Article

Community-based malaria prevention policy model in Rampah Village, Kutambaru District, Langkat Regency, Indonesia

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Abstract: Malaria is an infectious disease that poses a significant global health threat, particularly to children and pregnant women. Specifically, in 2020, Rampah Village, Kutambaru sub-district, Langkat Regency, North Sumatra Province, Indonesia, reported 22 malaria cases, accounting for 84% of the local cases. This study aims to develop a malaria prevention model by leveraging community capital in Rampah Village. A mixed-method sequential explanatory approach, combining quantitative and qualitative methods, was employed. Quantitative data were collected through questionnaires from a sample of 200 respondents and analyzed using structural equation modeling (SEM) with Smart PLS (Partial Least Squares) software. The qualitative component utilized a phenomenological design, gathering data through interviews. Quantitative findings indicate that natural capital significantly influences malaria prevention principles. There is also a positive and significant relationship between developmental capital and malaria prevention. Cultural capital shows a positive correlation with malaria prevention, as does social capital. The qualitative phase identified cultural capital within the Karo tribe, such as 'Rakut si Telu,' which signifies familial bonds fostering mutual aid and respect. The results of this study are crucial for formulating policies and redesigning community-capital-based malaria prevention programs. These programs can be effectively implemented through cross-sectoral collaboration among health departments, local government, and community members. Malaria is a communicable disease threatening global health, particularly affecting children and pregnant women. In 2020, there were 229 million cases of Malaria worldwide, resulting in 409,000 deaths. In Indonesia, specifically in North Sumatra's Langkat Regency, Kutambaru District, Rampah Village had 22 cases (84%). The purpose of this research is to formulate a Malaria prevention model using community resources in Rampah Village, Kutambaru District, Langkat Regency. The study employed a mixed-methods sequential explanatory approach, combining quantitative and qualitative methods. Quantitative data was collected through questionnaires, with 200 respondents, and structural equation modeling (SEM) analysis using smart PLS (Partial Least Squares) software. Qualitative data was gathered through interviews. The research findings showed a positive relationship between cultural modalities and Malaria prevention ($p = 0.000$) with a path coefficient *T*-value of 12.500. The cultural modality and Malaria prevention relationship were significantly positive ($p = 0.000$) with a path coefficient *T*-value of 3.603. A positive and significant correlation also exists between development modalities and Malaria prevention ($p = 0.011$) with a path coefficient *T*-value of 2.555. Qualitative research revealed the Rakut si Telu cultural modality of the Karo tribe, meaning that family-based social connections create a sense of helping and respecting one another. The Orat si Waluh cultural modality represents daily life practices in the Karo tribe as a form of community-based Malaria prevention.

Keywords: cultural modality; development modality; malaria prevention; policy model; social modality

1. Introduction

Malaria is a highly prevalent infectious disease contributing to the increase in morbidity and mortality rates worldwide, particularly in regions of the African and Asian continents (Dini et al., 2020). The highest number of malaria cases are found in Africa (93%), followed by Southeast Asia (3.4%), and the Eastern Mediterranean region (2.1%). According to the World Malaria Report 2020, an estimated 229 million malaria-contaminated cases occurred with 409,000 deaths resulting from malaria. Almost every country in Southeast Asia reported malaria cases, and in 2018, the World Health Organization (WHO) estimated 8 million cases and 11,600 deaths caused by malaria in the Southeast Asian region. Indonesia ranks second with the highest number of malaria incidents after India (WHO, 2019).

Indonesia ranks second with the highest number of malaria cases after India. In 2019, there were 250,644 malaria cases in Indonesia, with Papua being the province with the highest number of cases at 216,380, followed by Nusa Tenggara Timur with 216,380 cases, and West Papua with 7079. Globally, in 2019, there were 49 deaths (1%) caused by malaria in Indonesia (Ministry of Health of Indonesia, 2020). In 2019, some areas still had high malaria endemism, such as the province of North Sumatra. Based on 2018 malaria data, there were 1300 cases in North Sumatra, with Labuhan Batu Utara having the highest number of cases at 276, and Langkat District had 51 malaria cases. In 2019, the number of positive malaria cases in Langkat District began to decrease to 11 cases, while in 2020, Langkat District itself experienced an increase in the number of cases, amounting to 26 malaria cases (Ministry of Health of Indonesia, 2020).

According to the data obtained from the North Sumatra Provincial Health Department (2020), the area with the highest malaria incidence in the Langkat Regency is located in the Langkat Mountain Range Forest area, specifically in Langkat Hulu region. The highest number of cases in 2020 were found in Kutambaru sub-district, where 22 cases (84%) of the total cases in Langkat were recorded. Kutambaru sub-district consists of 8 villages: Kutambaru Village, Kuta Gajah Village, Namoteras Village, Kaperas Village, Perkebunan Marike Village, Perkebunan Namotongan Village, Sulkam Village, and Rampah Village. The highest malaria cases were reported in Rampah village (North Sumatra Health Department of Langkat Regency, 2021). Based on the observations conducted by the researchers, the residents of Rampah village practice subsistence farming, living and dwelling while constructing houses in the forest area. Due to the high prevalence of malaria in Langkat Regency, particularly in Kutambaru sub-district, it is necessary to conduct research to identify risk factors or causes of malaria in Kutambaru sub-district.

2. Review of literature

Malaria is caused by parasites from the Plasmodium genus, which is transmitted through the bites of Anopheles mosquitoes. This disease can affect various organs, such as the brain, heart, and kidneys, allowing the parasite to multiply and develop within them. Malaria can significantly impact infant, child, and pregnant mother mortality rates (Ahadzie-Soglie et al., 2022; Lombardo et al., 2017; WHO, 2020). In addition to mortality, malaria also influences morbidity rates. The increasing density

of Anopheles vectors is attributed to the presence of water pools such as puddles, fish ponds, wetlands, rivers, serving as habitats for Anopheles mosquitoes (Hasyim et al., 2019).

Malaria occurrences can be caused by various factors that support the Anopheles mosquito's ability to survive and reproduce, as they adapt to the existing environment. These factors include environmental, behavioral, healthcare services, immunity, and hereditary aspects (Gul et al., 2021; Sulistyawati et al., 2020; WHO, 2020). Risk factors play a role in malaria occurrences, both individual behavioral factors and environmental factors of the living area, as well as preventive measures to reduce malaria case numbers (Alimi et al., 2016; Mkali et al., 2021). Other research indicates that several risk factors for malaria occurrence include tightly built wooden house walls, not staying indoors during nighttime, and poor environmental conditions such as houses and sanitation. Community behavior also influences the contact between humans and Anopheles mosquitoes, making disease transmission more likely to occur. The presence of puddles and stagnant water around the living environment is associated with an increased risk of malaria (Sarkar et al., 2021; Smith et al., 2021).

To achieve the elimination of malaria in Indonesia and worldwide as part of the global commitment to Sustainable Development Goals (SDGs) by 2030, comprehensive malaria control is required (Adigun et al., 2015; Chen et al., 2017; Fahmi et al., 2022). The high number of malaria cases indicates that a comprehensive approach to managing malaria has not yet been implemented. A region is considered to have achieved elimination when no indigenous cases or local transmission are found for three consecutive years. Eliminating malaria involves stopping the local transmission in a specific area and requires preventive measures to avoid retransmission. Understanding the risk factors for malaria occurrence and knowing how to control them is crucial (Anstey et al., 2021; Feng et al., 2016; Sarkar et al., 2019).

This study is essential given the high prevalence of malaria, an infectious disease, in Indonesia, particularly in North Sumatra. Previous research on malaria in Indonesia has addressed various aspects, including malaria elimination programs (Sillehu, 2020) and the distribution of malaria based on the characteristics of people, places, and times (Irma et al., 2023). However, these studies did not examine the influential factors that could be used to halt the spread of malaria.

In summary, a research gap exists as no prior studies have explored the capabilities or community capital that can be leveraged to prevent malaria. Given the high prevalence of malaria in Langkat Regency, especially in Kutambaru sub-district, it is imperative to conduct research that identifies appropriate measures to address malaria cases through community resources. Therefore, the research problems are formulated as follows: What is the malaria prevention model in Langkat Regency? Does community capital influence malaria prevention in Langkat Regency? The objective of this study is to formulate a malaria prevention model by utilizing community capital. The results of this research are critical for developing policies and redesigning community-capital-based malaria prevention programs. These programs can be implemented through cross-sectoral collaboration among health departments, local government, and community members.

3. Materials and methods

3.1. Design

The research employs a mixed-method sequential explanatory design, which combines quantitative and qualitative approaches in two stages: the first stage is quantitative. Quantitative data is collected and then analyzed before proceeding to the second qualitative stage (Creswell, 2014). This decision was made to develop an accurate model. The quantitative method was employed to formulate the Malaria prevention model, while the qualitative method was used to explore the community's potential (community capital) derived from the quantitative approach.

In the first stage of the research, a quantitative approach with a cross-sectional survey design is used. This approach is employed to demonstrate that specific variables have an impact on other variables. Quantitative methods are used to determine the impact of interventions (Creswell, 2014). Relevant to previous research, a positive deductive design is applied in the study's design to prove the effects of the presence of some variables on others (Babu, 2023).

In the second stage, a qualitative approach is used, employing a phenomenological design. This approach is relevant to previous research, as it uses phenomenology to explore the potential of communities, enabling the findings to describe human experiences or phenomena in the observed society, ultimately deriving meaning from the researched theme (Harahap et al., 2023). The research is conducted in Rampah Village, Kutambaru sub-district, Langkat Regency, North Sumatra Province, considering that the village has one of the highest malaria case numbers in the North Sumatra Province. **Figure 1** the research location is situated in the Southern part of Langkat Regency, Kutambaru District (North Sumatra Health Department of Langkat Regency, 2021).
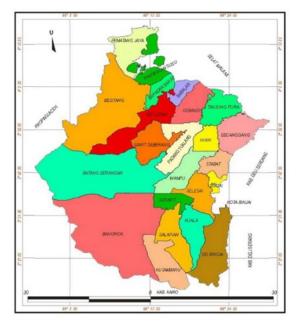

Figure 1. Map of sub-districts in Langkat Regency (North Sumatra Health Department of Langkat Regency, 2021).

3.2. Population, samples and informants

In the first quantitative stage of the research, the population used is the entire community residing in Rampah Village, Kutambaru sub-district, Langkat Regency, numbering 1460 individuals. The sample was determined using previous references (Haryono, 2016) by calculating the minimum sample size for SEM-PLS based on the rule of thumb, which is 10 times the number of significant paths on the largest structural model. The largest structural model has 19 indicators multiplied by 10, resulting in 190. A larger sample size leads to better analyzed data. Then, a sample of 200 respondents was set. The sample was chosen using simple random sampling.

The qualitative phase involves 12 informants, comprising key informants and supporting informants. Informants were determined using purposive sampling and met the following criteria: 1) village health workers working at Rampah Village Health Center, 2) Rampah Village Chief and Village Secretary, 3) community members who have experienced malaria, 4) able to communicate well in Indonesian, and 5) willing to be an informant until the research is completed. Informants who met the criteria were asked to fill out a consent form as informants and to provide the necessary information. The research has obtained ethical approval from the Research Ethics Committee of the Health Faculty University of North Sumatra Medan, with reference number: 929/KEPK/USU/2023.

3.3. Data collection

In the quantitative phase of the study, data were collected using a questionnaire. The variables were determined based on field phenomena and relevant theories. A total of nine variables were examined: social capital ($X1$), economic capital ($X2$), cultural capital ($X3$), natural capital ($X4$), human capital ($X5$), developmental capital ($X6$), principles of malaria prevention ($Y1$), epidemiological surveillance ($Y2$), and malaria prevention ($Y3$). The measurement of variables was conducted using a questionnaire that had undergone validity and reliability tests. Each variable was measured based on its specific indicators. The study utilized a structured questionnaire to collect data on various research variables and their respective indicators, as outlined in **Table 1**.

Table 1. Research variables and indicators.

No	Variable	Indicator
1	Social capital ($X1$)	Group characteristics ($X1.1$)
		General norms ($X1.2$)
		Cohesiveness ($X1.3$)
		Daily interactions ($X1.4$)
		Community relationships ($X1.5$)
		Volunteering ($X1.6$)
		Trust ($X1.7$)
2	Economic capital ($X2$)	Financial resources ($X2.1$)
		Assets ($X2.2$)

Table 1. (*Continued*).

No	Variable	Indicator
3	Cultural capital (*X*3)	Knowledge (*X*3.1)
		Cultural values (*X*3.2)
		Cultural dispositions (*X*3.3)
4	Natural capital (*X*4)	Weather conditions (*X*4.1)
		Environment (*X*4.2)
5	Human capital (*X*5)	Education (*X*5.1)
		Training (*X*5.2)
6	Developmental capital (*X*6)	Facilities (*X*6.1)
		Housing (*X*6.2)
		Accessibility (*X*6.3)
7	Principles of Malaria prevention (*Y*1)	Malaria risk awareness (*Y*1.1)
		Mosquito bite prevention (*Y*1.2)
		Chemoprophylaxis (*Y*1.3)
8	Epidemiological surveillance (*Y*2)	Human resources (*Y*2.1)
		Surveillance programs (*Y*2.2)
9	Malaria prevention (*Y*3)	Knowledge of malaria prevention (*Y*3.1)
		Attitudes towards malaria prevention (*Y*3.2)
		Malaria prevention practices (*Y*3.3)

These variables and indicators were systematically measured using the questionnaire, which had been validated and tested for reliability. Each variable was evaluated based on its defined indicators. Respondents' answers were scored and categorized into favorable (score > 75%) and less favorable (score < 75%) categories.

In the second phase of the qualitative data approach, data is collected through interviews based on interview guidelines with 12 participants. Interviews are conducted at the participants' homes, and prior arrangements have been made for their willingness to provide information and the scheduling of interviews. Each informant requires 15–25 min. The interviews consist of 6 themes, namely malaria events, environmental conditions, social, cultural, prevention principles, and prevention efforts. This information is needed to complement quantitative data from phase 1.

3.4. Data analysis

Quantitative data analysis is conducted through univariate and multivariate analyses. Univariate analysis produces frequency value data such as respondent characteristics and variable frequencies. Multivariate analysis formulates a model using structural equation modelling (SEM) with Partial Least Square (PLS) software. The analysis is used to test the relationships between variables. Hypotheses are accepted if the *p*-value is less than 0.05 and the *T*-statistic is greater than 1.96.

Qualitative data validity is carried out through data triangulation and theoretical triangulation. Data triangulation checks information from different sources, such as the same answers from several participants, and then draws conclusions. Theoretical triangulation analyzes the conclusions of participants' responses using several

different theories. Qualitative data analysis of information and explanations is based on themes, and unnecessary data is reduced and conclusions are drawn. The results of quantitative data processing are presented in tables and graphs and categorized according to themes.

4. Results and discussion

4.1. Quantitative approach

The characteristics of the sample based on analysis using SPSS version 23 are displayed in **Table 2**.

The **Table 2** provides an overview of the characteristics of the community in Rampah Village, allowing the identification of some patterns and trends. In terms of gender, there is a fairly balanced distribution with 55% female and 45% male. Regarding education, those with elementary school education dominate at 33%, followed by junior high school at 27% and senior high school at 26%. 14% never attended school. In terms of ethnicity, the majority of respondents are from the Karo tribe at 85%. Looking at family structure also reveals a diverse picture, with 64% living without parents, 19% living with a single parent, and 17% living with both parents. Another notable aspect from the table is income, which is the most significant factor in this analysis. Most respondents, 86%, have an income of less than Rp. 2,500,000; 52% receive assistance, with the most dominant types of aid being the Family Hope Program (FHP) at 24% and the Health Indonesia Card (HIC) at 15%.

Table 2. Characteristics of respondents based on gender, education, ethnicity, family structure, income, and type of assistance.

Characteristics	Frequency	Percentage (%)
Gender		
Male	90	45
Female	110	55
Education		
Not educated	28	14
Elementary school	66	33
Junior high school	54	27
Senior high school	52	26
Ethnicity		
Karo	170	85
Javanese	22	11
Banjar	2	1
Bantenese	2	1
Melay	2	1
Nias	2	1
Family structure		
Living with parents	38	19
Living alone	128	64
Living with both parents and other siblings	34	17

Table 2. (*Continued*).

Characteristics	Frequency	Percentage (%)
Income		
< Rp. 2,500,000	172	86
Rp. 2,500,000–Rp. 2,500,000	20	10
Rp. 3,500,000–Rp. 4,500,000	4	2
> Rp. 4,500,000	4	2
Receiving government assistance		
Yes	104	52
No	96	48
Type of assistance		
None	98	49
Family Assistance Program (FAP)	48	24
Non-Cash Food Assistance (NCFA)	14	7
Health Indonesia Card (HIC)	30	15
Others	10	5

Table 3 provides an overview of the distribution of variable categories being studied. Social capital is dominated by the "poor" category with 67%, and aspects of economic capital also provide a predominantly "poor" picture with 82%. In contrast, cultural capital was better in the past, with 62% in the "good" category, and natural capital also falls into the "good" category with 63.2%. Aspects of human capital are a variable and predominantly fall into the "poor" category with 88%. Development capital is also mostly "poor" at 56%.

Table 3. Distribution of respondent categories for research variables.

Variable	Good		Bad	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Social capital	67	33	134	67
Economic capital	36	18	164	82
Cultural capital	124	62	76	38
Natural capital	127	63.5	73	36.5
Human capital	24	12	176	88
Development capital	88	44	112	56
Principles of malaria prevention	81	40.5	119	59.5
Epidemiological surveillance	90	45	110	55
Malaria prevention	49	24.5	151	75.5

The malaria prevention principle is dominated by the "poor" category with 59.5%, and the epidemiological surveillance aspect also falls into the "poor" category with 55%. The malaria prevention variable shows that the "poor" category still significantly dominates at 75.5%, while the "good" category only accounts for 24.5%.

Table 4 presents the results of hypothesis testing on the direct effects of exogenous variables and endogenous variables in the structural model. The path

coefficients represent the extent to which exogenous variables affect related endogenous variables. In this case, *T*-statistics and *P*-values are measured to evaluate the significance of each path coefficient. The table reflects four significant positive relationships between variables. The natural capital has a significantly positive relationship with principle of malaria prevention, with a *p*-value of 0.000 and a path coefficient *T*-value of 12.500. Cultural capital shows a significantly positive relationship with malaria prevention, with a *p*-value of 0.000 and a path coefficient *T*-value of 3.603. There is also a significantly positive relationship between development capital and malaria prevention with a *p*-value of 0.011 and a path coefficient *T*-value of 2.555. Lastly, social capital exhibits a significantly positive relationship with malaria prevention, with a *p*-value of 0.000 and a path coefficient *T*-value of 3.609.

Table 4. Direct effect test results.

Path analysis	*T* statistics (O/STDEV)	*P*-values
Natural capital → Malaria prevention	0.982	0.326
Natural capital → Principles of malaria prevention	12.500	0.000*
Natural capital → Epidemiological surveillance	1.198	0.231
Cultural capital → Malaria prevention	3.603	0.000*
Cultural capital → Principles of malaria prevention	1.117	0.264
Cultural capital → Epidemiological surveillance	0.900	0.368
Economic capital → Malaria prevention	0.224	0.823
Economic capital → Principles of malaria prevention	0.645	0.519
Economic capital → Epidemiological surveillance	0.752	0.452
Human capital → Malaria prevention	0.168	0.867
Human capital → Principles of malaria prevention	1.210	0.226
Human capital → Epidemiological surveillance	0.312	0.755
Development capital → Malaria prevention	2.555	0.011*
Development capital → principles of malaria prevention	0.565	0.572
Development capital → Epidemiological Surveillance	0.293	0.769
Social capital → Malaria prevention	3.609	0.000*
Social capital → Principles of malaria prevention	1.495	0.135
Social capital → Epidemiological surveillance	1.432	0.152
Principles of malaria prevention → Malaria prevention	0.703	0.482
Epidemiological surveillance → Malaria prevention	0.254	0.799

* sig. *p*-value < 0.05.

The SEM analysis identified three exogenous variables that have a direct impact on malaria prevention: developmental capital, cultural capital, and social capital. Additionally, one exogenous variable, natural capital, was found to influence the endogenous variable, specifically the principles of malaria prevention.

The goodness of fit for the structural model was assessed using the *Q*-square statistic, which measures the predictive relevance of the model. *Q*-square values range between 0 and 1, with values indicating moderate to high predictive relevance when 0 < *Q*-square < 1. The calculated *Q*-square value for this study was 0.328 or 32.8%, indicating that the observed values strongly support the research model. The model

demonstrates good predictive relevance for the estimation of its parameters.

This finding implies that community capital is a suitable predictor for effective malaria prevention efforts in Rampah Village, Kutambaru sub-district, Langkat Regency. The application of path analysis confirms that leveraging community resources can significantly enhance malaria prevention initiatives.

4.2. Qualitative approach

In the next step of the qualitative approach (phase 2), the potential of the community is tapped to obtain information, which is then used to complement the structural model. Informal data is displayed in **Table 5**.

Table 5 illustrates the informant characteristics. The 42-year-old malaria patient is a farmer with a high school education. The key informant characteristics span an age range of 36–53 years, consisting of two village heads with middle and high school educations and a crucial informant who is a community health center staff member involved in the malaria program.

Table 5 provides an overview of the informant characteristics for Rakut Si Telu and Orat Si Waluh. Based on age, informants range from 22 to 48 years old. In terms of gender, 87% are male and 12.5% are female. In terms of the relationship with the malaria patient, Rakut Si Telu and Orat Si Waluh are drawn from familial or close connections. In terms of education, those with high school (SMA/SMK) education dominate at 50%, followed by elementary (SD) education at 25%, and those with middle school (SMP) and college (S1) education at 12.5% each. In terms of occupation, most are farmers (87.5%), with 12.5% working in other fields. Based on this information, the Rakut Si Telu and Orat Si Waluh malaria patient network can be visualized.

Table 5. Characteristics of informants malaria patients, key informants, and informants based on the Rakut Si Telu Orat Si Walu approach.

Informant	Age	Gender	Family relation	Education	Work
Malaria patient					
R	42	Male		Senior high school	Petani
Key informants					
*K*1	53	Male		Senior high school	Village Head of Sumbersari
*K*2	47	Male		Junior high school	Village Head of Bunga Rinte
*K*3	36	Female		Bachelor's degree	Malaria Program Responsible
Informants based on the Rakut Si Telu Orat Si Waluh					
*T*1	40	Female	Anak Beru (A child from a female cousin)	Bachelor's degree	Private Company Employee
*T*2	31	Male	Sipemeren (blood relationship from the mother's side).	Junior high school	Farmer
*T*3	42	Male	Puang Kalimbubu (Respected family with strong blood ties).	Senior high school	Farmer
*T*4	46	Male	Anak Beru Menteri (a child from female cousin).	Senior high school	Farmer
*T*5	22	Male	Kalimbubu (Respected family with blood ties).	Senior high school	Farmer
*T*6	33	Male	Anak Beru Singukuri (a child from female cousin).	Senior high school	Farmer
*T*7	48	Male	Siparibane (spouse of partner).	Elementary	Farmer

Rampah Village is located in Kutambaru sub-district, situated in the southern part of the map. The distance from the village to the sub-district's administrative center is 12 km, while the distance to the regency's administrative center is 90 km. This village is situated in a hilly area surrounded by palm plantations and lies along the Langkat River (North Sumatra Health Department of Langkat Regency (2021).

The qualitative research results, in the form of interviews with malaria patients, key informants, and relationships based on Rakut Si Telu and Orat Si Waluh, which convey their experiences in dealing with malaria based on their social context. The interviews provide a picture that malaria patient informants receive attention from their family's close kinship connections in the form of advice on treatment locations, as well as providing traditional medicine, either in the form of applications or drinks, which makes it easier for malaria patients to manage their illness. In addition, informants also explain their feelings of happiness due to the care and excellent attention received by the family for sick family members within the Karo tribe, thus strengthening the social relationships among the community within the Karo tribe. Following is a quote from a cultural theme interview on cultural capital.

"Since they have already experienced malaria, I took them here to consult, hoping that traditional village medicine could be made into a drink like that, which was their suggestion. If there are new residents, let's welcome them into our family, just like that. Yes, they hope that they can adapt to our living environment, which is their greatest expectation."

"In such cases, there could be a social activity, for instance, if they fall ill again, they would help escort them to the health center, even if neighbors nearby might not be enough to just pay a visit or something. Moreover, having more residents here, personally, I find it very beneficial as our village becomes more populated."

"Yes, if neighbors support each other like that, it helps the sick person, as malaria can be quite severe, and if not, there must be some form of contribution, right? Or perhaps a more significant contribution would surely have its form of contribution from our community or from the church, like that. If there are newcomers, as long as we maintain a friendly relationship with those living here now, there won't be any problems, and that's what's important, keeping things clear like that, not strange."

Social capital, which is a significant part of community capital, plays a significant role in addressing health issues, particularly malaria. The positive community response will greatly aid malaria prevention efforts. In the research testing, the direct impact demonstrates a positive and significant correlation between social capital and malaria prevention.

Cultural capital encompasses the norms and values that are practiced and upheld by the community, such as the tradition of visiting sick family members. Social capital, on the other hand, pertains to the ways individuals or groups conduct their lives, including their thoughts, intellect, and customary behaviors, such as cooperation. The relationship between cultural capital and social capital within the community is closely intertwined. For example, the tradition of visiting sick family members exemplifies cultural capital, as it reflects community norms and values. This practice often involves providing social support, which can include both material and non-material assistance, thereby illustrating social capital.

The key distinction is that cultural capital is rooted in kinship ties, whereas social capital does not necessarily require such familial connections. This nuanced understanding highlights how cultural capital, driven by kinship, and social capital, fostered through broader community interactions, collectively contribute to the community's overall support system.

Interview results also provide a glimpse into the cultural capital between malaria patients and their relatives based on the Rakut Si Telu and Orat Si Waluh in terms of malaria prevention and management. The malaria sufferer mentioned the Karo language term "sedalan tere-tere ilu," which can be interpreted as mutual empathy in sharing emotions or when one experiences joy or sorrow that others also feel.

> *"Yes, there is a role, for example, like observing or paying attention in that way. For instance, Lisna knows about Anak Beru and asks if they have recovered or received treatment somewhere. The importance grows in the Karo tradition because when it comes to grief or sadness, called Rakut Si Telu or Orat Si Waluh mentioned earlier, it is crucial. If it involves Kalimbubu, there is a customary bond, and if it involves Anak Beru, it is Ngalo who works to prepare everything."*

> *"One may have a slight understanding but not fully grasp everything, like Sipemeren, Siparibanen, Sipengalon, Anak Beru, Anak Beru Menteri, Anak Beru Singukuri, Kalimbubu, Puang Kalimbubu, and so on. In essence, these terms are still interpreted as a family. Therefore, the understanding of Rakut Si Telu or Orat Si Waluh is like a wise person who has experienced life, similar to a mother or elder sister. For instance, in this village, Siparibanen is known as Bapak Tosa Sipangalon Impal Ku, and there is someone named Sujana."*

> *"The younger sibling, or we could alternatively call them Anak Beru, is essentially the one who handles their issues during the events they participate in."*

> *"... As for us, Senina serves as an older sibling, somewhat like a combination of a parent and my sister, considering both of us as sisters within the family context. Of course, I will visit Senina Sipemeren, as others would when they are unwell, especially in the case of Senina Sipemeren."*

> *"I feel connected to Puang Kalimbubu, but to be honest, from where I stand, I am still not well-versed in its true essence, as it remains somewhat of a mystery to me, sir. Just like that, sir, when I visit that place, I learn about the people there, including those from the Karo ethnic group."*

> *"... From my understanding, which was once shared with me, Puang Kalimbubu is intertwined with the person as Kalimbubu."*

> *"... As a child of Singukuri, for example, I am similar to Kalimbubu, my elder sibling, who comes from the Singukuri lineage, making our connection clear."*

> *"... As a side note regarding Father Rudi. If mentioned, it would be clearer to say that he is the one who took our spouse, be it a brother or sister."*

> *"... If I were with Rudi at that time as his assistant, in terms of responsibility, for instance, if there was a party, I would have to work diligently without causing any disturbance, like that, you see."*

The interview above has explained the position and function in Rakut Si Telu and Orat Si Waluh, consisting of Anak Beru, Senina Sepemeren, Puang Kalimbubu, Anak Beru Menteri, Kalimbubu, Anak Beru Singukuri, Siparibanen, Sipengalon.

Understanding one's role and function within Rakut Si Telu Orat Si Waluh is influenced by a person's age. The quantitative approach test results show a direct or positively significant and significant relationship between cultural capital and Malaria prevention in the Rampah Village community.

This qualitative research also provides an insight into the natural capital, encompassing the environmental and ecological conditions in Rampah Village. The informants, who are Malaria patients, describe the village's environmental conditions as follows:

> *"… Their cleanliness, in my opinion, is quite adequate for the village, as here one can observe that there isn't much standing water anywhere, which used to be an issue before, and we only provided simple water storage in the bathrooms for bathing purposes."*
>
> *"… It is not yet considered clean, as garbage can still be found scattered around, and our wastewater disposal system is still lacking. Moreover, even if we dispose of it into the ground, people might still get upset."*
>
> *"… I believe our environment is not clean enough, and our home is also not as clean as it should be, which could potentially make us vulnerable to diseases like Malaria."*
>
> *"… The condition, for example, still remains messy in front of the house, as the trash cans are not yet available, even though I suggested placing them there yesterday, perhaps in front of the house."*

It is known that there is a positive and significant correlation between natural capital and malaria prevention principles. Environmental cleanliness, both outside and inside the house, not only refers to the external environment but also the indoor environment. The condition of the house has a bearing on the risk of Malaria occurrence. Geographically, Rampah Village is a mountainous area still filled with vegetation, including forests and swamps. The majority of the community repurpose the mountain forests into agricultural land and reside near their farmlands.

Malaria-endemic regions are often impoverished and lacking progress, especially in healthcare infrastructure. This context necessitates a reevaluation and restructuring of malaria prevention policies into comprehensive work programs. These programs should capitalize on various forms of community capital, such as natural capital, developmental capital, social capital, and cultural capital. By leveraging these resources, it is possible to develop more effective and sustainable malaria prevention strategies that are tailored to the unique conditions and needs of these regions. This approach can enhance community engagement and resource utilization, ultimately leading to better health outcomes and more resilient healthcare systems in malaria-endemic areas.

5. Discussion

The characteristics of village scattered can be observed through activities such as open community meetings or discussions, going to the rice fields, and nighttime fish catching, which increase the likelihood of contact with malaria-carrying mosquitoes. The community group's characteristics reflecting community participation play a crucial role in fostering a positive attitude towards programs, costs, and the inclination

to make decisions, particularly malaria prevention (Cheng, 2021). Community involvement in decision-making regarding their environment significantly affects the distribution of long-lasting, free insecticide nets, maintaining insecticide activities for 3–5 years to control malaria. This contributes significantly to the decline in malaria prevalence among rural communities (Egbuche et al., 2013; Kulkarni et al., 2010). However, progress in malaria control has plateaued, with no significant changes in malaria cases or deaths between 2015 and 2017 (WHO, 2018).

A study conducted in highland Kenya on three types of land, namely agricultural land, forest, and wetland, provides an insight that agricultural land is more prone to become a mosquito habitat compared to forests or wetlands. Involving several African countries, the research demonstrates that weed control or ditch clearing leads to a decrease in mosquito population density due to the loss of breeding sites and mosquito resting places. Conversely, invasive ditch clearing increases the risk of malaria transmission (Bousema, 2012; Landier, 2018).

Community capital within the scope of daily life, consisting of economic capital, social capital, development capital, cultural capital, and symbolic capital, are used to analyze the external individual environment in the social space with personal internal characteristics. In the Karo ethnicity, Rakut Si Telu refers to a three-part hearth consisting of Kalimbubu, Anak Beru, and Senina, while Orat Si Waluh represents eight kinship concepts related to communication (Nasution, 2016).

Culture closely ties with the spirit of collective help based on the principle of helping one another when a family faces misfortune in the form of accidents, natural disasters, riots, or death. As a result, all surrounding community members feel as if the event happened to themselves or their family (Al-khrabsheh and Balqa, 2022). The theory of modality states that a society cannot independently resolve its issues, necessitating the collaboration of community members to address problems occurring within their environment.

A good cultural modality requires knowledgeable and acknowledging members within the community. Malaria prevention variables are significantly influenced by indicators of malaria prevention behavior and malaria prevention knowledge. Understanding human behavior and cultural-social practices is crucial for identifying appropriate interventions to prevent mosquito bites and control malaria in rural communities.

An individual's understanding of culture at a young age remains relatively low, as does the reverse (Arianto, 2012). Cultural factors also influence the occurrence or control of malaria, as presented by Jombo et al. (2010), leading to a research plan to examine the relationship between cultural factors of the Karo Rakut Si Telu tribe and Si Waluh clan and malaria prevention. It is crucial to understand these cultural factors, as they significantly contribute to local elimination strategies in a region. Culture forms the basis of healthcare services at the client, service provider, and system levels, as culture shapes expectations, interactions, and meanings within healthcare. When individuals face health issues and life risks, attention towards cultural matters increases. This makes social and cultural practices more important at various experience levels (Baragatti, 2009; Bejon, 2010; Kreuels, 2008; Midega, 2012; Yamamoto, 2010).

Sustainable development encompasses the existing infrastructure and facilities

within communities, including the physical condition of homes and healthcare service provisions. The research in Rampah Village also depicts that most of the community members express the unavailability of healthcare facilities in their vicinity and the inadequacy of accessible healthcare services. The quantitative approach at phase 1 demonstrates that developmental resources have a positively influential impact on malaria prevention.

In line with Masrizal et al.'s (2020) statement, the lack of proper household facilities plays a significant role in attracting mosquitoes, entering, and biting humans within the house. A well-maintained house can reduce mosquito contact with humans, thereby minimizing the risk of disease transmission caused by mosquitoes, even if there are mosquito breeding sites nearby. Thus, it is crucial to keep the house in good condition and pay attention to the cleanliness of the surrounding environment.

Maintaining environmental cleanliness is founded upon an individual's knowledge. The higher an individual's understanding of Malaria causes and risks, the greater the efforts or actions taken to preserve cleanliness to prevent Malaria transmission (Sixpence et al., 2020). An individual will take preventive measures or treat their illness, and thus, they must feel vulnerable to that disease. Preventive actions will emerge when an individual believes they are susceptible to the disease (Doe et al., 2022).

The quantitative research findings of phase 1 prove that cultural capital directly affects social capital. Social capital is an integral part of society, comprising values and norms practiced and trusted by the majority of residents in a particular area, enabling them to engage in daily community activities, either directly or indirectly, impacting individual, community, and overall quality of life.

Social capital serves as a mutual trust between community members and their society towards their leadership. Social capital arises from the belief that the community will face difficulties in solving individual problems and must be addressed collectively (Shiell et al., 2020). The more attention the community gives to Malaria patients, the faster Malaria can be addressed (Ng'ang'a et al., 2021). In maximizing malaria prevention and control efforts, strong social capital is needed within the community, which aligns with the research conducted in Nyabondo Village, stating that social capital plays a significant role in determining Malaria control success (Ahadzie-Soglie et al., 2022). Therefore, a clear understanding of human behavior and social-cultural practices is crucial for identifying appropriate interventions to prevent mosquito bites and manage Malaria in rural communities (Ahadzie-Soglie et al., 2022).

Fundamentally, malaria disease is influenced by weather conditions, as presented by Teklehaimanot (2004), Mouchet (1996), and WHO (2015). Weather affects mosquito habitats and increases the risk of humans contracting the illness. The global distribution of malaria varies significantly and is affected by numerous factors, forming areas with high-risk zones that can sustain malaria transmission over long periods, particularly in extensive regions, as explained by Bousema (2016), Samadoulougou (2014), Ouedraogo (2018), and WHO (2015). In terms of control, this aspect is emphasized in a study conducted in Uganda, which found that consumable plants native to the environment, such as Artemisia annua L, led to a dramatic reduction in malaria-related symptoms and a decrease in confirmed malaria cases

through laboratory diagnosis (Bousema, 2016; Bejon, 2014; Ogwang, 2011; Smithuis, 2013).

6. Conclusion

It is inferred that malaria prevention is influenced by cultural, developmental, and social resources. Understanding cultural factors is crucial because they significantly contribute to the local malaria elimination strategy in a region. Community resources are examined from the social cultural aspects of the Karo Rakut Si Telu and Orat Si Waluh tribes, involving directly involved subjects who exhibit cooperation, concern, and self-reliance in addressing malaria and other health issues as a preventive measure. The research provides significant contributions, particularly to remote and hard-to-reach areas, necessitating the involvement of social cultural roles.

Culture serves as the foundation for healthcare services at client, service provider, and system levels, as culture shapes expectations, interactions, and meanings within healthcare. When individuals face health issues and life risks, cultural concerns become more prominent. This activity also involves healthcare professionals, leaders, or village officials, family members, and patients themselves, which can be adopted as a malaria prevention strategy aligned with the seventh Sustainable Development Goal and the World Health Organization and Indonesia's target of eliminating malaria by 2030.

This research serves as input for the Langkat Regency Health Department and related parties to incorporate the social cultural aspects of the Karo Rakut Si Telu and Orat Si Waluh tribes into malaria prevention and handling other health issues. This approach is more easily accepted and understood because it becomes part of the daily life of the community and has already integrated into the local people's mindset of the Karo tribe.

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