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ISSN: 2705-165X

Prevalence and Factors Associated with Malaria amongst Pregnant Women Attending Hoima Regional Referral Hospital Antenatal Care Clinic

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ABSTRACT

Malaria is an acute and chronic illness characterized by paroxysms of fever, chills, sweats, fatigue, anaemia, and splenomegaly and is caused by parasite protozoan of the genus Plasmodium. Malaria remains one of the most severe public health problems globally. It is the leading cause of death and disease in many developing countries including Uganda, where children under 5 and pregnant mothers are the most affected. The main objective of this study was to determine the prevalence and factors associated with malaria amongst pregnant women attending Hoima Regional Referral Hospital Antenatal Clinic. The study was a quantitative descriptive type. Pregnant women who came for routine antenatal care visits during the months of January and February 2021 had their capillary blood samples collected. Smears, both thick and thin were made and stained using Field's staining technique. These were examined for malaria parasites using a light microscope. The study highlighted that malaria among pregnant women in Hoima Regional Referral Hospital is high and therefore put the life of mothers and unborn children at risk (18.5%). The socio-demographic determinants that were found to be predictive of malaria acquisition were level of education, marital status, and number of household members. It was also 4 times more likely that participants who were buying mosquito nets were likely to have malaria than those who were getting them from the government [95% CI 1.32-10.60: P=0.013]. The Ministry of Health needs to sensitize the communities to the importance of mosquito nets. The health care workers need to inform the clients about the use of mosquito net services.

Keywords: Malaria, Pregnant mothers, Antenatal care, Mosquito nets, Plasmodium.

INTRODUCTION

Malaria is an acute and chronic illness characterized by paroxysms of fever, chills, sweats, fatigue, anaemia, and splenomegaly and is caused by parasite protozoan of the genus *Plasmodium* [1,2]. Malaria remains one of the most severe public health problems globally. It is the leading cause of death and disease in many developing countries including Uganda, where children under 5 and pregnant mothers are the most affected [3,4]. In 2016, an estimated 445,000 deaths and 216 million cases of malaria occurred worldwide. Most of the cases and deaths were in sub-Saharan Africa (90%), followed by South-East Asia Region (7%) [5]. According to CDC 2019, Africa was most affected because of high transmission by a efficient mosquito verv (anopheles

gambiae complex). The predominant parasite is *P. falciparum*, the species that cause severe malaria and death. Local weather conditions allow transmission to occur year-round [6]. Scarce resources and socio-economic instability have hindered efficient malarial control activities. Malaria remains one of the most important diseases in Uganda, causing significant morbidity, mortality, and negative socioeconomic impact [7]. Pregnant women are at high risk due to low immunity against the disease. Hospital records suggest that malaria is responsible for 30 to 50 percent of outpatient visits, 15 to 20 percent of admissions, and 9 to 14 percent of inpatient deaths [8]. In Africa each year around 24 million women become malaria-endemic pregnant in areas.

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

Pregnancy increases susceptibility to malaria and pregnant women are more likely to develop clinical attacks of malaria and serious complications than nonpregnant women of the same age [9]. Human malaria is caused by the protozoan parasite of the genus *Plasmodium*. It lives in the red blood cells and is transmitted by the female Anopheles mosquito. Malaria infection is significant in Africa where its fatality as a result of virulent Plasmodium *falciparum* is a far greater problem than in most parts of the world Pregnant women are susceptible to malaria and this is thought to be, in part, the result of a certain degree of immune suppression during pregnancy required for retention of the fetal allograft. At pregnancy, immunity has been altered; hence, with malaria, 70-80% of pregnant women in malariaendemic areas are susceptible to anaemia and increased risk of neonatal birth defects [10-12]. In 2016, an estimated 445,000 deaths and 216 million cases of malaria occurred worldwide, 5 million more than in 2015. Most of the cases and deaths were in sub-Saharan Africa (90%). followed by South-East Asia Region (7%) [5]. Uganda has the sixth highest number of *P*. Falciparum infections in Africa, and some

of the highest reported malaria transmission rates in the world. The 2016 DHS, indicated that malaria prevalence had not been reduced nationally and that severe malaria remains a public health problem in Uganda, especially in pregnant women and children. According to 2016 data from Uganda's Health Management Information System (HMIS), malaria accounts for 30% to 50% of outpatient visits and 25% to 37% of admissions, and 9-14 % of inpatient death [13]. In areas endemic for malaria, it is estimated that at least 25% of pregnant women are infected with malaria, with the highest risk for infection and morbidity in primigravidas, second trimester, adolescents, and those co-infected with HIV [14-16]. This calls for antepartum care as part of malaria prevention and treatment efforts. Thus, this study was aimed at determining the prevalence and factors associated with malaria amongst pregnant women attending Hoima Regional Referral Hospital Antenatal Care Clinic [17-23]. There is limited information on the prevalence and factors associated with malaria amongst pregnant women in this area.

METHODOLOGY Study design

The study was a quantitative descriptive type. Pregnant women who came for routine antenatal care visits during the months of May and June 2021 had their capillary blood samples collected and

The study was conducted at the antenatal care clinic of Hoima regional referral

The study focused exclusively on all pregnant women attending

The participants included all pregnant

women attending ANC services at Hoima

smears, both thick and thin were made and stained using Field's staining technique. These were examined for malaria parasites using a light microscope.

Area of Study

hospital; the clinic serves the rural people in and around Hoima town council.

Study Population

services at Hoima regional referral ANC hospital.

Inclusion Criteria

regional referral hospital of sound mind and consented to be part of the study.

Exclusion Criteria

The researcher excluded all women who refused to consent to the study, and those mentally ill, deaf or without a sound mind. were not pregnant, pregnant women who Sample Size Determination

A sample size of the population using Kiesh Leshlie's formula (1965), as shown below; $N=Z^2PQ$

$$D^2$$

Where; N = sample size to be determined.

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

Z = standard deviation at the required degree of accuracy which at 95% is 1.96 (3.8416)

P = proportion of pregnant women with malaria [=15.5% (Namusoke *et al.* [17]; P = 15.5% (0.155).

Therefore, $N = 1.96^2 X 15.5 X 85.5 = 5091 = 203$ 5² 25

So, the sample size (N) = 200 Pregnant women.

Sampling Procedures

0.0025

The participants included pregnant mothers attending ANC services at Hoima regional referral hospital. The participants

A research assistant was trained in the methods of data collection and employed to collect data using the best language known to the respondents. Pre-testing the questionnaire was done using a few

Data obtained was recorded and checked for completeness then compiled, coded, and analyzed using Microsoft Excel and SPSS computer programs where they were

Questionnaires were pre-tested using a small group of students of KIU - Western Campus to avoid mistakes and ambiguity. A research assistant was employed to collect data using the best language known to the respondents. The research assistant translated the questionnaire to the clients language in the the respondent

were selected through simple random sampling after explaining the purpose of the study at the ANC clinic.

Q = 1 - P (Percentage of pregnant women

without malaria); Q =1- 0.155= 0.845 D = the acceptable degree of error = 5% =

Data Collection Methods

students from Kampala International University, Western Campus to avoid mistakes and confusion and make adjustments where necessary both to the researcher and the respondents.

Data Analysis

converted to frequencies and graphs. It was then presented in the form of tables, pie charts, and graphs.

Data Quality Control

understands best during the process of sample collection. All consented clients were issued with a client leaflet that contained their initial number, in case they opted to withdraw, the number on the leaflet would be used to trace it in the record book.

RESULTS

Demographic characteristics of the respondents

A total of 200 pregnant mothers were enrolled in the study. The majority of the participants were aged between 20-24 vears (33.0%) and the least prevalent was age above 35 years (8.5%). Of the 200, of the 37(18.5%) pregnant women interviewed had malaria, whereas 163 (81.5%) of women had no malaria. The majority, 65(32.5%) attained a primary level of education while the least 38(19.0%) had formal education. Majority no 134(67%) were married while the least 22(11%) were divorced. Majority 91(45.5%) were Catholics while the least 7(3.5%) were Pentecostal. Most 73(36.5%) had 2-3 households while the least 25(12.5%) had 6 and above number of households.

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

Table 1 shows the demographic characteristics of the sample				
Variable	Frequency (n=200)	Percentage (%)		
Age categories				
15-19	33	16.5		
20-24	66	33.0		
25-29	57	28.5		
30-34	27	13.5		
>35	17	8.5		
Level of education				
No education	38	19.0		
Primary	65	32.5		
Secondary	45	22.5		
Tertiary	52	26.0		
Marital status				
Single	19	9.5		
Married	134	67		
Separated	25	12.5		
Divorced	22	11		
Religion				
Pentecostal	7	3.5		
Catholic	91	45.5		
Anglican	79	39.5		
Muslim	23	11.5		
Size of household				
1	51	25.5		
2 - 3	73	36.5		
4 - 5	51	25.5		
6 and above	25	12.5		

Prevalence of malaria

Of the total respondents, 37 (18.5%) mothers had malaria while 163(81.5%) were negative for malaria.

Table 2 shows the Prevalence of malaria			
Prevalence	Frequency (n=200)	Percentage (%)	
Positive	37	18.5	
Negative	163	81.5	

Association between demographic characteristics and acquiring of malaria among pregnant mothers

Age categories, level of education, marital status, and size of the household were statistically significantly associated with being with malaria among women attending Hoima Regional Referral Hospital Antenatal Care Clinic in the model at a 5% level. Pregnant women in the age group 15-19 were 3 times more likely to have malaria compared to those who belonged to the age group above 35 years (OR =3.11: 95%CI, 1.22-19.1: P=0.001). Pregnant women with no formal education were 4 times more likely to have malaria compared to those who attained a tertiary

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

level of education (OR=4.31: 95%CI, 1.94-20.5: P=0.001). Single pregnant women were 5 times more likely to have malaria compared to married women (OR=5.24: 95%CI, 0.77-24.13: P=0.001). Pregnant mothers who belonged to a family with 6 and above number of the household were

2 times more likely to have malaria compared to those who had 4 – 5 members of the household (OR=2.24: 95%CI, 11.76-27.35: P=0.012). In this study, religion was not statistically significantly associated having malaria among pregnant women.

Table 3 shows	an association	between	demographi	c characteristics	and malaria
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Variable	Malaria		OR (95% CI)	P-Values
	Positive	Negative	-	
Age categories	n=37	n=163		
15-19	9(27.3%)	24(72.7%)	3.11(1.22-19.1)	0.001
20-24	12(18.2%)	54(81.8%)	2.41(1.04-14.30)	0.024
25-29	9(15.8%)	48(84.2)	1.22(0.19-10.33)	0.096
30-34	3(11.1%)	24(88.9%)	1.77(0.14-6.10)	0.071
>35	4(13.5%)	13(76.5%)	Ref	
Level of education				
No education	15(39.5%)	23(60.5%)	4.31 (1.94-20.5)	0.001
Primary	10(15.4%)	55(84.6%)	1.47 (0.49-2.33)	0.620
Secondary	6(13.3%)	39(86.7%)	1.33(0.21-1.10)	0.071
Tertiary	2(3.8%)	50(96.2%)	Ref	
Marital status				
Single	13(68.4%)	6(31.6%)	5.24 (0.77-24.13)	0.001
Married	06(4.5%)	128(95.5%)	ref	
Separated	10(40%)	15(60%)	3.10 (0.44-13.19)	0.004
Divorced	08(36.4%)	14(63.6%)	2.27 (0.44-3.68)	0.014
Religion				
Pentecostal	01(14.3%)	06(85.7%)	0.26(3.18-29.63)	0.917
Catholic	16(17.6%)	75(82.4%)	0.41(0.15-6.46)	0.042
Anglican	14(17.7%)	65(82.3%)	0.43(0.15-6.46)	0.042
Muslim	06(26.1%)	17(73.9%)	ref	
Size of household				
1	04(7.8%)	47(92.2%)	0.41(1.04-14.30)	0.620
2 - 3	14(19.2%)	59(80.8%)	1.28(0.69-29.16)	0.052
4 - 5	11(21.6%)	40(78.4%)	ref	
6 and above	08(32.0%)	17(68.0%)	2.24((1.76-27.35)	0.012

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

The prophylactic use of antimalarial drugs by pregnant women attending Hoima Regional Referral Hospital Antenatal Care Clinic.



Figure 1: showing the Use of antimalarial drugs

From the figure above, a total of using antimalarial drugs while 180(90%) respondents, 20 (10%) mothers were not were using them.

The use of indoor residual spraying (IRS) or any other form of repellant against mosquitoes by pregnant women attending Hoima Regional Referral Hospital Antenatal Care Clinic.



Figure 2: showing the use of indoor residual spraying

From the study findings, the majority, 106 (53%) of the pregnant mothers were not

using indoor residual spraying while the least 94(47%) were using indoor resident.

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023



The number of pregnant women attending Hoima Regional Referral Hospital Antenatal Care Clinic who sleep under an insecticide-treated bed net.

Figure 3: Showing the rate of sleeping under an insecticide-treated net

The above study findings showed that the majority of women 178(89%) were sleeping

under insecticide-treated nets while the least 12 (11%) were not.

The availability, source, and use of mosquito nets by pregnant women attending Hoima Regional Referral Hospital Antenatal Care Clinic.

The logistic regression model after adjusting for other factors, results indicated statistically significant predictor factors to mosquito net use to be; Availability of mosquito nets, Source, and rate of use. It was 9 times more likely that participants that reported no availability of nets will have malaria [95% CI 3.35-26.00: P<0.001] than those that disagreed with the availability of mosquito nets. It was also 4 times more likely that participants who were buying mosquito nets were likely to have malaria than those who were getting them from the government [95% CI 1.32-10.60: P=0.013]. Respondents who agreed that they don't use nets were 6 times more likely to have malaria as compared to those who said they use mosquito nets [95% CI 1.222 - 22.164: P=0.003].

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023

	Table 4: Showing the availabil	ty source and use of moso	quito nets by pregnant women
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Variable	Malaria	Malaria	Odds Ratio	[95% Conf. Interval]
	Positive n=37	Negative n=163		
Availability of	2			
mosquito nets				
Yes	18(10.1%)	160(89.9%)	0.573	0.208 -1.574
No	19(86.4%)	03(13.6%)	9.335	3.351-26.000*
Source				
Government	04(3.0%)	129(97.0%)	0.374	0.125 - 1.116
Health facility	15(35.7%)	27(64.3%)	1.517	0.567 - 4.060
Buying	18(72.0%)	07(28.0%)	3.742	1.321- 10.603*
Use				
Yes	21(11.5%)	162(88.5%)	0.410	0.153 - 1.100
No	16(94.1%)	01(5.9%)	5.693	1.222 - 22.164*

* Statistically significant factor

DISCUSSION

Prevalence of malaria among pregnant women in

More than half of the women 37(18.5%) were negative for malaria. Nationally 17% mothers had malaria while 163(81.5%) of pregnant mothers have malaria. Factors associated with utilization of postnatal care services at Hoima Regional Referral Hospital Antenatal Care Clinic.

Association between demographic Characteristics and Malaria

In the study, the majority of the participants were aged between 20-24 vears (33.0%) and the least prevalence was age above 35 years (8.5%). The above results are in line with the study findings by Salim Shakur [18] which revealed that young pregnant mothers are most likely to have malaria during pregnancy as compared to the elder ones. Of the 200. 37(18.5%) of the pregnant women interviewed had malaria, whereas 163 (81.5%) of women had no malaria. The majority, 65(32.5%) attained a primary

The study highlighted that malaria among pregnant women in Hoima Regional Referral Hospital was high and therefore put the life of mothers and unborn children risk (18.5%).at The

Recommendations

Based on the results of the study, the following recommendations were made.

MOH needs to sensitize the The communities to the importance of the use

This study makes important contributions with respect to the incidence of malaria. However, a number of limitations in the findings of the study emerged and were included, most of the pregnant mothers

level of education while the least 38(19.0%) had no formal education. The study findings by Schantz-Dunn and Nour [19] are correlated with the above results which revealed that the prevalence of malaria among pregnant mothers was at 18.66%. Majority 134(67%) were married while the least 22(11%) were divorced. Majority 91(45.5%) were Catholics while the least

7(3.5%) were Pentecostal. Most 73(36.5%) had 2 - 3 households while the least 25(12.5%) had 6 and above number of households.

CONCLUSION

sociodemographic determinants that were found to be predictive of malaria acquisition were level of education, marital status, level of education, and number of household members.

of Mosquito nets and health care workers need to inform the clients about the use of mosquito net services.

Weaknesses and suggestions for further research

who come from humble backgrounds are always at Hoima Regional Referral Hospital Antenatal Care Clinic. Therefore, malaria cases are not monitored well and cannot be clearly estimated. The study was done in a

Ariokot

INOSR APPLIED SCIENCES 10(2):74-84, 2023 single facility and thus the number of enrolled patients was small. These facts may limit the generalization of the current study to the entire Hoima population. In the maternal department, there is poor

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documentation of the client`s information, therefore it is hard to determine the exact current prevalence of malaria.

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