Original Research Article

Knowledge and preventive practices of malaria among pregnant women in Huye district Southern province, Rwanda

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ABSTRACT

Background: Regardless of the accessibility of effective malaria control interventions, malaria has been reported in first place with a 25% morbidity rate in Rwanda, particularly in pregnancy. This study explored knowledge and preventive practices of malaria among pregnant women in Huye district Southern province, Rwanda.
Methods: Study design was cross-sectional descriptive, 384 pregnant women living in Tumba sector were recruited. A semi-structured questionnaire was used for data collection, and data were entered in SPSS version 21 for analysis and the Chi-square test was computed for measuring the associations between variables at 5% level of statistical significance.
Results: Of the 384 respondents, 340 (88.5%) were married and the mean age was 29.5±6.8 years with 172 (44.8%) aged between 25 and 29 years. Majority 224 (58.4%) had primary level of education and 147 (27.9%) were agricultures. 96 (25%) of respondents had low knowledge whereas 42 (10.9%) had high knowledge and 246 (64.1%) moderate knowledge. 298 (77.6%) were aware and knew that malaria is transmitted by female anopheles and the majority of respondents 323 (84.1%) were using LLINs. Education level, marital status, occupation were associated with malaria knowledge on preventive practices and LLINs utilization (p=0.001).
Conclusions: This study revealed satisfactory knowledge of malaria prevention among pregnant women in southern Rwanda despite the poor implementation of current malaria control strategies. There is a need for sustaining and expanding the current LLINs ownership and utilization level and also improving public health education on malaria knowledge, preventive practices, and high health risks behaviors for malaria control and elimination.

Keywords: Malaria, Knowledge, Prevention, Pregnant women, Rwanda

INTRODUCTION

Globally malaria led to 405,000 deaths and 92% of them occurred in Sub-Saharan African countries in 2018.[1] Malaria is severe in pregnant women and causes anemia, stillbirth and premature delivery, and it causes 17.6% of maternal mortality.[2,3] In Rwanda, from 2012-2016 health system information management (HSIM) has reported malaria in first place with a 25% morbidity rate; malaria is also included in the topmost ten causes of illness across the country. In addition, the calculated mortality rate in pregnancy is currently 210 deaths per 100,000 live births, and it contributes to a large proportion of deaths, with a 7.5% disease-specific prevalence rate.[4,5]

World health organization (WHO) targets to reduce by 90% of malaria prevalence rates in 2030, and it stresses the need for entire coverage of main malaria control interventions, including behavior change for populations at risk of malaria disease, especially pregnant women.[6] In that case, three core malaria control strategies were recommended by the WHO, such as early detection and

real malaria case management; long-lasting insecticide nets utilization (LLINs); and give the Intermittent preventive treatment (IPTp) to pregnant women with sulfadoxine-pyrimethamine (IPTp-SP) in all areas with moderate to high malaria transmission in Africa sulfadoxine-pyrimethamine.[3] Even though IPTp was stopped in Rwanda since 2008, owing to increased parasite resistance to sulfadoxine-pyrimethamine countrywide, in 2012, WHO recommends the IPTp-SP to be given to all pregnant women starting as early as possible in the second trimester but not in the first trimester.[7] Currently, an intermittent screen and treat (IST) approach to malaria control and prevention among pregnant women living in high transmission districts in Rwanda is being explored by malaria and other parasitic diseases division (MOPDD). In Rwanda, oral quinine is recommended in the first trimester and artemether-lumefantrine (AL) use both in the second and third trimester for uncomplicated cases and utilization of injectable artesunate when it is severe malaria during pregnancy.[4]

Artemisinin-based combined therapy (ACT) or coartem treatment is given to those in the second and third trimesters of pregnancy for uncomplicated malaria, whereas quinine is given for severe malaria in the first trimester and for at any gestational age.[3] Elsewhere, findings showed that 87.9% were aware of ITNs use while 78.7% demonstrated ITN use as an important tool amongst the malaria control interventions in pregnancy. In Rwanda, the national malaria control program has freely distributed LLINs and antimalarial drugs like ACT among pregnant women.[8] Besides that, the country has aligned and adopted the WHO strategies for malaria control and prevention towards under-five children and pregnant women as highly vulnerable groups to malaria [9]. In households, women were reported as a role model in malaria control and prevention. The lack of awareness and low malaria knowledge in pregnancies was reported to be accompanied by the increased risk in malaria transmission and causes many problems in the region.

The low knowledge of malaria and its causes and transmission, use of traditional treatments and poor housing quality in Sub- Saharan Africa has often impeded the quality of malaria control and elimination.[10] Pregnant women have demonstrated a good knowledge of malaria's complications and its prevention during pregnancy. Yet, a considerable ratio of them had a misconception about the cause and transmission mode of malaria.[11] Elsewhere, the locality of pregnant women was observed to be considerably associated with knowledge of malaria with those from the urban area were more knowledgeable compared those living in the rural area, and also those who attended education have demonstrated good knowledge about malaria control and prevention.[12,13]

Knowledge about malaria has also been shown to influence malaria treatment choices and success in

implementing preventive interventions among pregnant women.[14] Low knowledge of the malaria burden was stated to be associated with low educational levels and poor health education being delivered at health clinics during antenatal care services (ANC). Although several studies were done on malaria knowledge, very few had investigated the predictors of knowledge on malaria preventive measures in pregnancy. Also, different studies have reported the pregnancy outcome to be influenced by ITNs use in African countries, where malaria is endemic.[15] Knowledge about malaria has also been shown to influence malaria prevention, treatment choices and the success of its control interventions, including utilization of LLINs among pregnant women.[10] Age, sex, education, place of residence and geographical region were probably considered as the predictors of malaria knowledge. Through the studies done on malaria knowledge, attitudes, and practices (KAP), misunderstandings have been reported on risk factors and transmission of malaria, which still cause an effect on malaria control and elimination programs.[16] Although malaria prevention knowledge was reported at a high level (90%), it was also poorly reported to reflect in their practices (16%).[17] Another study revealed the poor use of malaria control interventions among pregnant women.[18] Similarly, Amongst 64.8% of pregnant women who used ITNs, 30% utilize them day-to-day, whereas 12.9% use them one time a week.[19] The paucity of studies has explored the knowledge of malaria and preventive practices during pregnancy in the given areas. Considering the susceptibility of pregnant women to malaria burden.[20] Therefore, this study assessed the malaria knowledge and its preventive practices among pregnant women in Huye district southern province, Rwanda. The study findings will fill the gap in malaria prevention and generate new knowledge in gaps and also it will expand the application of integrated malaria control and elimination strategies in the region.

METHODS

Study area and design

Huye district is located in Southern province of Rwanda. It has 314,022 residents on surface area of 581.5 square Kilometers.[21] Huye is one of the top ten high malaria burden districts that contained 61% of malaria cases in Rwanda.[22] A cross-sectional quantitative study design was used.[23]

Study population and sample size determination

The respondents were pregnant women living in Tumba sector, Huye district. In this study, the sample size (n) was computed based on Cochran's formula, using the following equation.[24]

$$n = \frac{Z^2 \ [p(1-p)]}{d^2}$$

Z = ±1.96 (at 95% confidence interval)

p: True proportion of factor in the population, or the expected frequency value (50%)

The proportion in the target population estimated to have characteristics being measured. Since no estimate is available. No study in the region has been done to estimate the level of knowledge and preventive practices of malaria among pregnant women towards malaria control and elimination in region

q =1-p=(0.5);

d = margin error or level of precision (5%).

The above formula was used to calculate the sample size as studies were deficient in this topic in Huye district. Then the following formula was applied:

n = Z×Z [p (1-p)/ (d×d)] =1.960×1.960 [0.50(1-0.50) / (0.05×0.05)] =384.16≈384

Therefore, the sample size was 384 study participants, and the required minimum sample size of 384 pregnant women who visit Rango Health Center of Tumba sector in Huye district for antenatal care and routine immunization of their children has been determined

Sampling and data collection

By adopting the balloting approach, the names of the sectors of Huye district were written on small papers, placed and shuffled in a container, with a random selection, one sector (Tumba) was selected from the frame list of 14 sectors in Huye district. Tumba sector was selected by systematic random sampling technique. The second stage a list of names of all five villages and the number of households of each village in the Tumba sector based on the Rwanda population and housing Census was found 8 years ago. In the third stage, the streets were randomly selected in the villages afterward was used to select the houses: by an ordered selection of a particular house from the sampling frame. In the sampled houses a woman that was pregnant, was considered and interviewed after signing the consent form. When a woman was not there, the researcher went immediately to the next household on right side for replacement.

To collect the data, a written semi-structured questionnaire (English) has been used and translated in Kinyarwanda. Slight modifications were made to the questionnaire to fit each of the participants. Four professional nurses, two males, and two females, have been recruited for the study data collection and given one-day intensive training and then deployed to the selected sector. They were daily supervised by the principal investigator to ensure data quality. Written consent to participate was obtained at the beginning of each interview. During the pilot study, the questionnaire tool was tested in the population from Huye and Ngoma sector. For validity, the data were collected using a questionnaire adapted from the questionnaire tool available from the RBM-Rwanda Malaria Indicator Survey of 2017. Some amendments were done with the Rwanda Biomedical Centre (RBC). The data were collected over a period of two months. Statistical Package for Social Sciences (SPSS) version 21 was used to enter the completed and coded questionnaires for data analysis and interpretation.

Ethical considerations

Ethical approval was obtained from the ethics review committee of Jomo Kenyatta University of Agriculture and Technology (JKUAT), Administrative approval was been obtained from Huye district. Each study participant voluntarily signed informed consent. And interviews were conducted after obtaining permission. The collected data was handled with a high level of privacy and confidentiality.

RESULTS

Three hundred eighty-four (384) pregnant women were recruited in this study. The majority 172 (44.2%) of respondents, were between 25 and 29 years old, compared to those 34+ years who were 14 (3.7%) of respondents. The majority was married 340 (88.5%) and the least was widowed represented 2 (0.5%). The majority 233 (60.2%) of respondents have less than three number of children aged less than fifteen years old. In terms of educational level, majority 224 (58.4%) of respondents were having primary education 50 (13%) reported no formal education. Only 10 (2.6%) respondents had completed high learning education or college and the most educated persons. Agriculture was the primary occupation of 147 (27.9%), which is a reasonable image of the rural areas of Rwanda in general. In terms of income status, 228 (59.4) are earning 500 to 1000 Rwandan francs (Table 1).
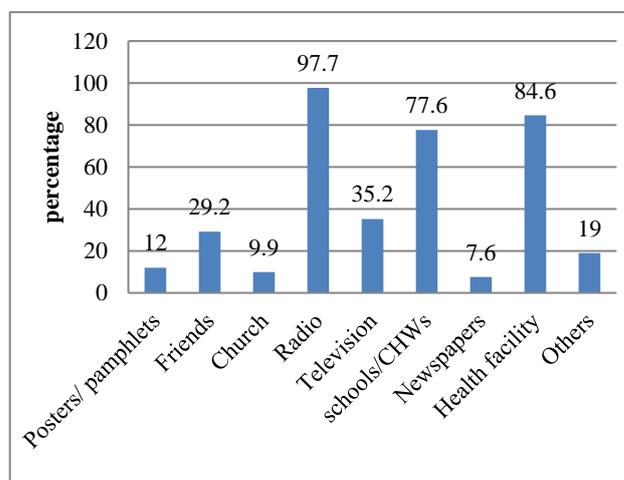

Figure 1: Source of information.

Table 1: Socio-demographic information of respondents (n=384).

Variables	Number	Percentage
Age group (in years)		
Under 24	131	34.1
25-29	172	44.8
30-34	67	17.4
More than 34	14	3.7
Mean age=30.05, Sd=7.8, Min=19, Max=68		
Marital status		
Single women	38	9.9
Married women	340	88.5
Widowed women	2	0.5
Divorced women	4	1.1
Total	384	100
Number of children		
≤ 3	233	60.7
Between 4-6	139	36.2
≥ 7	12	3.1
Total	384	100.0
Education level		
No formal education	50	13
Primary	224	58.4
Secondary	100	26
HLI/ College	10	2.6
Total	384	100
Occupation		
Craftsperson	46	8.7
Trader	90	17.1
Agriculturer	147	27.9
Public servant	35	6.6
Total	384	100
Income status/day		
None (0 Rwf)	76	19.6
500.5-1000.5 Rwf	228	59.4
1000.5-1500.5 Rwf	65	17
Above 1500.5 Rwf	15	4
Total	384	100

Sources of information

The findings find out that the radio was the commonest source of information among the respondents 375 (97.7%). Health professionals or facilities were on the second source of information with 325 (84.6%) of the respondents, schools or CHWs 298 (77.6%), television 135 (35.2%), family or friends 112 (29.2%), and newspaper 29 (7.6%), respectively (Figure 1).

Knowledge on malaria control and prevention.

Table 2 presented the majority 375 (97.7%) of study participants whore were aware of malaria compared to 9 (2.3%) who were not aware of malaria prevention. Majority 366 (95.3%) of respondents were able to identify fever as the common symptoms or signs, 282 (73.4%) of respondents for body pain and 264 (68.8%) for headache. 298 (77.6%) of study participants had correctly mentioned the female anopheles as the mosquito vector of malaria. For antimalarial drugs, the majority 349 (90.9%) of the respondents point out ACT (coartem), while 182 (47.4%) of respondents also mentioned quinine. And the last was 86 (22.4%) of respondents who stated the other drugs as malaria treatments like chloroquine, amodiaquine, artesunate etc. This study has reported the majority 323 (84.1%) of respondents as ITNs /LLINs utilizers, and 287 (74.7%) of respondents used to cover their body with clothes for preventing mosquito bite. More than half of the respondents also used cutting bushes/grasses nearby home, clearing drainages and keeping the environment neat and clean 178 (46.4%), and closing windows and doors 165 (43%) for fighting against the mosquito breed and its bites. The use of repellent lotion sprays 97 (25.3%) and the use of insecticide spray 91 (23.7%) to drive away mosquitoes were the least. The respondents generally indicated that female anopheles is the most vectors that can transmit malaria compared to male anopheles. Most of the respondents 356 (92.7%) knew that malaria is a very serious problem and it can kill when not treated timely. (Table 2).

Table 2: Awareness and knowledge regarding malaria causes, signs or symptoms, treatment and complications (n=384).

Variables	Number	Percentage (%)
Knowledge scores (0-8)		
High (7-8 scores)	42	10.9
Moderate (5-6 scores)	246	64.1
Low (0-4 scores)	96	25
Mean knowledge: 2.14±0.584		
Malaria awareness		
Yes	375	97.7
No	9	2.3
Malaria vector		
Female anopheles	298	77.6
Male anopheles	111	28.9
Uncertain	59	15.4

Continued.

Variables	Number	Percentage (%)
Malaria as a serious problem		
Very serious problem	356	92.7
Serious problem	314	81.8
Moderate problem	280	72.9
Small problem	120	31.3
Malaria common sings /symptoms		
Headache	264	68.8
High temperature/ fever	366	95.3
Chills	215	56.0
Vomiting	163	42.4
Body pains	282	73.4
Loss of energy and appetite	235	61.2
Anti-malarial drugs		
ACT (Coartem)	182	47.4
Quinine	171	44.5
Others	86	22.4
Malaria preventive practices		
Use repellent lotion and sprays	97	25.3
Covering body with clothes	287	74.7
Close windows & doors	165	43.0
Use of LLINs/ITNs	323	84.1
Keeping environment neat and clean	178	46.4
Insecticide spray	117	30.5
Others	91	23.7

Table 3: Association between socio -demographic information and malaria knowledge.

Variables	High	Moderate	Low	Chi-square	P value
	N (%)	N (%)	N (%)		
Age groups (in years)					
Under 24	26 (19.8)	45 (34.4)	60 (45.8)		
25-29	36 (20.9)	83 (48.3)	53 (30.8)	20.231	0.011
30-34	23 (34.3)	29 (43.3)	15 (22.4)		
More than 34	3 (21.4)	8 (57.2)	3 (21.4)		
Education					
No formal education	0 (0.0)	19 (38.0)	31 (62.0)		
Primary level	50 (22.3)	104 (46.4)	70 (31.3)	40.784	0.001
Secondary level	31 (31.0)	40 (40.0)	29 (29.0)		
HLI/ College level	7 (70.0)	2 (20.0)	1 (10.0)		
Marital status					
Single women	6 (15.8)	28 (73.7)	4 (10.5.)		
Married women	32 (9.4)	218 (64.1)	90 (26.5)	20.635	0.002
Widowed women	0 (0.0)	1 (50.0)	1 (50.0)		
Divorced women	1 (25.0)	2 (50.0)	1 (25.0)		
Number of children					
≤3	48 (20.6)	104 (44.6)	81 (34.8)		
4-6	36 (25.9)	57 (41.0)	46 (33.1)	2.262	0.688
≥7	4 (33.3)	4 (33.3)	4 (33.3)		
Occupation					
Craftsperson	11 (23.9)	21 (45.7)	14 (30.4)		
Trader	22 (24.4)	46 (51.1)	22 (24.4)		
Agriculturer	25 (17.0)	61 (41.5)	61 (41.5)	26.723	0.001
Public servant	18 (51.4)	7 (20.0)	10 (28.6)		
Others	12 (18.2)	30 (45.5)	24 (36.4)		

Variables	High	Moderate	Low	Chi-square	P value
	N (%)	N (%)	N (%)		
Income					
None	17 (22.4)	32 (42.1)	27 (35.5)		
500-1000Rwf	48 (21.1)	99 (43.4)	81 (35.5)		
1000-1500Rwf	20 (30.8)	27 (41.5)	18 (27.7)	3.247	0.781
above 1501Rwf	3 (20.0)	7 (46.7)	5 (33.3)		

Table 4: Association between respondent characteristics and knowledge of LLIN utilization.

Variables	High	Moderate	Low	Chi-square	P value
	N (%)	N (%)	N (%)		
Age groups (in years)					
Under 24	56 (42.7)	34 (26.0)	41 (31.3)		
25-29	77 (44.8)	64 (37.2)	31 (18.0)	16.083	0.041
30-34	36 (53.7)	21 (31.3)	10 (14.9)		
More than 34	4 (26.7)	7 (46.6)	4 (26.7)		
Education					
No formal education l.	17 (34.0)	15 (30.0)	18 (36.0)		
Primary level	85 (37.9)	81 (36.2)	58 (25.9)	32.377	0.001
Secondary level	62 (62.0)	28 (28.0)	10 (10.0)		
HLI/ college level	9 (90.0)	1 (10.0)	0 (0.0)		
Marital status					
Single women	10 (26.3)	26 (68.4)	2 (5.3)		
Married women	32 (9.4)	214 (62.9)	94 (27.6)	23.572	0.004
Widowed women	0 (0.0)	2 (100.0)	0 (0.0)		
Divorced women	0 (0.0)	4 (100.0)	0 (0.0)		
Number of children					
≤3	97 (41.6)	80 (34.3)	56 (24.0)		
4-6	62 (44.6)	50 (36.0)	27 (19.4)	1.585	0.812
≥7	6 (50.0)	3 (25.0)	3 (25.0)		
Occupation					
Craftsperson	21 (45.7)	12 (26.1)	13 (28.3)		
Trader	36 (40.0)	34 (37.8)	20 (22.2)		
Agriculturer	56 (38.1)	52 (35.4)	39 (26.5)	39.225	0.001
Public servant	31 (88.6)	4 (11.4)	0 (0.0)		
Others	21 (31.8)	31 (47.0)	14 (21.2)		
Income					
None	26 (34.2)	24 (31.6)	26 (34.2)		
500-1000Rwf	97 (42.5)	83 (36.4)	48 (21.1)		
1000-1500Rwf	34 (52.3)	21 (32.3)	10 (15.4)	10.478	0.106
above 1501Rwf	8 (53.3)	5 (33.3)	2 (13.3)		

Association between malaria knowledge and socio-demographic information

In this study, 23 (34.3%) of the respondents aged between 30 and 34 years were reported to have a high knowledge level compared to 60 (45.8%) of those aged under 24 years and who had low knowledge level on malaria burden. More respondents who qualified in high learning institution or college 7 (70%) are more knowledgeable on malaria preventive measure than those who qualified in primary (22.3%), secondary (31.0%) level and none formal education category 31 (62.0%); have had low knowledge towards malaria preventive practices however, the association between education level and malaria prevention knowledge levels was statistically significant (p=0.001). Those with tertiary education 7 (70%) were the ones who had high knowledge level compared to the rest. None uneducated had high knowledge of malaria preventive measures. The marital status was associated with malaria knowledge levels, which is statistically significant, where the married pregnant women had high knowledge compared to the rest categories of marital status. Furthermore, the study findings have shown the strong association (p=0.001) between occupation and malaria knowledge on preventive practices which is statistically significant (Table 3).

Association between respondent characteristics and knowledge of LLIN utilization

The present study showed the association between LLINs knowledge and age categories, in which is statistically significant (p=0.04), where 77 (44.80%) participants with group age of 25 to 29 years old had high knowledge on LLIN utilization, followed by the other group age of 30 to 34 years old, 36 (53.7%) in second place. it was observed that the respondents aged less than 24 years old were less knowledgeable 41 (31.3%) on LLIN utilization compared to those aged between 25 and 29 years old. In addition, the present study has reported that respondents 334 (86.9%) who attended the school including HLI/college education were the most knowledgeable to utilize the LLIN compared to 50 (13.1%) of those who don't have any level of education (p=0.001). More respondents who qualified in high learning institution or college 9 (90%) are more knowledgeable on LLIN utilization compared to non-qualified in formal education 17 (34%) who had low knowledge towards LLINs utilization 18 (36%), however, the association between education level and knowledge levels on LLINs utilization was statistically significant (p=0.001). There was a statistically significant association between marital status and knowledge of LLINs utilization in terms of malaria control and prevention, where the married pregnant women had high knowledge compared to the rest categories of marital status. Furthermore, the study findings have shown the strong association (p=0.001) between occupation and knowledge of LLINs utilization which is statistically significant. (Table 4).

DISCUSSION

Malaria is still a public health problem in Rwanda on 11th place and especially in Huye district, southern Rwanda where malaria is reported as the most community morbidity disease in adults including, pregnant women and under-five children (53%) among the leading causes of morbidity and mortality rate in Rwanda.[22] Though this study is designed to assess the knowledge and preventive practices of malaria among pregnant women in Huye district Southern province, Rwanda, the majority 246 (64.1%) of respondents had moderate knowledge which is supported by Mathania et al in their r study where 71.5% of study participants have demonstrated knowledge level of malaria transmission during pregnancy.[25] In this study, 298 (77.6%) of respondents knew female anopheles as a malaria vector, which is an essential component in the prevention of malaria transmission. Similarly, in their study have found 78.9% of respondents mentioned infected mosquito bite as a vector of malaria transmission.[26] Elsewhere, the study has reported that pregnant women were aware and knowledgeable about causes, signs/symptoms of malaria and its control interventions, but this knowledge is not transformed into practice due to lack of access to LLINs and careless, sleeping discomforts and other logistical limitations.[27] With regard to malaria treatment, 349 (90.9%) of the respondents were found to use (ACT) or coartem and 171 (44.5%) also used quinine. These study findings are in line with the antimalarial policy in Rwanda where it recommends the use of coated for uncomplicated malaria and quinine for severe malaria treatment.[4] Likewise, another study has stated that during the pregnancy, ACT drug is recommended in both second and third trimester for uncomplicated malaria, whereas quinine is for severe malaria cases in the first trimester at any age of gestation.[3] Normally the use of this ACT and quinine is in line with the malaria treatment guidelines of Rwanda, so far the high coverage with ACT was reported as the most cost-effective antimalarial drug across the sub-Saharan African countries.[28]

The findings of this study reported 173 (45.1%) respondents, who had high knowledge of LLINs utilization as a major malaria preventive measure. To another place, (73%) were presented with a high knowledge of LLINs utilization.[29] Although knowledge and awareness of LLINs were as high as 70%, its utilization was as low as 3% among pregnant women. Similarly, another study, conducted by Adebayo et al reported (27%) of the pregnant women who had moderate knowledge of LLINs utilization.[18] However, it has been concluded that they do not actually put into practice their knowledge of malaria control and prevention.[30] In addition, some reasons for not using LLINs were reported among pregnant women, like discomfort related to heat, smell caused by bed net, and obstacles in hanging it.[27]

Similarly, in their study have reported 81.4% of LLIN ownership while 42.5% was LLIN utilization. Another study has reported 87.9% of pregnant women who were aware of LLINs utilization in the prevention of malaria disease.[19,29] Amongst 64.8% of LLINs utilizers in pregnancy, 30% use it day by day, while 12.9% use it one time a week. In their study, pregnant women have demonstrated adequate knowledge about LLINs utilization. However, LLINs utilization level was low.[19] In Rwanda, 73% of pregnant women slept under LLINs in order to prevent mosquito bites and malaria complications; however, the government targets 100% of LLINs utilizers in households.[4] The use of LLINs was reported as the most current malaria control intervention and they were regularly and freely given to pregnant women during antenatal care visits at health centers.[31] According to RDHS 2014-15 LLINs ownership among pregnant women was 70%, but this study has reported the majority 323 (84.1%) of respondents as LLIN owners and this increase of LLINs utilization cannot be generalized to the entire population of pregnant women in Rwanda due to study limitations in methodology.

The majority 375 (97.7%) of respondents heard information about malaria from radio and 325 (84.6%) of respondents got it from health facility or from health professionals these findings are supported by Depina et al in their study results revealed around 90% of the respondents who used media as a source of information

about malaria, mainly the TV and the radio (83% and 43%, respectively) found that most of their study participants (75%) used the health facilities and consulting health care providers at clinics majority also specified the local health facility (53%), radio (16%) and community meetings (7%) as their sources of malaria information which is in line with these study findings which reported more than half of the respondents to hear malaria information from health facilities and health community workers or community meetings 325 (84.6%).[32,33]

Limitations

Impossible to generalize the findings due to the used cross-sectional descriptive design, moreover the utilization of a semi-structured questionnaire can affect and can limit the chance for in-depth respond of study participants, as malaria is a big subject, there some areas were not been incorporated in the questionnaire leaving many facts not being discovered. The findings from different studies done were retrieved; from now some changes happened currently. During data collection, some researches assistant were not allowed to observe indoor to see, whether they really had the LLINs or not and to see if they hung them, therefore the findings were largely based on self-reported LLIN ownership and utilization even if 94% of the respondents were reached at homes. Also, due to some pregnant women who were out of their homes during data collection, the use of systematic sampling techniques was weak. Additionally, there might be a misclassification and selection bias where the pregnant women used LLINs during pregnancy but did not at the night preceding the survey. And also, the women who were pregnant at the time of the survey were not included in the data collection and analysis and the results may not entirely represent the population of pregnant women in Rwanda.

CONCLUSION

Pregnant women had moderate knowledge of malaria and its preventive practices. Despite the poor implementation of current malaria control strategies and also, the majority of them used antimalarial treatment like ACT/ coartem, and quinine. The most malaria preventive strategies used by respondents were the LLINs, cleaning of houses and removal of stagnant water. Radio and health facilities were common sources of malaria information. There is a need for sustaining and expanding the current LLINs ownership and utilization level and also improving public health education on malaria knowledge, preventive practices, and high health risks behaviors for malaria control and elimination.

Recommendations

On the basis of the study findings, the following issues should be considered for improving malaria knowledge and management behavior among pregnant women. Regular training on malaria prevention and management is necessary to address the knowledge gap revealed in this study. Therefore, educational programs should be organized for improving knowledge about malaria and it should focus mainly on increasing the awareness of the groups at high risk regarding the importance of implementing all malaria preventive measures. In general, there is a need for more researches to conclude why LLIN utilization is not good enough and factors hindering preventive practices and behavioral change. The free distribution of LLINs should continue in order to encourage pregnant women to use LLINs.

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