PREVALENCE OF MALARIA AND ASSOCIATED RISK FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT ISHAKA ADVENTIST HOSPITAL

BY

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SEPTEMBER 2018

DECLARATION

I, Byabashaija Johnesm; hereby declare that this research report is my original work and has never been submitted to any institution of learning for any academic award.

Signature.....Date: 04/10/2013

BYABASHAIJA JOHNESM

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APPROVAL OF SUBMISSION

This is to certify that the research entitled 'Prevalence of Malaria and associated risk factors among pregnant women attending antenatal at Ishaka Adventist hospital' was done by the student under my supervision.

Supervisor;

Dr.GUMISIRIZA NOLBERT

Signature.....

Date 4th/10/18

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DEDICATION

To my parents Tiberindwa Abusolom and Keishengyero nice for their support and inspiration during my studies. To my step mothers, brothers and sisters for their love and advice during my study.

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LIST OF ACRONYMS

ITN	Insect side treated nets
LBW	Low birth weight
LLINs	Long lasting insecticidal nets
MIS	Malaria indicator survey
PAM	Pregnancy associated malaria
RDT	Rapid diagnostic test
WHO	World health organization

DEFINITION OF TERMS

Malaria prevalence: Testing positive for malaria parasite either by RDT or microscopic smear.

Pregnant women: Having pregnancy confirmed by a health worker.

Risk factors: Any variable that increased the chance of getting malaria.

ABSTRACT

Background: In the sub Saharan Africa, malaria affects an estimated 24 million pregnant women and the region records the greatest severity of malaria accounting for 90% of all the deaths. Thus, this study aimed at determining the prevalence of malaria and possible risk factors for malaria among pregnant women attending ANC at Ishaka Adventist Hospital.

Methods: This was a cross sectional study carried out among 185 pregnant women after informed consent was obtained. Data on demographic factors and prevalence of malaria was collected using a pretested questionnaire. Collected data was entered and analyzed using the IBM SPSS 25.

Results: Of the total 185 pregnant women in the study, 19.5% were infected with malaria parasites. It was found that prevalence of malaria was increased by, non-usage of ITNs, primigravity and not taking IPT.

Conclusion: Malaria prevalence was high due to not using ITNs and IPT as preventive measures. Increasing awareness about malaria preventive measures will help to reduce malaria infection.

CHAPTER ONE: INTRODUCTION

1.1 Background

Malaria is caused by a parasite of *Plasmodium*-species, of which most common is *Plasmodium falciparum*. According to World Health Organization (WHO), approximately 216 million cases of malaria occurred worldwide in 2016, an increase of 5% over 2015 (WHO, 2017). Malaria related deaths have declined by 29 % between 2010 and 2015. Majority of malaria cases and deaths related to malaria occur in Africa (World Health Organization, 2016). However, malaria still creates a remarkable worldwide burden, even though morbidity and mortality caused by malaria has reduced within past decade, especially among pregnant women and children under five years old.

In areas with stable malaria transmission, due to protracted exposure to infectious bites, partial protective immunity to clinical malaria is gradually acquired with increasing age. Severe *P. falciparum* malaria is thus predominantly a childhood disease. There is however one exception to this general rule: pregnancy-associated malaria (PAM). Despite their semi-immune status, women become more susceptible to malaria upon pregnancy. In endemic areas, approximately 25 million pregnancies are at risk of *P. falciparum* infection every year, and 25% of these women have evidence of placental infection at the time of delivery (Namusoke, Rasti, Kironde, Wahlgren, & Mirembe, 2010).

Clinical features of infection during pregnancy vary with the degree of preexisting immunity and thus the epidemiological setting. In high-transmission areas, maternal anaemia and low birthweight (LBW), as a result of prematurity and/or intrauterine growth restriction (IUGR), are the main adverse outcomes of placental infection and tend to be more severe in first pregnancies and in younger mothers (Greenwood, Bojang, Whitty, & Targett, 2014). These effects are less marked by gravidity in low-transmission areas (Rashidi & Roullet, 2013). Moreover, LBW babies are in general at increased risk of death during infancy. Each year between 100 000 to 300 000 infant deaths may be attributable to maternal malaria in Africa (Eisele et al., 2012).

The pathophysiological processes preceding adverse outcomes in PAM are initiated by the accumulation of *P. falciparum*- infected red blood cells (pRBCs) in placental intervillous spaces, causing inflammatory responses and deposition of fibrinoid material. Adhesive interactions between parasite encoded erythrocyte surface antigens and intervillous host receptors such as chondroitin sulphate A (CSA), hyaluronic acid (HA), and nonimmune immunoglobulins (Igs) are

believed to be involved in the sequestration process (McDonald, Tran, & Kain, 2015). The exact details of how sequestration causes LBW are unknown. Local inflammatory immune responses in the infected placenta may induce early labour (Holmberg et al., 2012). IUGR appears to be related to reduced nutrient transport to the foetus due to high parasite and inflammatory cell density (World Health Organization, 2015). Maternal anaemia may also independently contribute to IUGR, most likely via a reduction in oxygen transport to the foetus (De Beaudrap et al., 2013).

Uganda is the second highest malaria prevalent country in the subregion after Mozambique and in 2016, Uganda accounted for 17% of the 395 million estimated cases in East and Southern Africa (World Health Organization, 2017). The overall burden of malaria is high and its adverse outcomes to the infected mother and the unborn child are widespread (Wanzira et al., 2017). There is growing awareness that pregnancy-associated malaria is also of importance in areas of low and seasonal transmission worldwide. Although Uganda is regarded as being a malaria-endemic region, the transmission level varies considerably across the country (UBOS and ICF, 2016). Similar to studies from other countries, data on malaria burden are mainly available from areas of high transmission. In light of this, the researcher sought to conduct this study to assess the prevalence of malaria and associated risk factors among pregnant women attending antenatal clinic (ANC) at Ishaka Adventist hospital.

1.2 Problem statement

Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her fetus, and the newborn child. In the sub Saharan Africa, malaria affects an estimated 24 million pregnant women and hence the region records the greatest severity of malaria accounting for 90% of all the deaths (WHO, 2015). Some of the established negative impacts of malaria on pregnancy outcomes include a high incidence of miscarriages and a high number of deliveries of low birth weight babies (Eisele et al., 2012). Despite the malaria in pregnancy control efforts, malaria prevalence among pregnant women is still reported. For example, a study in a recent study in Mulago Hospital among pregnant women found out a prevalence of 14% (McDonald et al., 2015) which could endanger both the mother and the fetus. No study has been done in Bushenyi district regarding the subject, thus, this study was to find out the prevalence of malaria among pregnant women and explore associated risk factors.

1.3 Significance of the study

Malaria has far reaching effects on pregnancy including maternal anemia, miscarriage and low birth weight, this study assessed the prevalence and associated factors of malaria among p3regnant women attending ANC at Ishaka Adventist hospital. Results from the study will be important in policy formulation for prevention and management of malaria in pregnancy and also help in the development of new health education and health promotion materials and strategies in Bushenyi district. The results will be used as a reference for further studies.

1.4 Objectives

1.4.1 General objective

This study explored prevalence and associated risk factors of malaria among pregnant women attending ANC at Ishaka Adventist hospital.

1.4.2 Specific objective

1. To find out the proportion of malaria among pregnant women attending ANC at Ishaka Adventist hospital.
2. To assess the risk factors of malaria among pregnant women attending ANC at Ishaka Adventist hospital.

1.5 Research questions

1. What is the proportion of malaria among pregnant women attending ANC at Ishaka Adventist hospital?
2. What are the risk factors of malaria among pregnant women attending ANC at Ishaka Adventist hospital?

CHAPTER TWO: LITERATURE REVIEW

2.1 Etiology and Pathogenesis of Malaria

Plasmodium-species that infect humans are *P. falciparum, P. vivax, P. malariae* and *P. ovale*. *P. falciparum* is the most dangerous and can cause serious complications and even lead to death. Malaria is transmitted to humans by *Anopheles*-mosquito (White, Dondorp, Faiz, Mishra, & Hien, 2012).

When the mosquito stings human, it releases *Plasmodium* sporozoites to the blood within saliva of the mosquito. The sporozoites transfer to liver, where each sporozoite mature to few thousands of merozoites. For *P. falciparum* this stage lasts about 5–6 days. The merozoites break the liver cells and are released to the bloodstream where they invade red blood cells and continue maturing. After 1–3 days divided merozoites break the red blood cell, enter the blood stream again and infect more red blood cells. The infected red blood cells become more prone to stick to each other and the endothelium of small blood vessels, creating thrombosis and hemorrhage. This leads to end organ damage, especially in brain, kidneys, gastrointestinal tract, lungs and liver (WHO, 2015).

The incubation period is 7–30 days. Symptoms caused by malaria are fever, headache, nausea, vomiting and myalgias. Fever is typically cyclic but especially in *P. falciparum* infection, fever can be anything between cyclic and continuous. The length of cycle depends on the species infecting and is between 36–72 hours (Oakley, Gerald, McCutchan, Aravind, & Kumar, 2011).

2.2 Malaria in pregnancy

In 2015, it was estimated that 25 million pregnant women every year were at risk of *P. falciparum* infection in sub-Saharan Africa (Mbonye, Mohamud, & Bagonza, 2016). In areas of stable transmission, the prevalence of malaria in pregnancy at the time of delivery was estimated as 25 % for peripheral or placental infection. This was evaluated as underestimate, since the data it's based on, are prevalence data at one time-point and determined by light microscopy. Thus, infections outside the particular time-point haven't been considered, and low-grade parasitemia, which are not detectable by light microscopy, are not included. For detection of those submicroscopic infections, polymerase chain reaction (PCR) or placental histology would be needed (Pehrson et al., 2016).

Recently, studies from high transmission areas have shown prevalence of malaria among pregnant women with microscopy from 2.3 % in Malawi (Roman et al., 2014) to as high as 99 % in South-

Eastern region of Nigeria (Onyebuchi, Lawani, Iyoke, Onoh, & Okeke, 2014). It seems that the prevalence of malaria in pregnancy has declined along with the overall incidence of malaria. Even prevalence determined by PCR and thus including submicroscopic infections, is not as high as before. These suggest that the utilization of malaria control measures in both general population and among pregnant women has been successful.

In high transmission areas malaria in adults is often asymptomatic. That is due to acquired immunity as a result of constant exposure and prior infections in childhood (World Health Organization, 2016). This immunity does not cover from infection but reduces the risk of severe disease. The acquired immunity protects pregnant women too and the malaria infections are often asymptomatic. But pregnant women are still predisposed to malaria and the risk for severe symptomatic disease is higher than among non-pregnant women. Additional immunocompromising state besides pregnancy, e.g. HIV, further increase the risk of severe disease. Also in areas of seasonal or low transmission, the probability of symptomatic malaria is higher (Roman et al., 2014). In a study reported by Oakley et al., the clinical complaints suggestive to malaria were not associated with prevalence of malaria, indicating that traditional signs and symptoms of malaria doesn't predict malaria infection in pregnant women (Oakley et al., 2011).

In pregnant women, the infected red blood cells sequester to placenta causing placental infection. As a consequence, the rate of parasitaemia in peripheral blood is low, and will most likely be undetected by light microscopy. Immunity also results as low-grade parasitaemia in peripheral blood. To detect these submicroscopic infections, more sensitive methods like PCR and placental histology are needed (Namusoke et al., 2010).

Although malaria in pregnancy is mostly asymptomatic and severe disease is rare, malaria infection during pregnancy has remarkable negative consequences which not only affect maternal health but also birth outcomes. Most significant maternal outcome is anaemia. Of all severe anaemia among pregnant women in Africa, it is estimated that 25 % is caused by malaria (De Beaudrap et al., 2013). Moreover, a study by Braun et al. found that submicroscopic infection was associated with increased risk of maternal anaemia (Braun et al., 2015). Thus, asymptomatic and submicroscopic malaria also cause anaemia.

The maternal mortality is also one of the negative outcomes caused by malaria and it remains to be poorly estimated. The mortality rates caused directly or indirectly by malaria range from 0.5 % to 23 % in hospital studies and from 2.9 % to 17.6 % in community-based studies (Holmberg et al., 2012).

For birth outcome, the most commonly reported adverse effect is an increased risk of low birthweight (LBW, defined as birthweight < 2500 g). LBW is highly associated with increase in infant mortality. The cause for LBW is thought to be intrauterine growth retardation (IUGR) or preterm birth which are partly caused by malaria in pregnancy. Also, association between placental malaria and stillbirth has been shown (De Beaudrap et al., 2013).

In South western Uganda (Rakai), by Kiggundu et al found low prevalence of malaria (0.07 %) among pregnant women and no association to anaemia or LBW (Kiggundu et al., 2013). The diagnosis was made by rapid diagnostic tests (RDT). There was great loss in study population during the study period, and less than half of the enrolled was in follow up at the time of delivery. Malaria tests were planned to be taken at least three times during the study period until delivery, but there is no information on how this was fulfilled. Authors recognize, that the numbers are too low to show evidence of association.

In conclusion, the evidence of the association between submicroscopic malaria infections and LBW is somewhat contradictory. On the other hand, microscopic malaria, either peripheral of placental, increases the risk of LBW unequivocally (Rashidi & Roullet, 2013).

In addition, the risk of all-cause anaemia is higher among infants born to mothers with placental malaria. Placental infections reduce the transfer of maternal antibodies to the fetus causing increasing risk to many other infectious diseases besides malaria. Earlier studies suggest that malaria during pregnancy creates increasing overall morbidity and developmental problems for the child later in life. These conclusions are still uncertain and require more research (van Eijk, Hill, Noor, Snow, & ter Kuile, 2015).

2.3 Risk factors and prevention of malaria in pregnancy

The known risk factors for microscopic malaria in pregnancy on high transmission areas are primigravity, younger maternal age and second trimester (Beaudrap et al., 2013). On low transmission and seasonal malaria areas the gravidity hasn’t been so strongly associated to risk of

malaria. These suggest that in high and stable transmission areas immunity acquired is associated to both age and parity (Wanzira et al., 2017). For the prevention of malaria in pregnancy WHO recommends the use of long-lasting insecticidal nets (LLINs), intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) in areas of moderate to high transmission and prompt diagnosis and effective treatment of malaria (World Health Organization, 2016).

Maternal characteristics as risk factors are quite commonly investigated but environmental factors affecting malaria prevalence hasn't been much studied, with the exception of bed net availability and usage (Mbonye et al., 2016). Obliviously, a lot of studies about the benefits of IPTp has been done, but they are not referred here.

In many countries, Malaria Indicator Survey (MIS) has been conducted regularly to determine the availability and usage of malaria control measures including insecticide treated bed nets (ITN) and determining the prevalence of malaria in risk groups and/or general population. In Eritrea at MIS 2015 the coverage of bed nets was high, at least one bed net was owned by 90 % of households and 87 % had at least one ITN. Of pregnant women, 60 % had slept under an ITN the previous night. The malaria prevalence in general population was 1.1 % (95 % CI 0.9–1.3) (Anonymous. & Anonymous, 2016).

In South Sudan, MIS 2012 showed that the prevalence of malaria was 24.5 % (95 % CI 23.0–26.1) among general population and among pregnant women 9.9 % (95 % CI 7.4–13.1) (Pasquale et al., 2013). The proportion of households with at least one bed net was 59.3 % (95 % CI 57.5–61.6), and 35.9 % (95 % CI 31.9–40 .2) of pregnant women had slept under the net the previous night. The malaria prq

For environmental factors affecting malaria prevalence among pregnant women, not many studies were available. In six studies the association between malaria prevalence in pregnancy and ITN coverage or usage was analyzed. The effect of season in the prevalence of malaria among pregnant women was analyzed in three studies with inconsistent findings (Keating et al., 2011). High-risk season was associated with higher malaria prevalence in one study (Kibret, Wilson, Tekie, & Petros, 2014), but two studies found no association between dry or rainy season and prevalence of malaria. The effect of housing conditions and materials of walls, roofs, floors and windows on the prevalence of malaria was investigated in general population. The poor wall materials were found

to be associated with prevalence of malaria. Another study found association between household size and malaria prevalence in pregnant women. Only two of the studies above included submicroscopic infections to the analysis.

The need for malaria control strategies specifically targeted to pregnant women was evaluated in two studies. In the South African study of the prevalence of malaria was low (0.07 %) (Maharaj et al., 2013). They suggest that malaria control measures for entire population benefit also during pregnancy, and there is no need for measures specifically aimed for pregnant women.

Another study investigated if a universal bed net campaign would reduce the burden of malaria among pregnant women in Malawi (Centres for Disease Control and Prevention, 2013). Following the bed net campaign, the use of bed nets increased from 50.3 % to 66.2 %. At the same time the prevalence of malaria decreased from 28.4 % to 15.0 %. However, there was no association between malaria infection and bed net use in individual level. Contradictory to the study by Lowe, Chirombo, & Tompkins, (2013), this study suggests that besides universal anti-malarial measures, specific strategies targeting pregnant women are still needed. All women had their first or second pregnancy, being in higher risk of malaria, which may explain the high prevalence (Lindblade et al., 2015). And in the end, the bed net coverage in Malawi is still quite low, and as a universal method it cannot be compared with the yearly IRS of every household.

CHAPTER THREE: METHODS

3.1 Study area

The study was conducted in Ishaka Adventist Hospital and more specifically MCH clinic. The Ishaka Adventist Hospital which was founded in 1950, is a community hospital in the town of Ishaka ,Bushenyi District ,Western Uganda .The hospital is a mission facility administrated by the seventh Day Adventist church and it caters for the local population, who are mainly subsistence farmers. The hospital is located 77kilometers west of mbarara , which is the largest town in the subregion. The hospital also maintains a training school for nurses and there is large nursing cohort on the staff. The hospital specialises in maternity care and infectious diseases .

Funding status NGO/charity. It has 110 bed numbers .The hospital has a catchment area of about 28000 people and is affiliated with the American Loma Linda university, which is located in Loma Linda,California. The hospital has both inpatient and outpatients and outpatient department works from Monday to Friday.

3.2 Study design

The study was retrospective cross sectional and utilized quantitative method of data collection.

3.3 Study population

Study population included all women attending ANC at Ishaka Adventist hospital.

Inclusion criteria: records of pregnant women who attended ANC at Ishaka Adventist Hospital for the last 6 months (from February 2018-July 2018) and tested for malaria

Exclusion criteria: pregnant women who did not test for malaria. And those that attended ANC before February or after July 2018

3.3.2 Sample size determination

The sample size required for the study was calculated based on the formula by Kish and Leslie to estimate a single population proportions (Gwet, 2010).

$$\boldsymbol{N = \frac{Z^2\, p(1-p)}{\delta^2}}$$

Where,

N = estimated sample size

P = anticipated proportion of pregnant women with malaria. Similar study at Mulago hospital found only prevalence of 14%, so P was taken to be 0.14

Z = standard normal variation ant 95% confidence (1.96)

δ = margin of error (5%)

the calculated sample size was, $\frac{1.96^2 \, x \, 0.14(1-0.14)}{0.05^2}$ **= 185 sample was taken.**

3.3.3 Sampling procedure and techniques

Convenient sampling was employed to get list of women who attended ANC and tested for malaria from the register. Then systematic sampling was used to get the sample required. The list was created and numbered from number '1' up wards. Only names with even numbers was selected for the study until the required number 185 was reached.

3.4 Data collection procedures

3.4.1 Data collection instruments

Data was collected by reviewing records from antenatal register, using structured pretested checklist.

3.4.2 Variables

Dependent variables

Prevalence of malaria in pregnancy.

Independent variables

Socio demographic: - age, sex, religion, educational background, marital status, employment status, gravidity, IPT use, ITN use and area of residence.

3.5 Data processing and analysis

The checklist was checked for completeness, missed values and then manually cleaned up on such indications before living the study area. Data was coded and entered in to IBM SPSS version 25. Data was cross checked for consistency and accuracy, after data clearing, data was analyzed and presented in tables and charts.

3.6 Ethical Consideration

Ethical clearance was obtained from faculty of clinical medicine and dentistry in form of introduction letter. The copy of introduction letter was taken to the Ishaka Adventist hospital administrator to seek permission to collect the data.

3.7 Dissemination of results

The finding of this study was disseminated to the faculty of clinical medicine and dentistry and Ishaka Adventist Hospital administrator.

CHAPTER FOUR: RESULTS

4.1 Demographic characteristics of pregnant women in the study

Characteristics of the 185 participants in this study are summarized in Table 1. The age of participants ranged from 18-38 with mean age of 26.6 ± 4.6 years standard deviation. majority (86.5%) had education of primary or below, 90.3% were married however only 4.9% were employed. 25.0%, 21.6%, and 17.3% had primary, secondary and tertiary education, respectively.

Table 1: Demographic characteristics of the participants (N=185)

Characteristics of participants		**Frequency**	**Percent**
Age group	18-23	51	27.6
	24-29	92	49.7
	30-35	32	17.3
	36-41	10	5.4
Education level	primary and below	160	86.5
	Secondary	18	9.7
	tertiary	7	3.8
Marital status	married	167	90.3
	single	7	3.8
	others	11	5.9
Occupation	peasant	144	77.8
	employed	9	4.9
	business	32	17.3
Area of residence	rural	145	78.4
	urban	40	21.6

Figure 1: ITN use among pregnant mothers (N=185)

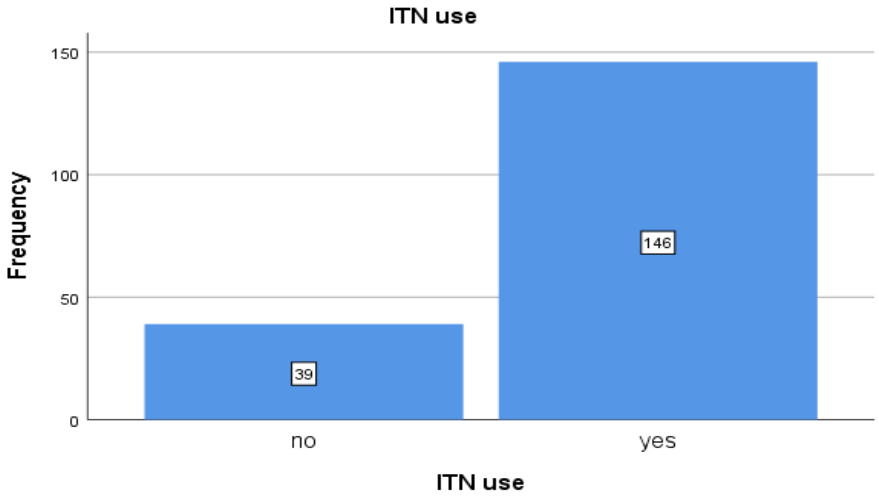
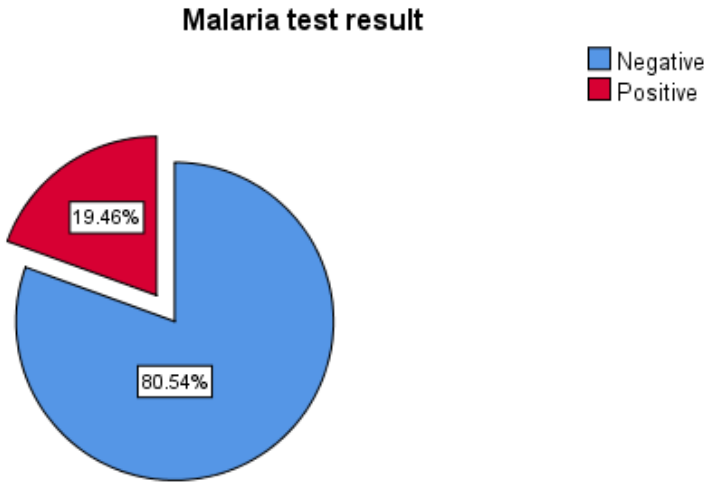


Figure 1 above shows that 146 participants (78.9%) were using ITN. However, 39 participants (21.1%) were not using the ITN.

4.2 Prevalence of malaria among pregnant mothers attending Ishaka Adventist Hospital

Figure 2 below shows that prevalence of malaria among participants was 19.5%.

Figure 2: Prevalence of malaria among pregnant mothers (N=185)



4.3 Chi-square test for prevalence of malaria and participants' characteristics

The results show that gravidity (X^2: 6.23, p<0.013); ITN use (X^2: 123.53, p=<0.001); and IPT (X^2: 70.27, p<0.001) were significantly associated with malaria in pregnancy.

Table 2: Chi-square test for prevalence of malaria and participants' characteristics

Characteristics		Malaria test result		Chi-square (X^2)	P-value
		Negative	Positive		
Age group				6.79	0.079
	18-23	40	11		
	24-29	80	12		
	30-35	23	9		
	36-41	6	4		
Marital status				2.54	0.281
	married	136	31		
	single	4	3		
	others	9	2		
Education level				1.35	0.510
	primary and below	131	29		
	secondary	13	5		
	tertiary	5	2		
Occupation				4.11	0.128
	peasant	119	25		
	employed	5	4		
	business	25	7		
Gravidity				6.23	**0.013***
	primigravida	17	10		
	multigravida	132	26		
Area of residence				2.11	0.147
	rural	120	25		
	urban	29	11		
ITN use				123.53	**<0.001***
	no	7	32		
	yes	142	4		
IPT taken				70.27	**<0.001***
	no	13	26		
	yes	136	10		

***Significant value

4.4 Multivariate logistic regression analysis of risk factors associated with malaria in pregnancy

To identify the risk factors associated with malaria in pregnancy, the researcher conducted a multiple logistic regression analysis and results are summarized in table 3 below.

According to the gravida of women, results showed that primigravida woman had a three times risk of having malaria in pregnancy (OR=2.99; CI= 1.230-7.251; p<0.016) compared to those who were multi gravidas.

For ITN use, findings show a remarkable decrease of malaria to those who were sleeping under ITNs (OR=0.01; CI= 0.002-0.022; p<0.001) compared to those who did not sleep under ITNs.

About IPT, pregnant women who had taken IPT had a very low risk of having malaria in pregnancy (OR= 0.03; CI= 0.012-0.080; p<.001) compared to those who had not taken IPT.

Table 3: Multivariate logistic regression analysis of risk factors associated with malaria in pregnancy

Characteristics		OR	95%CI	P-value
Gravidity	primigravida multigravida	2.99 1	1.230,7.251	0.016
ITN use	no yes	0.01 1	0.002,0.022	<0.001
IPT taken	no yes	0.03 1	0.012,0.080	<0.001

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 Prevalence of malaria in pregnancy among pregnant mothers attending Ishaka Adventist hospital

In this study, the prevalence of malaria infection among pregnant women in the study area was found to be 19.5%. This finding is higher than in Mulago hospital where a prevalence of 9% was reported among pregnant women (Namusoke et al., 2010). It also contrasts with findings in South Sudan, where a prevalence rate of 9.9% among pregnant women was reported (Pasquale et al., 2013). However, prevalence in this study is similar to the one reported in Malawi, where a total prevalence of 25% was recorded (Pehrson et al., 2016).

The difference in prevalence may be due to difference in time of study and study setting. The low prevalence reported may also be due a general decline in malaria among the general population due to robust measures put by government in prevention of malaria.

5.2 Risk factors of malaria in pregnancy

In this study, it was observed that mother's gravidity was associated with malaria prevalence, showing that a primigravida woman is at a greater risk of malaria infection that a multigravida woman. Similar findings have been reported in Mulago national referral hospital where prevalence was observed to decrease as gravidity increased (Beaudrap et al., 2013). It has been reliably established that infection rates are higher in women in their first and second pregnancies, with lower rates in later pregnancies (Wanzira et al., 2017). This is understandable as pregnancy is naturally accompanied by general immune suppression that may cause loss of acquired immunity to malaria especially among primigravidae.

There was a strong association between ITN use and malaria infection. Prevalence of malaria among pregnant women in the under the study decreased significantly with the increase in ITN use. The use of ITNs decreases both the number of malaria cases and malaria deaths in pregnant women (World Health Organization, 2016). A previous study conducted in Fortportal, Western Uganda also indicated that the rate of malaria in pregnancy decreases with the increase in the use of ITNs (Braun et al., 2015).

This study further shows that malaria prevalence among pregnant women was significantly associated with the use of IPT. Women who had taken IPT had reduced risk of getting malaria compared to those who had taken IPT. This finding concurs with that reported in Ghana, where

IPT usage greatly influenced the prevalence of malaria in pregnancy (Holmberg et al., 2012). However, the study in western Uganda did not find IPT in take to be significant (Braun et al., 2015).The author in the later study reported resistance to fansidar to have been the reason and he recommended alternative measures to be used.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Malaria is still a major public health problem among pregnant women in Africa. This study found a high prevalence of malaria in pregnancy (19.5%). Lower gravidity, non-usage of ITNs and not taking IPT were the major factors associated with an increased risk of malaria infection in pregnancy.

6.2 Recommendation

The control measures available in the area should be reviewed and emphasis should be placed on adequate sensitization on usage of ITNs and IPT should be taken from the health facility to ensure high coverage. Awareness on malaria prevention measures during pregnancy should target young women even before marriage preferably at schools, and social and religious gatherings.

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Annexes

Annex I: Informed consent

Hello, my name is Byabashaija Johnesm and I am conducting a research on prevalence of malaria and associated risk factors among pregnant women attending ANC at Ishaka Adventist hospital. I would like to ask you some questions regarding the topic and the interview will just take about 15-30 minutes. Your name will not be written on the paper, so your answer will be completely confidential, and if at any time during the interview you want to stop answering questions, you are free to do so.

If you are willing to participate, you will be requested to provide written informed consent before the interview.

If you have any question or if something is not clear, please feel free to ask. You can contact the investigator and ask any query you have at any time.

Are you willing to participate in the interview?

Signature of the consenting participant ……

Supervisor's name. ….. Dr Gumisiriza Nolbert------- Signature ----------

Annex II: Checklist

1. Age of respondents (in years) …….

2. Education level

- Primary and below ☐
- Secondary ☐
- Tertiary ☐

3. Marital status

- Married ☐
- Single ☐
- Others ☐

4. occupation

- Housewife ☐
- Peasant ☐
- Employed ☐
- Business ☐

5. Area of residence

- Rural ☐
- Urban ☐

6. Gravidity

- Prime ☐
- Multi ☐

7. IPT taken

Yes ☐

No ☐

8. ITN use

Yes ☐

No ☐

9. Malaria test results

Positive ☐

Negative ☐

Annex III: Map of Bushenyi showing study area

KEY

☆ Ishaka-Bushenyi Municipality

Annex IV: WORK PLAN

ACTIVITY	TIME FRAME	REQUIREMENT(S)	PERSON RESPONSIBLE
Proposal activity	28/08/2018 - 01/09/2018	Computer,stationary,internate access	Reseacher
Presentation of proposal, corrections	02/09/2018- 03/09/2018		Researcher, supervisor
Letter from university administration	04/09/2018- 05/09/2018		Researcher
Data collection	08/09/2018- 12/09/2018	Questionnaire	Researcher, Assistant
Data analysis and presentation of results	13/09/2018- 20/09/2018	Stationary, computer	Researcher
Discussion of results	21/09/2018- 23/09/2018	Literature, results	Researcher, supervisor
Printing and submission of report	24/09/2018- 10/10/2018	Stationary, computer	Researcher

Annex V: BUDGET

ITEM	UNIT	UNIT COST(UGX)	TOTAL COST (UGX)
Pens	06	700	4200
Pencils	03	400	1200
Paper	02 reams	13500	27000
Secretarial work	42 pages	500	21000
Air time		20000	20000
Research assistant			100000
Internet bundles	02 months	25000	50000
Consumables			30000
Miscellaneous			100000
GRAND TOTAL			353400

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OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY

Received and accepted to conduct his Research from IAH

05/09/2018

TO WHOM IT MAY CONCERN

RE: BYABASHAIJA JOHNESM (BMS/0206/123/DU)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Programme.

He wishes to conduct his student Research in your community.

Topic: Prevalence of malaria and associated risk factors among women attending antenatal clinic at Ishaka Adventist Hospital

Supervisor: Dr. Gumisiriza Nolbert

Any assistance given will be appreciated.

K.I.U TEACHING HOSPITAL 05 SEP 2018 ASSOCIATE DEAN FCM&D

ISHAKA Adventist HOSPITAL BUSHENYI UGANDA
SEVENTH-DAY ADVENTIST CHURCH
10/Sept/2018

Dr. Akib Surat O
Deputy Executive Director/Campus Dean (FCM & D)