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Knowledge, Attitude and Practice of the Community towards Malaria Prevention and Control Options: A case study of Meru South District, Tharaka Nithi County, Kenya.

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Abstract: Background: *Malaria is one of the major causes of morbidity and mortality in Kenya. The diseases displays varying degrees of endemicity in different regions in the country, however the knowledge, attitudes and practices of communities about the disease prevention and control measures are in many cases not in tandem.*
Objective: *To assess the level of knowledge, attitudes and practices of the communities towards malaria prevention and control options.*
Methodology: *A cross sectional study design was done in six boarding schools in Meru South District in Tharaka Nithi County in Kenya. A single population proportion sample size formula and design effect of two was used to determine sample size. A total of 347 students were included in the study and proportional allocation was done among schools in the highland and lowland areas. The data was collected by trained data collectors and supervisors using questionnaires and interviewing guidelines. The collected data was cleaned, coded and entered into SPSS version 20.0 for windows software for analysis.*
Results: *This study revealed that 7.8% of the respondents mentioned poverty as a strongly predisposing factor to malaria. Only 8.9% of the respondents reported that children were more vulnerable to malaria as opposed to 6.9% who give the opinion that adults were more vulnerable compared to children. On drainage, only 5.5% of the respondents reported that stagnant water near dwelling places is a strong predisposing factor to malaria. On the type housing, 4.6% of the respondents reported that poor housing exposed people to mosquito bites hence malaria. 18.2% of those interviewed were of the view that seasons with more fruits had more incidences of malaria and that this was more common during the wet and warm weather (23.6%) as compared to the cold and dry season (20.6%). Other predisposing factors that the respondents identified include pregnancy (25.3%), living with malaria infected people (43.8%) and self and presumptive medication (20.5%).*
Conclusion and recommendation: *Knowledge, attitude and practice of the communities living in the area studied towards malaria prevention and control options was low. This calls for continual strengthening and improvement of the community knowledge, attitudes and practices towards malaria prevention and control.*
Keywords: *Malaria; Knowledge; Attitude; Practice; Insecticide treated net utilization*

I. Introduction

Malaria affects the health and wealth of nations and individuals alike. In Africa today, malaria is understood to be both a disease of poverty and a cause of poverty. Annual economic growth in countries with high malaria transmission has historically been lower than in countries without malaria. Economists believe that malaria is responsible for a 'growth penalty' of up to 1.3% per year in some African countries (WHO, 2011). According to the Kenya Medical Research Institute (2014), malaria is the leading cause of morbidity and mortality in Kenya as demonstrated by the following statistics:

- 25 million out of a population of 34 million Kenyans are at risk of malaria.
- It accounts for 30-50% of all outpatient attendance and 20% of all admissions to health facilities.
- An estimated 170 million working days are lost to the disease each year (MOH 2001).
- Malaria is also estimated to cause 20% of all deaths in children under five (MOH 2006).
- The most vulnerable group to malaria infections are pregnant women and children under 5 years of age.

Studies indicated that despite these bitter facts, communities are not well aware of the multi-dimensional challenges of malaria in our country. The knowledge of the community is far from perfect, and misconceptions are rampant (NMIS, 2010). There have been a considerable number of reports about knowledge,

attitude, and practice relating to malaria and its control from different parts of Africa. These reports concluded that misconceptions concerning malaria still exist and that practices for the control of malaria have been unsatisfactory (Deressa *et al*., 2006).

The 2010 Kenya Malaria Indicator Survey report indicated that about 71% of the rural community and 80.5% of the urban community have heard about malaria. This survey also reported that more than 90% of the respondents had heard about malaria. However, only 30.1% of the rural and 59.7% of urban community knew that mosquito bite can transmit malaria. This survey indicated that 39.1% of pregnant women, 49.5% of children have slept under ITN in the previous day of the interview. Thus, understanding of the current knowledge of the community beliefs and practices with respect to the disease is required to obtain and maintain the community involvement in surveillance and control activities (Deressa *et al*., 2006). In collaboration with partners, the government has developed the 10-year Kenyan National Malaria Strategy (KNMS) 2009-2017 which was launched 4th November 2009. The goal of the National Malaria Strategy is to reduce morbidity and mortality associated with malaria by 30% by 2009 and to maintain it to 2017.

II. Methods

2.1.1 Research design

A community based descriptive cross sectional study design was used to assess knowledge, attitude and practice of the community towards malaria prevention and control options.

2.1.2 Study area and study period

The study was conducted in six boarding primary schools in Meru South District of Tharaka Nithi County in Kenya in the year 2009. The schools include: Kathituni, Kianjeru, Kirimankari, Mariamu, Reverend Ikingi and St. Joseph. Kathituni, Kianjeru, Reverend Ikingi and St. Joseph are in the highlands while Mariamu and Kirimankari are in the lowlands.

2.1.3 Source population:

Communities from which the sampled students came from.

2.1.4 Study population:

Students in the sampled schools.

2.1.5 Sampling units:

Selected students for the quantitative study

2.1.6 Sample size determination:

The appropriate sample size for a population-based survey was determined largely by three factors: (i) the estimated prevalence of malaria in the district, (ii) the desired level of confidence and (iii) the acceptable margin of error. For this survey design which was based on a simple random sample, the sample size required was calculated according to the following formula.

Formula:

$$\mathbf{n} = \frac{\mathbf{t^2 \times p(1-p)}}{\mathbf{m^2}}$$

Description:

n =required sample size

t =confidence level at 95% (Standard deviation is 1.96)

p = estimated prevalence of malaria in Meru South District (believed to be between 10% and 20%, hence p was taken as 30% or 0.3 (Gorstein *et al*., 2007).

m = margin of error at 5% (standard value of 0.05)

Calculation:

$$\mathbf{n} = \frac{1.96^2 \times .3(1-.3)}{.05^2}$$

$$\mathbf{n} = \frac{3.8416 \times .21}{.0025}$$

$$\mathbf{n} = \frac{.8068}{.0025}$$

n = 322.72 ˜ **323**

NB: A total of 347 students were involved in the study.

2.1.7 Inclusion and exclusion criteria

Students who had been in the selected schools for at least 6 months were included in this study while those who had been in the selected schools for less than 6 months were excluded from the study.

2.1.8 Variables of the study

Knowledge, attitude and practice of the community on malaria prevention and control options are outcome variables and socio demographic variables, and special experience to malaria (once contracted malaria, lost family member due to malaria, training on malaria prevention and control, having special access to information to malaria and other health related issues, leadership role in the school).The participants were classified into three categories namely knowledgeable, having a positive attitude and those having good practices depending on their final scores in answering the questions asked. A participant was regarded as knowledgeable if his/her score was equal to or more than means score of the total questions by the study participants. A study participant was said to have positive attitude towards malaria prevention and control options if his/her score towards the questions is equal to or more than the mean value; while an individual was considered as having good practice when he/she practices with a score of equal to or more than the mean value.

2.1.9 Data Collection

Data was collected using structured questionnaire adapted from standardized questionnaires used by international organizations, national studies such as Demographic and Health survey and published articles in peer reviewed journals. Data was collected by trained data collectors through face to face interview of the respondents. During data collection, the team tried to assess the socio-demographic variables, special characteristics of respondents like once contracted malaria, lost family member due to malaria, training on malaria, having special access to information to malaria, participation in community conversation, leadership role in the school, level of knowledge about mosquito behavior, signs and symptoms, treatment modalities and prevention mechanisms, attitude towards malaria prevention and treatment seeking and practices in malaria prevention of their community. Knowledge assessment part of the questionnaire tried to measure causes of malaria, means of transmission, mosquito breeding site, biting time, signs and symptoms of malaria, signs and symptoms of sever malaria, susceptible groups to malaria, treatment modalities and prevention methods. Attitude assessment part of the questionnaire tried to assess attitude towards malaria prevention and treatment modality options. Similarly, the study tried to assess practices of the community towards malaria prevention.

2.2.0Data Collection Procedure and Quality Issues

Data collection was carried out by diploma holder health professionals. Appropriate training was given to data collectors and supervisors by principal investigators. To ensure data quality, in addition to training of the research team, checklist was prepared starting from the sample selection to the end of interviewing the respondent. Similarly to get the maximum data quality, local guiders and district malaria focal person assisted the data collection process. The collected data was checked on daily bases, and identified problems were corrected as soon as possible by supervisors. A mechanism was developed to bring letter of approval for collected data in the selected schools administrators and communicate to monitor and witness that the data collectors collected data from the randomly selected schools.

2.2.1Data Management and Analysis

Data was checked for completeness and consistency, and entered into SPSS version 20 by principal investigators. The data cleaned using frequency and analyzed using SPSS version 20 for windows. The result was presented using simple frequencies with percentages in appropriate tables to display the descriptive part of the result.

2.2.2Ethical Consideration

Ethical clearance was sought from the District Medical Officer of Health (MoH) and the District Public Health and Sanitation Officer (DPHSO) by signing on specially prepared ethical clearance forms. The Medical Superintendent Chuka General Hospital provided two members of medical staff to assist in data collection while the DPSHO facilitated the field visits. In each school prior to data collection, the head teacher was required to sign an informed consent form allowing the students to participate in the study. Each of the participating students was assured that the information collected would be treated with utmost confidentiality and privacy. The participants were also informed about their right not to participate, not to tell a certain information if they did not want to or even to withdraw without being denied from any possible benefit. Data was collected after obtaining verbal consent from each study participant.

III. Results of the Study

The study enrolled a total of 347 students sampled from six boarding schools in Meru South District of Tharaka Nithi County in Kenya. These 347 representatives comprised of 25 (7.2%) from Kathituni, 95 (27.4%) from Kianjeru, 19 (5.5%) from Kirimankari, 75 (21.6%) from Mariamu, 48 (13.8%) from Reverend Ikingi and 85 (24.5%) from Saint Joseph boarding school.

3.1 Knowledge of Poverty as a predisposing factor to malaria

7.8 per cent of the respondents reported that poverty strongly predisposed people to malaria. 13.0 per cent were of the opinion that poverty was a moderately strong predisposing factor to malaria while 22.8 per cent of the respondents indicated that poverty very strongly predisposed people to malaria. 27.4 per cent reported that poverty weakly predisposed people to malaria while the remaining were of the opinion that poverty poorly predisposed people to malaria (Table 1).

Frequency	Percent	Valid Percent	Cumulative Percent		
Valid	Moderately Strong	45	13.0	13.0	13.0
	Poor	101	29.1	29.1	42.1
	Strong	27	7.8	7.8	49.9
	Very Strong	79	22.8	22.8	72.6
	Weak	95	27.4	27.4	100.0
	Total	347	100.0	100.0	

Table 1: Knowledge of poverty as a predisposing factor to malaria.

3.2 Perception of community towards age as a predisposing factor to malaria

8.9 per cent of the respondents were of the opinion that children under five years of age were not vulnerable to malaria; 5.8 per cent indicated that such children are very highly vulnerable to malaria; 22.2 per cent indicated that children under are highly vulnerable and 25.4 per cent were of the opinion that the children are weakly vulnerable while 37.8 per cent of the respondents indicated that such children demonstrate moderately strong vulnerability to malaria (Table 2).

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Moderately Strong	131	37.8	37.8	37.8
	Poor	31	8.9	8.9	46.7
	Strong	77	22.2	22.2	68.9
	Very Strong	20	5.8	5.8	74.6
	Weak	88	25.4	25.4	100.0
	Total	347	100.0	100.0	

Table 2: Vulnerability of children to malaria

On the other hand, 6.9 per cent of the respondents were of the opinion that adults very strongly vulnerable to malaria compared to children while 18.7 per cent of the respondents reported that adults are strongly vulnerable. 28.2 per cent of the respondents indicated that adults have moderately strong vulnerability and 29.1 per cent of the respondents were of the opinion that adults are not vulnerable to malaria while 17.0 per cent of the respondents reported that adults were weakly vulnerable (Table 3).

Frequency	Percent	Valid Percent	Cumulative Percent		
Valid	Moderately Strong	98	28.2	28.2	28.2
	Poor	101	29.1	29.1	57.3
	Strong	65	18.7	18.7	76.1
	Very Strong	24	6.9	6.9	83.0
	Weak	59	17.0	17.0	100.0
	Total	347	100.0	100.0	

Table 3: Vulnerability of adults to malaria

3.3 Knowledge of drainage as a predisposing factor to Malaria

On the part of Poor drainage around home, the study revealed that 5.5 per cent of the respondents were aware that poor drainage around home very strongly predisposed people to malaria compared to 5.8 per cent of the respondents who indicated that poor drainage strongly predisposed them to malaria. Some 17.6 per cent of the respondents indicated that poor drainage around home was a moderately strong predisposing factor to malaria compared to 38.6 per cent who reported that poor drainage around did not predispose them to malaria.

Another32.6 percent indicated that poor drainage around home only weakly predisposed them to malaria (Table 4).

	Frequency	Percent	Valid Percent		Cumulative Percent	
Valid	Moderately Strong	61	17.6	17.6	17.6	
	Poor	134	38.6	38.6	56.2	
	Strong	20	5.8	5.8	62.0	
	Very Strong	19	5.5	5.5	67.4	
	Weak	113	32.6	32.6	100.0	
	Total	347	100.0	100.0		

Table 4: Poor drainage as a predisposing factor to malaria

3.4 Perception of community towards housing as a predisposing factor to malaria

When asked on issues pertaining to type of housing, 17.6 per cent of the respondents were of the opinion that the type of housing was a moderately strong predisposing factor to malaria compared to 45.2 per cent who were of the opinion that type of housing did not predispose people to malaria. Another 6.9 per cent of the respondents were of the opinion that type of housing was a strong predisposing factor to malaria while 4.6 per cent of them indicated that type of housing was a very strong predisposing factor. 25.6 per cent of the respondents opined that housing was only a weak predisposing factor (Table 5).

	Frequency	Percent	Valid Percent		Cumulative Percent	
Valid	Moderately Strong	61	17.6	17.6	17.6	
	Poor	157	45.2	45.2	62.8	
	Strong	24	6.9	6.9	69.7	
	Very Strong	16	4.6	4.6	74.4	
	Weak	89	25.6	25.6	100.0	
	Total	347	100.0	100.0		

Table 5: Perception of community towards housing as a predisposing factor to malaria

3.5 Perception of the community towards fruits in season and malaria

On the part of fruits, the study revealed that 16.4 per cent of the respondents were of the idea that fruits in season were a moderately strong predisposing factor to malaria compared to 28.2 per cent of the respondents who reported fruits in season as a poor factor. 18.2 per cent of the respondents indicated that fruits in season strongly predisposed people to malaria while 15.3 per cent of the respondents indicated that fruits in season actually very strongly predisposed people to malaria. Another 21.9 per cent indicated of the respondents opined that that fruits in season was weak predisposing factor (Table 6).

	Frequency	Percent	Valid Percent		Cumulative Percent	
Valid	Moderately Strong	57	16.4	16.4	16.4	
	Poor	98	28.2	28.2	44.7	
	Strong	63	18.2	18.2	62.8	
	Very Strong	53	15.3	15.3	78.1	
	Weak	76	21.9	21.9	100.0	
	Total	347	100.0	100.0		

Table 6: Perception of community towards fruits in season as a predisposing factor to malaria

3.6 Knowledge of seasonal variations in incidences of malaria

When asked about the season when more incidences of malaria are likely to be reported, 18.2 per cent of the respondents reported that it was during the cold season compared to 8.9 percent who reported that it was during the warm and moist season. 25.4 percent of the respondents reported that there would be no incidences of malaria during the cold and dry season compared to 37.2 percent who reported that there would be no incidences of malaria during the warm and moist season. (Table 7a and 7b).

	Frequency	Percent	Valid Percent		Cumulative Percent	
Valid	Moderately Strong	63	18.2	18.2	18.2	
	Poor	25	7.2	7.2	25.4	
	Strong	72	20.7	20.7	46.1	
	Very Strong	159	45.8	45.8	91.9	
	Weak	28	8.1	8.1	100.0	
	Total	347	100.0	100.0		

Table 7a: Knowledge of seasonal variations in incidences of malaria

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Moderately Strong	31	8.9	8.9	8.9
	Poor	98	28.2	28.2	37.2
	Strong	65	18.7	18.7	55.9
	Very Strong	82	23.6	23.6	79.5
	Weak	71	20.5	20.5	100.0
	Total	347	100.0	100.0	

Table 7b: Knowledge of seasonal variations in incidences of malaria

3.7 Perception of the community about the most at risk population groups to Malaria

The study revealed that 21.3 per cent of the respondents were aware that pregnancy predisposed on to malaria while 28.8 per cent felt otherwise. 8.4 per cent of the respondents were of the opinion that pregnancy strongly influences that transmission of malaria while 25.3 per cent indicated that pregnancy very strongly enhances the transmission. The remaining 26.2 per cent reported that pregnancy only weakly enhances the transmission of malaria (Table 8).

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Moderately Strong	74	21.3	21.3	21.3
	Poor	100	28.8	28.8	50.1
	Strong	29	8.4	8.4	58.5
	Very Strong	53	15.3	15.3	73.8
	Weak	91	26.2	26.2	100.0
	Total	347	100.0	100.0	

Table 8: Perception of the community about the most at risk population groups to Malaria

3.8 Attitude of the community towards malaria infected people

When asked whether they felt at risk living together with malaria infected people, 13.5 per cent of the respondents were of the affirmative while12.7 per cent did not feel at risk.17.3 per cent of the respondents felt that living with malaria infected neighbors was a strong risk while 43.8 per cent believed that it was a very strong risk. Only 12.7 per cent believed that it was a weak risk (Table 9).

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Moderately Strong	47	13.5	13.5	13.5
	Poor	44	12.7	12.7	26.2
	Strong	60	17.3	17.3	43.5
	Very Strong	152	43.8	43.8	87.3
	Weak	44	12.7	12.7	100.0
	Total	347	100.0	100.0	

Table 9: Attitude of the community towards malaria infected people

3.9 Treatment seeking behavior of the community

When asked about self-medication as treatment mode for malaria, 10.4 per cent of the respondents reported that they preferred it while 37.2 per cent preferred hospital treatment. A further 12.1 percent of the respondents strongly preferred self-medication while another 20.5 per cent very strongly preferred it. The remaining 19.9 percent indicated that they did not have any problem with any mode of treatment including self-medication.

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Moderately Strong	36	10.4	10.4	10.4
	Poor	129	37.2	37.2	47.6
	Strong	42	12.1	12.1	59.7
	Very Strong	71	20.5	20.5	80.1
	Weak	69	19.9	19.9	100.0
	Total	347	100.0	100.0	

Table 10: Treatment seeking behavior of the community

IV. Discussion

Community Knowledge on malaria prevention and control options is important and the effort is related to either to environmental management, personal protection or vector control. This study indicated only 43.6% knew that poverty is a strong predisposing factor to malaria. This is because people living in extreme poverty are less able to access proper treatment for malaria compared to well to do families. It is also more challenging for such families to embrace recommended prevention and control options (www.malarianomore.org.uk; Gallup *et al*., 2001; www.earth.columbia.edu).

Only 8.9% of the respondents did not know that children under five years of age are more vulnerable to malaria than adults. This is mainly due to the fact that the children under five years of age have less developed immunity that makes them more vulnerable to diseases compared to adults. In fact, WHO recommends the following package of interventions for the prevention and treatment of malaria in children: use of long-lasting insecticidal nets (LLINs);in areas with highly seasonal transmission of the Sahel sub-region of Africa, seasonal malaria chemoprevention (SMC) for children aged between 3 and 59 months; in areas of moderate-to-high transmission in sub-Saharan Africa, intermittent preventive therapy for infants (IPTi), except in areas where WHO recommends administration of SMC and prompt diagnosis and effective treatment of malaria infections (www.who.int [2013]).

A large percentage of 38.6% of the respondents did not portray knowledge that drainage and malaria are intertwined. The juvenile stages of the malaria vectors are aquatic; hence the availability of stagnant water near dwelling places creates a conducive environment for mosquito breeding. As a control strategy, it is recommended that any stagnant water near human dwelling places must be drained or treated with larvicidal agents (Le Prince, 1920).

45.2% of the respondents did not perceive the type of housing an important factor to consider in control of malaria. This was an unfortunate scenario as studies done in various places in the world have shown that the type of housing plays an important role in control and prevention of malaria. For instance, a study done in Burkina Faso revealed that mud roofed houses were less protective from malaria transmitting *Anopheles gambiae* of mosquito than iron sheet roofed ones as the former provide efficient hiding and resting places before and after blood meals (Yazoume *et al*., 2006).

The biggest percentage of 28.2% did not perceive the presence of ripe fruits in the dwelling or near the dwelling places as a risk factor to malaria. This is mainly because the anorexia that arises during bouts of malaria creates craving for fruits and juices in patients. Accordingly, the major foodstuffs that are found in malarial wards in hospitals and at homes with malaria patients are fruits. Scientific studies have revealed that the sweet smells of the juices from fruits attracts mosquitoes as they also feed on sugar at certain times in their lives. As the female *Anopheles* mosquitoes seek the fruit juices, they come to close proximity with human beings who they also bite and in most cases transmitting malaria (Gunter *et al*., 2010).

A big percentage of the respondents had problems identifying the season that is most conducive for breeding of mosquitoes hence high cases of malaria (Table 7a and b). Previous scientific studies have revealed that the warm and moist weather is the most risky in terms of malaria incidences as there is ambient temperature and water for breeding of the vector and the human subjects also tend to expose themselves to the bites more in fewer clothing. During the cold season, vector breeding rates are lower, the parasite load in the human body is also lower and the people are more covered hence not easily bitten (Supargiyono *et al*., 2013).

28.8% of the respondents did not perceive pregnancy as a risk factor for malaria. This demonstrates that the communities are not aware of the fact that pregnant women have a semi compromised immunity hence high susceptibility to malaria. Indeed, WHO recommends that pregnant women be accorded similar treatment with children under five (www.rollbackmalaria.org).

12.7% of the respondents did not worry about living in the same houses with malaria infected people, however, a bigger percentage displayed fear of infection. The fear is actually justified as scientific research has revealed that infected people are the reservoirs from which mosquitoes pick parasites before transmitting them to healthy people. It is therefore recommended that infected people seek immediate medical treatment and that healthy people undertake personal protection like sleeping under a treated bed nets (WHO, 2006).

37.2% of the respondents did not seem to worry about self-treatment of malaria. Indeed, they did not care whether proper diagnosis is done or not but just rely on presumptive diagnosis. This is a serious health issue as cases of drug poisoning have been reported world over and worse still the reckless use of drugs breeds parasite resistance. It is always recommended that before treatment of malaria commences, a confirmatory laboratory diagnosis be undertaken (www.cdc.gov/malaria, Pfeiffer *et al*., 2008).

V. Conclusions

- There are common misconceptions on causes, means of transmission, clinical manifestations and prevention practices in the community.
- The study indicated that under five children and pregnant women were identified by the students as at most risky population groups which is in parallel with the national priority on malaria prevention and control.
- Demographic factors like poverty, type of housing, fruits in season and living near malaria infected people enhanced transmission.
- Climatic factors like drainage and weather changes influenced transmission of malaria.
- The communities where the respondents came from preferred self-treatment to proper medical treatment based on confirmatory diagnosis of malaria.

VI. Recommendations

Based above conclusion, we recommend the following:

- To achieve the objectives of the Kenya National Malaria Strategy 2009-2017 in Meru South District, it is recommended to focus on common misconceptions about malaria causes, means of transmission and clinical manifestations through community involvement activities as a main strategy.
- The ability to recognize febrile illness as symptom of malaria and treatment seeking behavior of the community for febrile children within 24 hours are low. Therefore special attention must be given to mothers/care takers of less than five children. This can be done by integrating with ANC, PNC and immunization programs.
- There is urgent need to incorporate other malaria control strategies like the use of ITNs and IRS to control malaria in the district especially in learning institutions.
- There is need to undertake a clinical study to establish the actual prevalence of malaria in the district in order to organize future control strategies.

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