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Community Engagement Approach to Successful Malaria Elimination in Kulon Progo District

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Abstract

This study, conducted in October–November 2024 in Kulon Progo Regency, Indonesia, explores a model of community engagement in supporting malaria elimination in high-case areas. Although malaria remains prevalent in eastern Indonesia, cases continue to occur in Java, including Kulon Progo. Using mixed-methods sequential exploratory design, this study combined qualitative and quantitative approaches. Data was collected through observations, interviews, focus group discussions (FGDs), and questionnaires, involving 200 participants—comprising 100 village officials and 100 community health cadres and members. Quantitative data were analyzed using univariate analysis and path analysis. Findings revealed that knowledge and attitudes significantly affect community participation in malaria elimination activities, such as mosquito breeding site eradication and clean-up programs. The path coefficient score (13.93) indicates that community engagement has a strong influence on environmental improvement. Moreover, cross-sector collaboration enhances program effectiveness. This engagement model demonstrates significant potential in strengthening sustainable malaria elimination efforts in endemic-prone areas.

Introduction

Malaria is a disease transmitted to humans through the bite of female Anopheles mosquitoes infected with plasmodium parasite sporozoites in the salivary glands (Nabatanzi *et al.*, 2022). Malaria remains a global health problem, especially in tropical and subtropical regions (Utami *et al.*, 2022). It is estimated that in 2019, there will be 229 million cases of malaria worldwide, with 94% of cases occurring in Africa (WHO, 2020; Mburu *et al.*, 2021). In Indonesia, malaria cases are still rampant throughout the country, causing morbidity and mortality in humans(Fitriani *et al.*, 2023). Nationally, 2019 data shows that the dominant malaria cases are still in the eastern region, namely Papua (86%) and NTT (5%). As for Java Island, which is the most densely populated area in Indonesia with several regions, there are still cases of malaria transmission and even declared an Extraordinary Event (KLB) of malaria, one of which is Kulon Progo District, DI Yogyakarta (Kemenkes RI, 2021), where the number of malaria cases fluctuates every year. In 2022, there were 97 cases spread across several areas such as Galur, Pengasih, Kokap, Girimulyo, and Samigaluh (Kulon Progo District Health Office, 2023). Until June 2022, malaria cases were still found in Kulon Progo. Even throughout 2022, the number of malaria cases continued to increase, with the highest number being in sub-district Samigaluh with 42 cases.

Malaria is still a serious threat in Kulon Progo, especially in border areas directly adjacent to endemic areas such as Purworejo. Meanwhile, in Girimulyo, which borders Purworejo, the risk of transmission is high

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because the area is not yet fully malaria-free. Community activities outside the home at night, such as fishing, also increase the potential for mosquito bites from malaria vectors. With this condition, vigilance and preventive measures are very important in the effort to eliminate malaria in Kulon Progo. The Indonesian government has issued Ministry of Health Regulation No. 293/SK/IV/2019 on malaria elimination in an effort to support the malaria elimination program. The program aims to achieve gradual elimination by 2030. The success of the malaria elimination program relies heavily on the cooperation of several parties, including community involvement (Widiastuti *et al*., 2021). Community engagement has been adopted mainly by low- and middle-income countries in their efforts to achieve elimination by 2030, in line with the WHO Global Malaria Strategy 2016-2030.

Based on previous research, community engagement has been used to design public health interventions and approaches for malaria prevention and control in different countries in various national programs, such as mass drug administration for malaria prevention in Myanmar and Laos (Adhikari B, Pell C, Phommasone K, 2017; Kajeechiwa L, Thwin MM, Nosten S, 2017); increasing LLIN use and promoting early testing and treatment in Cambodia and Kenya(Lim R, Tripura R, J Peto T, 2017); and improving access to diagnosis and treatment in communities in Zambia (Gordon A, Vander Meulen RJ, 2019). Various activities have been implemented for malaria prevention, control, and elimination based on Community Engagement. These include the establishment of community leadership groups comprising local decision makers, elderly, and youth; drama campaigns and health education programs conducted in local languages and delivered in schools and churches; door-to-door visits by community health volunteers to improve early detection and timely treatment in rural areas with high migration rates; and participatory action malaria research(Awasthi *et al*., 2021).

The topic of community engagement was central to the discussion and was recognized as a critical component in the shift towards creating local and site-specific solutions. Community engagement strategies have long been incorporated into themes such as women's health, political action, and HIV (Lavery JV, Tinadana PO, Scott TW, Harrington LC, Ramsey JM & Nuñez C, 2010). Community engagement is often misinterpreted as simply providing information, education, and communication (IEC) to communities; the malaria community has only recently begun to consider the importance and potential of Community engagement in malaria elimination (Baltzell *et al*., 2019). Health interventionists use Community Engagement to leverage communities in health promotion practices, research, and policy-related decision-making to advance knowledge and support behavioral and environmental changes to improve health outcomes(Baltzell *et al*., 2019). Public health interventions can incorporate Community Engagement in various forms: providing information, consultation, shared decision-making, acting collaboratively, and supporting community self-interest. Community Engagement can be effective in addressing health disparities, especially among disadvantaged groups who are faced with structural, geographical, cultural, financial, and language barriers.

Method

This study employed a mixed methods approach with a sequential exploratory design, intended to thoroughly investigate the factors influencing community engagement in malaria elimination and to test them quantitatively. The choice of this design was based on the need to qualitatively understand the social and cultural context before constructing an evidence-based model using quantitative methods. In the initial phase, a qualitative approach was applied using phenomenological methods to explore the essence of human experience concerning malaria prevention behaviors. As explained by (Dodgson JE., 2023), the phenomenological approach allows researchers to capture individuals' lived experiences concerning specific health phenomena, emphasizing depth of meaning rather than generalizability. Data was collected through participant observation, in-depth interviews using snowball sampling techniques, and focus group discussions (FGDs) to identify social constructions,

local values, and factors that facilitate or hinder participation. The data were analyzed thematically through processes of coding, categorization, and meaning abstraction to uncover patterns of engagement relevant to the local context.

Findings from the qualitative phase were then used as the basis for developing the survey instrument in the quantitative phase, which employed a cross-sectional design to measure the strength of relationships among the previously identified variables. This design aimed to describe the nature of the phenomenon at a specific point in time (Wang & Cheng, 2020). The survey involved 200 respondents (100 village officials and 100 community health cadres and members) from Jatimulyo and Pagerharjo Villages, areas with high malaria risk in Kulon Progo Regency. The quantitative instrument consisted of items measuring knowledge, attitudes, and levels of community involvement in malaria elimination programs. Data was analyzed using univariate analysis to describe variable distributions, and path analysis to examine direct and indirect causal relationships among variables. This statistical model was used to identify the most effective pathways in fostering community engagement and its impact on improving environmental conditions. The study was conducted from October to November 2024, with study sites selected based on malaria outbreak status and the presence of collaborative practices between local governments and communities.

Result and Discussion

Malaria Elimination Policy and Program

Indonesia aims to be malaria-free by 2030, and Kulon Progo Regency has successfully achieved malaria elimination on May 31, 2022, as part of its efforts to control this disease. This success was supported by cooperation between the local government, health centers, and the community and strengthened by the issuance of Regent Regulation No. 4 Year 2024 to support malaria elimination sustainably. The Kulon Progo District Health Office has also collaborated with Purworejo District and Magelang District through a Memorandum of Understanding (MoU) to share information related to malaria cases and treatment. In addition, cooperation has also been established with the Health Quarantine Center (BKK) and YIA Airport to screen individuals coming from endemic areas. A spokesperson for the Health Office explained:

> *"The Kulon Progo District Health Office made an MoU with Purworejo District and Magelang District to exchange information about malaria cases and treatment in the malaria elimination program. Then the MoU was also made with BKK (Health Quarantine Center) and YIA Airport, which carried out a screening program for people who came from endemic areas. For example, PON 2024 athletes from the DIY contingent, after returning from Aceh when they arrived at YIA Airport, they were immediately checked." (DHO Spokesperson, 2024)*

In addition to local government policies, the role of village policies is also influential in the success of malaria elimination. Girimulyo village officials expressed challenges in implementing the gotong royong program, which aims to improve environmental cleanliness:

> *"First, for gotong royong, the village already has a cash-for-work program, but it is constrained because there is no letter from the agency and PMD, so this program is difficult to implement. Even so, the Friday Clean and Sunday Clean activities in each hamlet continue to run based on community awareness." (Village officials Girimulyo, 2024)*

The community still shows high awareness of environmental cleanliness through routine activities such as Clean Friday and Clean Sunday carried out in each hamlet. These activities continue to run well thanks to the active participation of residents who voluntarily engage in maintaining the cleanliness of the surrounding environment, even without formal administrative support. The findings of these interviews show that the success of malaria elimination depends not only on local government policies, but also on village and community involvement. Effective policy implementation, strengthened prevention programs, and community awareness are key factors in ensuring sustainable malaria

elimination.

The Role of Health Center, Health Office, and Community Leaders in Malaria Elimination

Malaria elimination policies and programs play an important role in reducing the number of cases in vulnerable areas. Community Health Center and the Health Office are at the forefront in ensuring the success of this program, as expressed by the spokesperson of the Health Office below:

> *"For the role of the Health Office itself, at least up to sub-districts, by making an MoU at the sub-district level with the sub-districts that border directly under the MoU that has been made between districts, with several programs, including providing mosquito net assistance, repellent to the community. Most often in migratory communities, such as vegetable sellers who travel at night before morning to buy vegetables in neighboring districts and sub-districts." (Health Department Spokesperson, 2024)*

From the information above, the Health Office plays a strategic role in controlling malaria through cross-regional coordination up to the sub-district level. This collaboration aims to strengthen surveillance in areas at high risk of malaria spread. The implementation of concrete programs such as the provision of mosquito nets and repellents is aimed at vulnerable groups, especially migrant workers, including vegetable vendors who often move outdoors at times prone to mosquito bites. The Health Office also actively conducts socialization through various media, including leaflets, digital platforms, and banners in strategic locations, and urges residents to report the arrival of guests from outside the region. Direct engagement in community events, such as nighttime volleyball matches, was also implemented to raise awareness about the potential for malaria transmission. Community involvement in these efforts has proven to have a positive impact on the success of malaria elimination.

Community Participation in Malaria Elimination

Active community involvement makes the malaria elimination program more effective. The high level of public awareness of this disease is inseparable from the encouragement of the village government and local cadres.

> *"Community involvement is done through the role of cadres, gotong royong activities, and environmental cleaning programs. During the dry season, the community tends to be more relaxed, but when there are cases or victims, the new village is more serious in launching malaria elimination efforts." (Village officials Girimulyo, 2024)*

Village officials Girimulyo confirmed that community involvement in malaria elimination is carried out by optimizing the role of cadres, promoting gotong royong, and running environmental hygiene programs. However, community participation tends to decline when the situation is deemed safe, especially in the dry season. A serious response usually comes after a malaria case, which encourages increased awareness and commitment in preventing and controlling the disease.

> *"In the face of the rainy season, village officials always remind the community to maintain environmental hygiene through the delivery of information in WhatsApp groups. Community awareness has increased, especially because of the experience of residents who have been affected by malaria and traumatized." (Village officials Girimulyo, 2024)*

Village officials Girimulyo added that ahead of the rainy season, active education is carried out through WhatsApp groups that are easily accessible to residents. Community awareness has increased due to the real-life experiences of residents who have suffered from malaria, so they are more vigilant and support elimination efforts, including environmental hygiene and other preventive measures. The Community Health Center spokesperson also emphasized that community involvement in malaria elimination has shown positive results. This awareness is influenced by past experiences, especially for older communities, who understand the devastating effects of malaria. Trauma from malaria outbreaks has increased their motivation for prevention efforts. Active participation is seen in gotong royong, environmental cleanliness, and compliance with village officials' directives. In addition, village cadres confirmed that the

community plays an active role in various malaria elimination programs.

> *"Being involved in the PSN (Mosquito Nest Eradication) program, which is routinely carried out once a month, participating in environmental cleanliness work in each RT, participating in vector capture in two urban villages, especially because of the high population of livestock such as cows. Draining bathtubs regularly, once a month." (Jatimulyo cadre, 2024)*

Communities are involved in monthly PSN, neighborhood community service at the neighborhood level, and vector trapping in areas with high livestock populations. At the household level, communities also routinely drain bathtubs once a month to reduce the risk of mosquito larvae development.

Based on the data in Table 1, the level of community involvement in the elimination program shows a positive attitude toward involvement in malaria elimination. This reflects that the majority of the community has the awareness and willingness to participate in malaria eradication efforts. Enthusiastic community involvement is considered effective in reducing malaria cases. Therefore, further strategies are needed to increase awareness and overcome barriers that cause negative attitudes in community involvement. So that consistency in program implementation with the community has a positive impact in suppressing the spread of this disease.

Table 1. Distribution of community engagement participation

Category	Frequency
Positive	59
Negative	41
Total	100

Recommendations to Increase Community Participation

The Kulon Progo Health Office spokesperson provided several recommendations to improve community involvement in malaria elimination:

> *"To increase community involvement in the malaria elimination program, namely, the speed of information. If there is migration, then the community's self-awareness is increased if they migrate independently, which encourages them to be examined. For people who are on the border, if there are many cases in the outside area, we who are here must fortify by using mosquito nets or repellents." (Health Department resource person, 2024)*

Increasing community involvement can be done by accelerating the flow of information related to population migration, increasing awareness among residents to voluntarily check themselves, and encouraging the use of mosquito nets and repellents in high-risk border areas. These measures are expected to strengthen early detection and prevent the spread of malaria more effectively.

Path Analysis Results

Path analysis aims to measure direct and indirect relationships between variables in the model. Based on the goodness of fit test value of the model or path diagram, it is said that the model is fit. The model results, according to the figure, are used to answer the hypothesis of this study. The path analysis model is as follows:

Based on Figure 1, community involvement in this model is influenced by the knowledge and attitude factors of cadres and communities, which shows that the higher these factors, the greater the community involvement. The attitude pathway of cadres and communities has a greater influence, and community involvement is stronger in influencing environmental conditions. Community engagement in malaria prevention programs is influenced by various factors, including community attitudes and group decision-making tendencies (Cheng *et al*., 2021; Gowelo *et al*., 2020). Finally, the cumulative impact of community engagement leads to environmental conditions with the largest output of 13.93. This indicates that

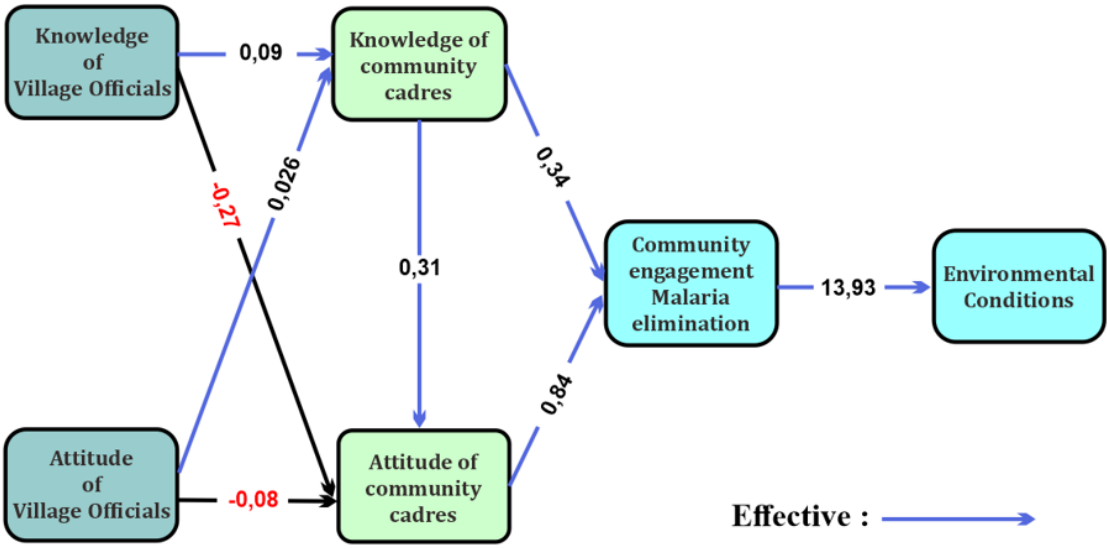

Figure 1. Path Analysis Model

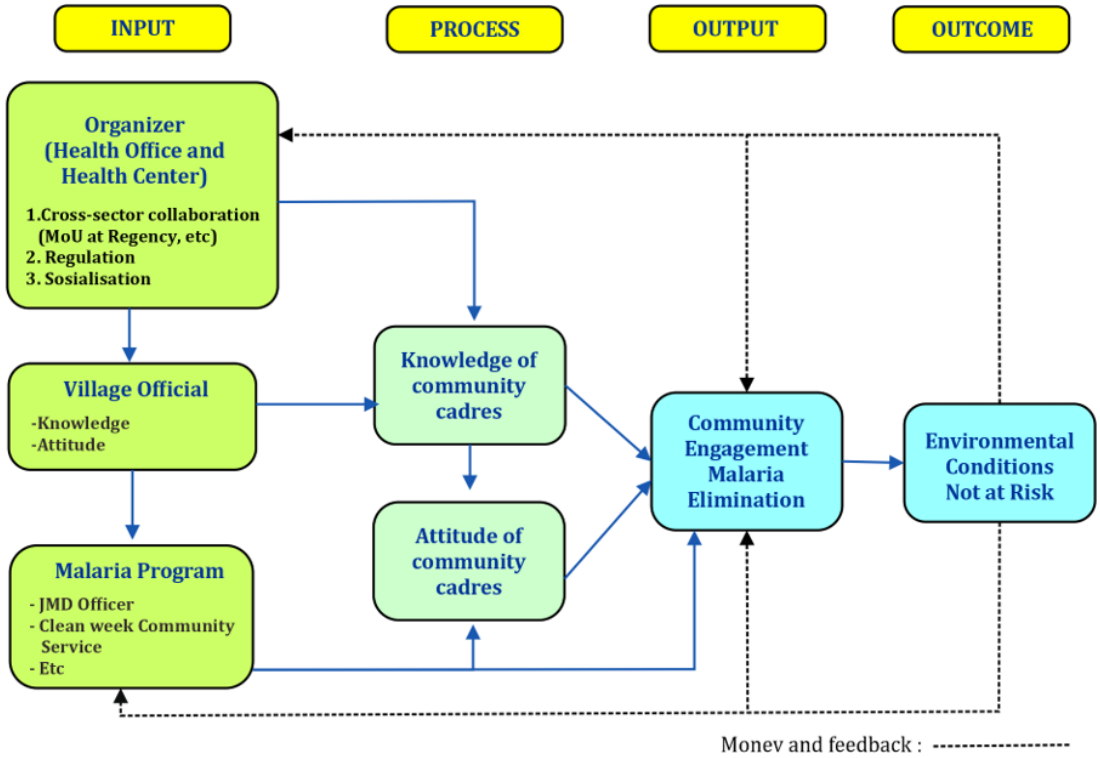

Figure 2. Recommendations for a Success Model for Malaria Elimination in Kulon Progo District Based on Path Analysis and research

the role of the community determines the change or improvement of environmental conditions. Based on the above model, the final recommended model for successful malaria elimination in Kulon Progo Regency is as follows:

Figure 2 illustrates the Model of Malaria Elimination Success in Kulon Progo Regency, depicting the interconnection of various factors in the malaria elimination effort. This model highlights both direct and indirect influences on community involvement and environmental conditions. The direct influence comes from the role of organizers, such as the District Health

Office and Community Health Centers, which, through cross-sector collaboration, regulations, and socialization, enhance the knowledge of health cadres and the community. The involvement of multiple stakeholders is crucial in determining the effectiveness of malaria interventions, with cross-sector and community participation serving as key elements. In addition to the role of the organizers, other partners and all community institutions also hold significant potential to participate in this effort to produce more effective interventions (Nasir *et al*., 2018). Based on field findings, at the local level, cross-sector collaboration is reflected in the coordination between village officials in Jatimulyo and Pagerharjo and the local Puskesmas through routine health checks every three months. Furthermore, the Kulon Progo District Health Office has established cooperation with the regencies of Purworejo and Magelang through a malaria case information exchange agreement. Collaboration also extends to the Health Quarantine Center (BKK) and Yogyakarta International Airport (YIA). This approach has proven effective in delivering information, raising awareness, and strengthening inter-agency cooperation in malaria control efforts (Awasthi *et al*., 2024).

There are also indirect effects that strengthen the effectiveness of the malaria elimination program. The program not only improves knowledge but also shapes community attitudes towards malaria prevention efforts. Positive attitudes then contribute to community involvement in elimination activities, which in turn affect environmental conditions. Special programs, such as the presence of Village Malaria Officers and clean week activities, also have an indirect effect by increasing community awareness and participation in keeping the environment clean and reducing mosquito habitats. Given the interaction between these factors, the model confirms that the success of malaria elimination depends on the synergy between policies, knowledge, attitudes, and active community involvement in maintaining a healthy environment free from malaria risk.

Studies in countries such as Kenya, Malaysia, and India highlight the importance of integrated vector management, community participation, and knowledge building in supporting malaria elimination. Effective strategies include partnerships with various government departments, training of community health volunteers, and distribution of educational materials(Ng'ang'a *et al*., 2021). Improved knowledge shapes people's positive attitudes towards malaria elimination programs, which in turn increases their involvement in prevention activities (Ngasala *et al*., 2023). Research shows that community knowledge, attitudes, and practices (KAP) significantly influence the success of malaria control interventions (Munajat *et al*., 2021; Munzhedzi *et al*., 2021). This active involvement contributes to a cleaner environment and less risk of malaria spread.

Government support is crucial in increasing community involvement, especially through early detection programs such as periodic blood tests by Community Health Center. These efforts not only ensure timely treatment but also build community trust in the malaria elimination program. Previous research emphasizes the importance of establishing community leadership groups led by local stakeholders, as well as health promotion and early detection programs in areas with high migration rates (Awasthi *et al*., 2021). In Kulon Progo district, high-risk border communities are encouraged to use mosquito nets and repellents as a preventive measure, while individuals experiencing malaria symptoms, especially after traveling to endemic areas, are advised to undergo immediate screening (Kulon Progo District Health Office, 2023). In addition, mosquito vector surveys conducted annually throughout the sub-district region involve community health centers and Village Malaria Managers in monitoring mosquito populations. This approach emphasizes that community involvement should be increased from mere passive participation to an active role in malaria diagnosis, treatment, education, and control (Bardosh *et al*., 2023). Thus, the community is not only the beneficiary of the program, but also the main actor in mitigating and solving malaria problems in their area.

Community-based programs, such as gotong royong and fishpond maintenance, can help reduce the breeding potential of malaria vectors and create a cleaner and healthier

environment. In Jatimulyo Village, weekly gotong royong involving cadres and residents has proven effective in malaria prevention, including through environmental cleaning and livestock management. The concept of gotong royong not only strengthens togetherness but also becomes an institutionalized strategy in improving the environment and preventing the spread of malaria (Winardi, 2020). The high level of community participation in gotong royong has had a positive impact on environmental conditions, with 84% of community dwellings in the area categorized as malaria risk-free. This finding confirms that community awareness and active participation are key elements in maintaining a clean environment and supporting sustainable malaria elimination.

Conclusion

The success of the malaria elimination model in Kulon Progo Regency is strongly influenced by the synergy between government policies, cross-sector collaboration, and active community participation. This study demonstrates that community knowledge and attitudes significantly affect their level of engagement. The path analysis results indicate that community engagement has the strongest influence on environmental improvement, with a path coefficient of 13.93, reflecting a very strong direct effect. The knowledge of community health cadres also shows a substantial influence (coefficient = 0.31), followed by the knowledge of village officials (coefficient = 0.09) and their attitudes, although the attitude of village officials showed a slightly negative path value (coefficient = -0.08), indicating the need for strengthened capacity and more targeted support. These findings emphasize that increasing public knowledge and reinforcing local leadership attitudes are key to enhancing effective community participation. Furthermore, this statistical model validates that sustained collaboration between health institutions and the community is essential to achieving long-term malaria elimination goals.

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