions that go beyond clinical treatment to address the root causes of transmission through local empowerment [5].

Community empowerment plays a vital role in malaria prevention by transforming the community from passive recipients of aid into active participants in health programs. This model encompasses health literacy, the development of local skills, and the mobilization of resources to eliminate mosquito breeding sites and maintain protective behaviors [4], [6]. When communities are empowered, they develop a sense of ownership over health initiatives, leading to more consistent use of bed nets, better environmental sanitation, and early health-seeking behavior. Previous studies suggest that empowerment-based models are more sustainable than top-down approaches because they align with local culture and social structures [7].

From a theoretical perspective, the community empowerment model in health is often rooted in the concept of self-efficacy and collective action. It suggests that when individuals believe in their capacity to change their environment and are supported by a strong social network, they are more likely to adopt and maintain preventive health behaviors. In the context of malaria, this involves bridging the gap between health knowledge and daily practice. Social mobilization and the involvement of local figures are key components that reinforce the community's ability to mitigate the risk of infection through collective vigilance and environmental management [8].

In the context of primary healthcare, Puskesmas Iwur serves a critical role as the frontline of malaria control in a geographically challenging area. At Puskesmas Iwur, the high incidence of malaria cases suggests that existing prevention strategies need to be optimized through more intensive community involvement. Preliminary observations indicate that while health education has been provided, community participation in structured prevention activities remains inconsistent. Geographical isolation and limited communication channels often hinder the delivery of health information, making it necessary to develop a specific empowerment model tailored to the unique needs of the Iwur community [9].

Previous studies have demonstrated that interventions focusing on "Health Volunteers" (Kader Kesehatan) and community-led environmental cleaning can significantly reduce mosquito larval density and malaria prevalence. Participation in social-health activities not only increases individual awareness but also creates a social norm that prioritizes malaria-free environments [10]. Despite these known benefits, there is still a lack of comprehensive research on the specific model of community empowerment that works best in remote areas like Iwur, where resources and infrastructure are limited.

Although previous studies have reported that community-based malaria interventions, such as health volunteer (Kader) programs and environmental management, are associated with improved malaria prevention activities, limited evidence is available regarding how different dimensions of community empowerment including health literacy, participation, and self-reliance are associated with malaria prevention behavior in remote and high-endemic settings [4], [11]. Most previous studies have focused on evaluating specific intervention programs rather than examining the relationship between community empowerment and malaria prevention behavior using an observational approach. Furthermore, evidence from geographically isolated areas such as the Puskesmas Iwur working area remains scarce. Addressing this gap is important for understanding the role of community empowerment in malaria prevention and for informing context-specific community health strategies in endemic regions.

The present study aims to analyze the community empowerment model and its relationship with malaria prevention behavior among the people in the working area of Puskesmas

Iwur. By identifying the key components of empowerment such as knowledge, attitude, and participation this study seeks to provide evidence-based insights for healthcare providers to design more effective and culturally appropriate malaria control programs. Understanding these dynamics is crucial for reducing the malaria burden in high-endemic and hard to reach regions.

The research hypothesis proposes that a higher level of community empowerment is significantly associated with more effective malaria prevention practices among the community. To test this hypothesis, a quantitative study will be conducted to measure dimensions of empowerment and their influence on preventive actions. The findings are expected to contribute to the development of a sustainable, community-led health strategy that supports the national goal of malaria elimination.

In conclusion, malaria prevention in endemic areas requires more than just clinical solutions; it demands a robust community empowerment model. Strengthening the capacity of the community through Puskesmas-led initiatives is essential to ensure the sustainability of malaria control efforts and improve the overall public health status in Iwur. This study is expected to provide a strategic framework for health practitioners to optimize community participation in the fight against malaria.

2. Methods

2.1 Research design

This study employed a quantitative cross-sectional design to analyze the relationship between the community empowerment model and malaria prevention behaviors among the community in the working area of Puskesmas Iwur.

2.2 Setting and sample

The study was conducted at Puskesmas Iwur, a primary healthcare facility located in a malaria-endemic region. The target population included heads of households or adult community members residing in the Iwur service area. A purposive sampling technique was used to select participants who met the inclusion criteria, such as residency for at least six months and willingness to participate. The final sample size was 96 participants, determined through a power analysis to ensure sufficient statistical significance for correlation and regression tests.

2.3 Instruments and data collection

A Community Empowerment Questionnaire was developed based on empowerment dimensions, consisting of 22 items measuring health literacy, community participation, self-reliance, and mobilization. The instrument's reliability was confirmed through a pilot test, resulting in a Cronbach's alpha score of 0.85, indicating good internal consistency.

A Malaria Prevention Behavior Questionnaire, consisting of 15 items, was used to assess practices such as the consistent use of insecticide-treated nets (ITNs), environmental sanitation, and early health-seeking behavior. The reliability test for this instrument showed a Cronbach's alpha value of 0.82, indicating high reliability.

The questionnaires were adapted to the local context and reviewed for linguistic and cultural appropriateness by experts in public health. Due to potential literacy challenges in the remote setting, participants were assisted by trained enumerators during data collection to ensure accurate understanding of each question. Recall bias was minimized by focusing on behaviors practiced within the last month. Social desirability bias was addressed by ensuring anonymity and emphasizing that the data would be used solely for research purposes to improve local health services.

2.4 Data analysis

Descriptive and inferential statistics were performed using IBM SPSS Statistics version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondents' demographic characteristics, community empowerment, and malaria prevention practices. The Pearson correlation test was employed to examine the relationship between community empowerment and malaria prevention practices. Statistical significance was determined at a p-value of < 0.05 .

2.5 Research ethics

Ethical approval was obtained from the Health Research Ethics Committee of Universitas STRADA Indonesia (Reference Number: 1252/Kep.Ka/2026). Before data collection, participants were provided with comprehensive information regarding the study's objectives, procedures, and the protection of their privacy. Written informed consent was obtained from all participants. Participation was entirely voluntary, and respondents were informed of their right to withdraw from the study at any time without any penalty. Strict measures were taken to

maintain data confidentiality and anonymity throughout the research process.

3. Results

A total of 96 respondents participated in the study. The findings reveal a significant association between the community empowerment model and malaria prevention behaviors among the community in the working area of Puskesmas Iwur.

Table 1. Demographic Characteristics of Respondents (n = 96)

Characteristics	Frequency	Percentage
Gender		
Male	52	54.2 %
Female	44	45.8 %
Age Group		
18–30 years	20	20.8 %
31–45 years	45	46.9 %
>45 years	31	32.3 %
Education Level		
Primary Education	55	57.3 %
Secondary Education	31	32.3 %
Higher Education	10	10.4 %

The demographic data indicate that most respondents were male (54.2%). In terms of age, the largest group belonged to the 31–45 years category (46.9%). Most respondents were within the productive age range. This age group generally

possesses a greater capacity for absorbing health information, making informed decisions, and actively participating in community empowerment initiatives. Most participants (57.3%) had a primary education level.

Table 2. Community Empowerment and Malaria Prevention Levels

Variable	Frequency	Percentage
Community Empowerment		
High Empowerment	55	57.3 %
Low Empowerment	41	42.7 %
Malaria Prevention Behavior		
Good Prevention	58	60.4 %
Poor Prevention	38	39.6 %

The majority of participants (57.3%) reported high levels of community empowerment, indicating a good understanding of health literacy and participation. Similarly, 60.4% of respondents demonstrated good malaria prevention behaviors. Respondents with higher empowerment levels tended to exhibit better preventive practices,

suggesting that health literacy, self-reliance, and active participation contribute positively to the consistent use of mosquito nets and environmental management. Conversely, those with lower empowerment were more likely to have poor prevention practices.

Table 3. Association between Community Empowerment and Malaria Prevention

Variable	Pearson's <i>r</i>	Degrees of Freedom (df)	p-Value	Significance
Community Empowerment X Malaria Prevention	0.58	68	0.001	Moderate positive correlation

The Pearson correlation analysis demonstrated a statistically significant positive relationship between community empowerment and malaria prevention behavior ($r = 0.58$, $df = 68$, $p < 0.001$). This finding indicates that higher levels of community empowerment were associated with

4. Discussion

The findings of this study demonstrated a statistically significant positive association between community empowerment and malaria prevention behaviors. Individuals who reported higher levels of empowerment, encompassing knowledge, participation, and self-reliance, also tended to report better malaria prevention practices than those with lower levels of empowerment. These findings are consistent with previous studies suggesting that community-based empowerment is positively associated with malaria prevention behaviors in endemic settings [12]. Similarly found that community knowledge and the role of community health volunteers (Kader) were significantly associated with malaria prevention practices in rural communities [13], [14].

The observed association underscores the importance of participatory approaches in primary healthcare. Community members with higher levels of empowerment may have a greater sense of ownership and responsibility for maintaining a healthy environment and therefore tend to report better adherence to preventive measures, including the consistent use of insecticide-treated nets (ITNs) and environmental management. Conversely, respondents with lower levels of empowerment were more likely to report lower participation in mosquito control activities and less favorable malaria prevention behaviors. These findings are consistent with health behavior theories, which suggest that self-efficacy and collective action are associated with the adoption of preventive health behaviors [15]. Similar observations were reported by Yuliani (2022), who emphasized that community empowerment encourages collective responsibility for environmental management and disease prevention [16].

One possible explanation for the observed association is that individuals who participate in health education and community activities may have greater opportunities to acquire health-related knowledge and engage in malaria prevention practices. Respondents who reported participation in health education provided by Puskesmas also tended to report proactive environmental sanitation and involvement in community activities such as

better malaria prevention practices. The magnitude of the correlation suggests a moderate positive relationship, supporting the hypothesis that strengthening community empowerment may contribute to improved malaria prevention behaviors in endemic community.

gotong royong Similar findings have been reported by Chen et al. (2021), who highlighted the important contribution of community health volunteers in strengthening malaria awareness and mobilizing local communities [17]. Likewise, Aeni and Yuwono (2021) reported that increased health knowledge was associated with better health-seeking behavior among people living in malaria-endemic areas. However, because the present study used a cross-sectional design, the temporal direction of this association cannot be determined [18].

The findings also suggest that local leadership and social networks may be associated with malaria prevention behaviors. In remote areas such as the Iwur region, community leaders and health volunteers (Kader) may facilitate participation in health promotion activities. Respondents reporting greater involvement in community empowerment activities also tended to report better malaria prevention practices. Participation in community meetings and health education sessions may be associated with increased awareness and stronger community engagement in malaria control. These findings are supported by Hale et al., who demonstrated that empowering local leaders strengthened malaria surveillance and community participation, and by Sari et al., who reported that community health volunteers play an important role in promoting malaria prevention activities [19], [20].

Environmental and structural factors should also be considered when interpreting these findings. Access to healthcare services and community empowerment programs at Puskesmas Iwur may be associated with higher levels of empowerment and malaria prevention behaviors. Conversely, geographical isolation, limited transportation, and restricted access to health information may be associated with lower participation in community health programs. Similar challenges have been reported in remote areas of Papua, where geographical barriers remain an important determinant of malaria prevention practices, identified environmental and social conditions as important factors associated with malaria transmission in Eastern Indonesia [21].

From a public health perspective, the findings support the integration of community empowerment approaches into primary healthcare services. Programs such as health volunteer training, family-based malaria education, and community participation initiatives may strengthen malaria prevention efforts in endemic areas. Previous studies have demonstrated that community-based malaria programs supported by local health volunteers are associated with increased community participation and improved preventive practices [22]. These findings are also consistent with the National Guidelines for Malaria Management issued by the Ministry of Health of Indonesia, which emphasize community participation as an essential component of malaria elimination strategies [23].

The findings also have implications for malaria control policies in endemic regions. Strengthening community empowerment networks, supporting local health initiatives, and promoting collaboration among healthcare providers, local governments, community leaders, and community members may facilitate malaria prevention activities. These recommendations are consistent with the WHO Global Malaria Strategy and the Indonesian malaria elimination program, which emphasize multisectoral collaboration and community engagement as key strategies for achieving malaria elimination. However, the effectiveness of these approaches should be evaluated using longitudinal or experimental study designs [24].

This study has several limitations. First, the cross-sectional design precludes conclusions regarding causal relationships between community empowerment and malaria prevention behaviors [25]. Second, the use of self-reported questionnaires may have introduced response bias. Third, the study was conducted in a single endemic area, which may limit the generalizability of the findings. Future longitudinal, cohort, or intervention studies are recommended to examine the temporal relationship between community empowerment and malaria prevention behaviors and to evaluate the effectiveness of empowerment-based interventions in different endemic settings.

5. Conclusion

This study identified a significant positive association between community empowerment and malaria prevention behavior among community members in the Puskesmas Iwur working area.

Higher levels of empowerment, particularly in health literacy, participation, and self-reliance, were associated with better malaria prevention practices. These findings support the importance of incorporating community empowerment into malaria prevention programs through health education, community participation, and collaboration among healthcare providers, local leaders, and policymakers. However, due to the cross-sectional design, the findings should be interpreted as associations rather than causal relationships. Future longitudinal and intervention studies are needed to confirm these findings.

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