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Malaria In Primigravidas: Prevalence and Associated Factors, A Case of Masafu General Hospital Antenatal Clinic, Busia District- Uganda.

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Background: *Malaria remains a major health concern in Busia district, Eastern Uganda. Due to their low pregnancy-specific immunity, primigravidas are more vulnerable to malaria infection and prone to severe malaria-related maternal and fetal complications. This study aimed to assess the prevalence and associated factors of malaria among primigravidas attending Antenatal Care at Masafu General Hospital Busia district, Uganda.*

Method: *A cross-sectional study involving 126 participants was undertaken from December 2024 to April 2025. Malaria in pregnancy was defined as a positive rapid malaria antigen test or blood slide microscopy during Antenatal clinic visit. Capillary blood samples were collected from the participants and tested using malaria rapid diagnostic tests and microscopy to assess the malaria prevalence. A structured and pretested questionnaire was used to collect data on socio-demographics and other risk-factors. Bivariate analysis was done to identify variables significantly associated with malaria status (p<0.05). Multivariate logistic regression was further run to adjust for confounding factors and thus determine the independent predictors of malaria infection.*

Results: *Of the 126 primigravidas that were included in this study, 40 were malaria positive representing the overall prevalence of 31.8% (95% CI: 23.6%-39.9%). Of the positive cases, 20% were asymptomatic. This study revealed that single mothers and those residing in the villages exhibited the highest prevalence rates of 45.95% and 33.66% respectively. In the adjusted model, significant risk factors included occupation (p=0.042), sleeping under a treated mosquito net (p<0.001), living near mosquito breeding sites (p=0.013), and lack of health education on malaria prevention.*

Conclusion: *The study found that the prevalence of malaria among primigravidas was 31.8%, of which 20% were asymptomatic. The factors associated with malaria were inadequate use of mosquito nets, living near mosquito-breeding sites, and poor access to health education in their communities.*

Keywords: *Primigravida, Antenatal care, Malaria, Prevalence, Busia, Uganda.*

Background

Malaria remains a leading cause of morbidity and mortality in Sub-Saharan African countries [1]. Malaria in pregnancy is a public health concern that endangers pregnant women, developing fetuses, and the newborns, contributing to adverse effects of stillbirth, premature delivery, spontaneous abortion, low birth weight, as well as maternal and newborn anaemias [2]. Estimates of 10,000 maternal and 100,000 newborn deaths occur each year globally due to malaria, nearly half of these occur in Sub-Saharan Africa including Uganda [3]. In 2019, 152 of the total 3,528 maternal and newborn deaths in Uganda were due to malaria in pregnancy [4]. The risk of malaria in first pregnancy in younger pregnant women is high, and the infection tends to decline as gravidity increases due to

the gradual development of immunity against malaria [5]. According to a study done in Nigeria, the prevalence of malaria infection was higher among the primigravidas compared to multigravidas [6]. Even if first-time pregnant women have lived in malaria-endemic areas and encountered malaria before, they have not developed the **special immunity that forms only during repeated pregnancies**, making them more prone to complications such as anaemia [7]. The changes in their immune system associated with pregnancy increase their susceptibility to these complications. However, the vulnerability of primigravidas to malaria infection decreases with increasing numbers of pregnancies suggesting that women acquire a gravidity form of immunity, resulting in a decrease in both the prevalence and severity of the disease [8]. Despite the various tools and methods put forward to combat malaria infection by WHO, several studies have pointed out the increasing prevalence of malaria among pregnant women mostly those in their first pregnancy in African countries including Uganda. However, such critical information is lacking in Busia district despite it being one of the districts with increasing malaria burden.

Methods and Materials:

Study design and settings

A cross-sectional study was conducted from December 2024 to April 2025, among the first-time pregnant women attending Antenatal Care at Masafu General Hospital, Busia district. The hospital is located in Masafu Town Council, Busia district in Eastern Uganda along Busia-Namayingo Road. This hospital serves pregnant women from most parts of Busia including Masaba, Lumino, Buhehe, Masinya, Dabani, Bulumbi, and Manjaji sub-counties. Prior to the start of data collection, clearance was obtained from the administration of Masafu General Hospital and the Research and Ethics committee of CoVAB- Makerere University. A formal consenting process was conducted by the research team and only consented patients were enrolled in the study. Respondents retained the right to withdraw from the study at any time they felt uncomfortable continuing with it. Patients who were on antimalarial medication by the time of data collection were excluded to avoid the likely confounding effect of the medicine.

Demographics and clinical data collection

A structured and pretested questionnaire was used to collect data on the factors associated with malaria among the primigravidas and independent factors such as religion, levels of education, occupation as well as availability and correct use of a mosquito bed net. Face-to-face interviews were conducted among the respondents to obtain data on their levels of knowledge about malaria, its control and prevention. A history of fever in the past 24 hours was the key clinical presentation of interest.

Sampling technique

A consecutive sampling method was used to recruit 126 primigravidas into the study. The first eligible primigravida attending ANC on the first day of data collection was enrolled, followed by consecutive participants until the required sample size (126) was attained.

Laboratory procedures:

Specimen collection: Finger prick capillary blood samples were collected aseptically from the participants.

Malaria Rapid Diagnostic Test (mRDT)

A drop of blood sample was put in the sample well of a labeled RDT cassette followed by three drops of buffer and the sample was allowed to run for 15-20 minutes for the reaction to occur. The presence of two red lines indicated the presence of malaria antigen (positive result) and one red line at the control window indicated absence of malaria Antigen (negative result). Abbott Bioline[MT] Malaria Ag P.f test kits of sensitivity (99.7%) and specificity (99.5) were used and quality controlled as indicated by the kit manufacturer [9].

Malaria microscopy

Thick and thin smears of each participant were prepared on two different labeled glass slides. Thick and thin blood smears were prepared, processed and stained using Field's stain A and Field's Stain B stains according to the procedures outlined by Monica Cheesbrough [10]. The dried stained smears were examined under a light microscope (Olympus CX 23) using an oil immersion objective lens as was spelt out in the SOPs of Masafu General Hospital Laboratory. Thick smears were used to detect the presence of parasites while thin smears were used for species identification. A WHO certified malaria microscopist was hired to help proofread and validate the results.

Data management and analysis

Malaria in pregnancy was defined as a positive rapid malaria antigen test or blood slide microscopy during ANC visits. Malaria test results and data from questionnaires were cleaned, coded, and entered in the Microsoft Excel, then transferred to STATA software for Logistic regression analysis to determine factors associated with malaria. Bivariate analysis was done to identify variables significantly associated with malaria status (*p<0.05*). Multivariate analysis was further run to adjust for the confounding factors.

RESULTS

Socio-demographic characteristics of participants

The 126 primigravidas studied had age distribution of 13-17, 18-25 and 26-35 years as 30.95%, 61.9%, and 7.14% respectively. Of the 126 primigravidas, 70.63% were married while 29.37% were single, 30.95% were of Catholic faith, 30.16% Anglicans, 22.22% Born agains and 16.67% Muslims. In relation to education levels, 53.97% of them had attained primary, 38.10% secondary, and 7.94% attained tertiary education. By occupation, 50.97% were peasants, 14.29% housewives, 13.49% formally employed, 11.11% farmers, 10.32% businesswomen. By residence, 80.16% lived in the villages 19.84% in town as shown in Table 1.
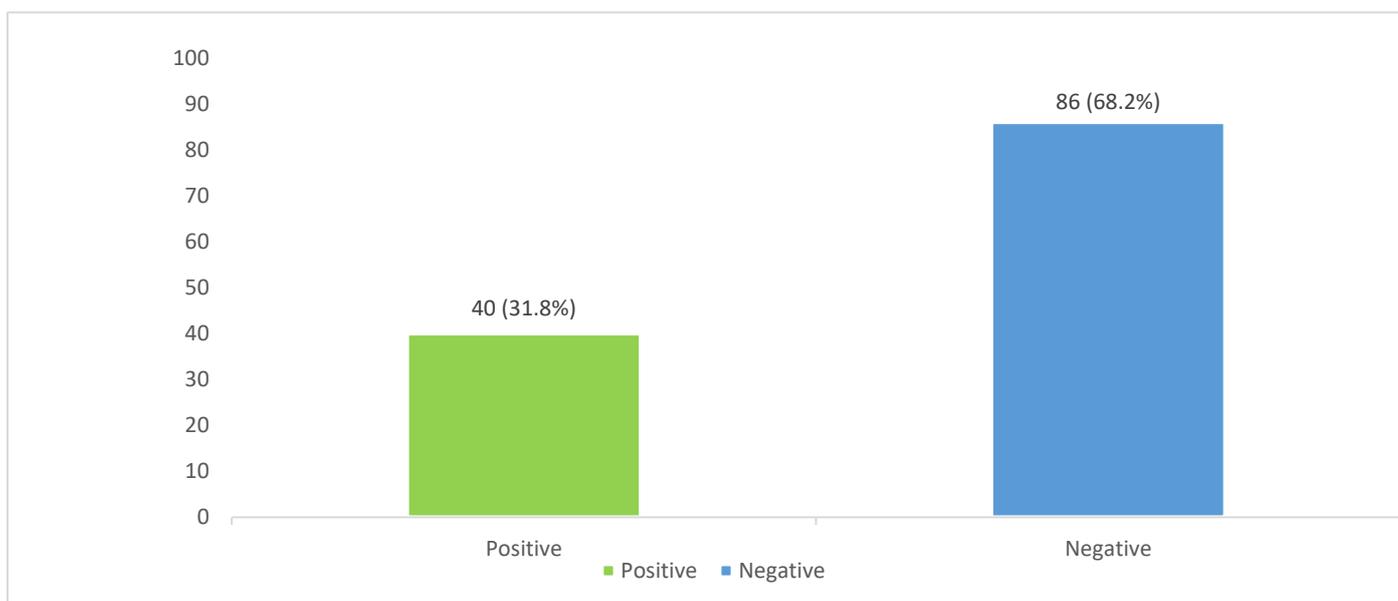
Table 1: Socio-demographic Characteristics of primigravidas

Variable	Category	Frequency (n=126)	Percentage (%)
Age group	13-17	39	30.95
	18-25	78	61.90
	26-35	9	7.15
Religion	Catholic	39	30.95
	Anglican	38	30.16
	Muslim	21	16.67
	Born-again	28	22.22
Marital status	Married	89	70.63
	Single	37	29.37
Level of education	Primary	68	53.97
	Secondary	48	38.10
	Tertiary	10	7.93
Occupation	Peasant	64	50.79
	Housewife	18	14.29
	Employed	17	13.49
	Farmer	14	11.11
	Businesswoman	13	10.32
Place of residence	Town	25	19.84
	Village	101	80.16

Prevalence of malaria among the participants

Among the 126 primigravidas, 31.8% (n=126, 95% CI: 23.6-39.9%)) tested positive for malaria whereas 68.2% were negative.

Figure 1: Prevalence of malaria among primigravidas

Table 2: Malaria distribution among symptomatic and asymptomatic primigravidas

Out of 40 primigravidas, 80% and 20% tested positive for malaria among the symptomatic and asymptomatic categories respectively. The association between symptom status and malaria infection was not statistically significant (X^2 =1.112, *p= 0.3146*).

Primigravidas Category	Positive n=40	Negative n=86	X^2	P-Value
Symptomatic	32(80%)	61(70.9%)	1.0112	0.3146
Asymptomatic	8(20%)	25(29.1%)		

Logistic regression analysis for significant association between factors and malaria status.

By unadjusted analysis, factors significantly associated with malaria were marital status COR=2.44 (95% CI: 1.09-5.44, P=0.029) sleeping under ITNs COR=0.05 (95% CI: 0.02-0.15, p<0.001) , living near mosquito breeding sites COR=6.83 (95% CI: 2.59-17.95, p<0.001), number of trimester COR=0.25 (95% CI: 0.07-0.92, P=0.036), knowing the recommended ANC visit time COR=0.39 (95% CI: 0.18-0.84, P=0.017), and getting health education and talks COR=0.32 (95% CI: 0.14-0.75, P=0.008). The following factors were significantly associated with malaria status upon adjusted model.

- Occupation: Primigravidas who were employed had significantly lower odds of malaria infection, AOR=0.05 (95% CI: 0.00, 0.90) p=0.042 than their counterparts.

- Sleeping under a mosquito net: Mothers who slept under mosquito net were 0.04 times less likely to develop malaria infection, AOR=0.04 (95% CI: 0.01, 0.18) p = 0.001 compared to those who did not. This indicates a greater than 96% reduction in the likelihood of malaria infection among consistent net users.

- Living near mosquito breeding sites: Mothers living near mosquito breeding sites had significantly increased risk of malaria, AOR=6.67 (95% CI: 1.49, 29.96) p=0.013 than those who did not.

- Health education and talks: Those who received health education and talks were significantly less likely to have malaria, AOR=0.19 (95% CI: 0.04, 0.81) P=0.025.

Table 3: Logistic regression analysis for significant association between factors and malaria status.

Variable	Negative n=86(%)	Positive n=40(%)	COR [95% CI]	P-value	AOR [95% CI]	P-value
Age group						
13-17	25(64.10)	14(35.90)	1 Ref		1 Ref	
18-25	56(71.79)	22(28.21)	0.70(0.31, 1.59)	0.396	1.18(0.28, 4.98)	0.824
26-35	5(55.56)	4(44.44)	1.43(0.33, 6.20)	0.634	1.00(0.07, 14.89)	0.995
Religion						
Catholic	25(64.10)	14(35.90)	1 Ref		1 Ref	
Anglican	24(63.16)	14(36.84)	1.04(0.41, 2.64)	0.931	1.20(0.25, 5.87)	0.82
Muslim	17(80.95)	4(19.05)	0.42(0.12, 1.49)	0.181	0.20(0.02, 2.18)	0.186
Born-again	20(71.43)	8(28.57)	0.71(0.25, 2.04)	0.530	0.41(0.07, 2.50)	0.331
Marital status						
Married	66(74.16)	23(25.84)	1 Ref		1 Ref	
Single	20(54.05)	17(45.95)	2.44(1.09, 5.44)	**0.029**	2.07(0.52, 8.31)	0.306
Level of education						
Primary	47(69.12)	21(30.88)	1 Ref		1 Ref	
Secondary	33(68.75)	15(31.25)	1.02(0.46, 2.26)	0.966	1.39(0.27, 7.19)	0.698
Tertiary	6(60.00)	4(40.00)	1.4(0.38, 5.85)	0.566	7.91(2.05, 13.07)	0.194
Occupation						
Peasant	41(64.06)	23(35.94)	1 Ref		1 Ref	
Housewife	10(55.56)	8(44.44)	1.43(0.49, 4.12)	0.512	0.67(0.09, 5.04)	0.695
Employed	15(88.24)	2(11.76)	0.24(0.05, 1.13)	0.071	0.05(0.00, 0.90)	**0.042**
Farmer	11(78.57)	3(21.43)	0.49(0.12, 1.92)	0.304	0.77(0.08, 7.02)	0.815
Businesswoman	9(69.23)	4(30.77)	0.79(0.22, 2.86)	0.722	1.99(0.25, 15.89)	0.513

Variable	Negative n=86(%)	Positive n=40(%)	COR [95% CI]	P-value	AOR [95% CI]	P-value
Place of residence						
Town	19(76.00)	6(24.00)	1 Ref		1 Ref	
Village	67(66.34)	34(33.66)	1.61(0.59, 4.39)	0.356	0.72(0.11, 4.56)	0.726
Knowledge about malaria						
Failed	22(68.75)	10(31.25)	1 Ref		1 Ref	
Passed	64(68.09)	30(31.91)	1.03(0.43, 2.45)	0.944	1.11(0.26, 4.80)	0.891
Sleeping under ITNs						
No	18(35.9)	33(64.71)	1 Ref		1 Ref	
Yes	68(90.67)	7(9.33)	0.05(0.02, 0.15)	**<0.001**	0.04 (0.01, 0.18)	0.001
Utilization of ITNs for other activities						
No	81(69.83)	35(30.17)	1 Ref		1 Ref	
Yes	5(50.00)	5(50.00)	2.31(0.63, 8.50)	0.206	1.70(0.12, 23.51)	0.691
Living near mosquito breeding sites						
No	47(88.68)	6(11.32)	1 Ref		1 Ref	
Yes	39(53.42)	34(46.58)	6.83(2.59, 17.95)	**<0.001**	6.67(1.49, 29.96)	**0.013**
Number of trimesters						
First trimester	15(63.75)	29(36.25)	1 Ref		1 Ref	
Second trimester	14(63.64)	8(36.36)	1.00(0.38, 2.68)	0.992	0.88(0.18, 2.84)	0.871
Third trimester	57(87.50)	3(12.50)	0.25(0.07, 0.92)	**0.036**	0.33(0.04, 21.66)	0.300
Knows recommended ANC visit time						
No	36(58.06)	26(41.94)	1 Ref		1 Ref	
Yes	50(78.13)	14(21.88)	0.39(0.18, 0.84)	**0.017**	0.72(0.18, 2.83)	0.635
Received health education and talks						
No	15(48.39)	16(51.61)	1 Ref		1 Ref	
Yes	71(74.47)	24(25.53)	0.32(0.14, 0.75)	**0.008**	0.19(0.04, 0.81)	**0.025**

*NOTE: * P<0.05 indicates that a variable is significantly associated with malaria status.*

Ref means reference.

Discussion

This study established a prevalence of malaria at 31.8% (N=126) among primigravidas attending Antenatal Care at Masafu General Hospital Busia district, Uganda. Out of 40 malaria-positive participants, 8 (20%) were asymptomatic as they did not report a feeling of fever in 24 hours prior to attending the ANC. The adjusted Logistic regression analysis revealed significantly associated factors such as occupation: Primigravidas who were employed had significantly lower odds of malaria infection, AOR=0.05 (95% CI: 0.00-0.90, p=0.042) than their counterparts, Sleeping under a mosquito net: Mothers who slept under mosquito net were 0.04 times less likely to develop malaria infection, AOR=0.04 (95% CI: 0.01-0.18, p = 0.001) compared to those who did not. Living near mosquito breeding sites: Mothers living near mosquito breeding sites

had significantly increased risk of malaria, AOR=6.67 (95% CI: 1.49-29.96, p=0.013) than those who did not, Health education and talks: Those who received health education and talks were significantly less likely to have malaria, AOR=0.19 (95% CI: 0.04, 0.81) P=0.025.

The observed malaria prevalence of 31.8% in this study is higher than 8.9% to 15% in low transmission areas and lower than 40% to 50% in high transmission settings reported in other studies in Uganda [5]. However, the prevalence in this study is higher than that reported in the previous studies. For instance, 9% by [11] in Mulago National Referral Hospital and 16.28% by [12] in Bududa Hospital in Eastern Uganda.

The difference might have resulted from the degree of environmental sanitation and the infrastructural status due to different study areas, leading to the variations in the level or the degree in malaria transmissions and infections. For instance, in Busia, much rain fall was received during the study period leading to abundant breeding grounds for mosquitoes. Additionally, the higher prevalence in the current study could be attributed to the failure to adhere and utilize the malaria prevention and control measures like sleeping under mosquito nets, taking malaria prophylaxis, and poor access to health care services as compared to those in urban areas.

The findings revealed that primigravidas who slept under mosquito net had significantly decreased odds of developing malaria infection AOR=0.04 (95% CI: 0.01, 0.18) p=0.001. This findings is consistent with the findings of previous studies that were undertaken in western Uganda [13] and in north-west Ethiopia [14] which reported that using mosquito bed nets significantly reduced malaria infection. These associations could be explained by the fact that sleeping under ITNs effectively minimize direct human-mosquito contact and as a result preventing malaria illness which could be caused through mosquito bites. These findings indicated that primigravidas who lived near mosquito breeding sites like stagnant waters, thick bushes and forested areas were more likely to have malaria infection than those who did not AOR=6.67 (95% CI: 1.49, 29.96) p=0.013. This finding was in agreement with the results reported in the previous study done in Nigeria [15]. This suggests that proximity to breeding sites increases the likelihood of mosquito bites and consequently malaria transmission.

According to the findings of this research, getting health education and talks significantly lowered the odds of malaria infection AOR=0.19 (95% CI: 0.04, 0.81) p=0.025. Primigravidas who received health education and talks had less likelihood of being infected with malaria. This result aligns with the findings reported by [2] in Nigeria, which documented that getting a consultation and health education about malaria prevention methods during ANC follow-up significantly reduced the risk of malaria infection among pregnant mothers. This association can be attributed to the fact that health education and talks during ANC equips primigravidas with the knowledge about the malaria prevention and control measure that enables them to stay healthy without being infected with malaria.

The present study revealed that occupation factor was significantly associated with malaria. The primigravidas who were employed had lower odds of getting malaria AOR=0.05 (95% CI: 0.00, 0.90) p=0.042 compared to their counterparts. This indicates that being employed was a protective against malaria infection. This association suggests that being employed may contribute to reduced exposure to malaria risk, possibly due to better living conditions, higher awareness of preventive measures and improved access to health care. However, this study findings differed from the previous study done in Bududa by [12], which documented that being employed is not associated with malaria infection. To the contrary, [7] reported that being a housewife was significantly associated with malaria prevalence in pregnant mothers in Sudan.

About malaria prevalence among symptomatic and asymptomatic primigravidas, the results indicated that malaria infection was more common among symptomatic primigravidas compared to asymptomatic ones. This aligns with the expectation that primigravidas presenting with symptoms such as fever or chills are more likely to have malaria. However, the presence of 20% (8/40) malaria positivity being asymptomatic primigravidas highlights that a notable proportion of infections may occur without clinical signs. The lack of statistical significance (*p = 0.3146*) suggests that symptom status alone cannot reliably predict malaria infection, emphasizing the need for routine screening of primigravidas. Although symptomatic primigravidas had a higher malaria positivity rate, the detection of malaria among asymptomatic primigravidas 20% (8/40) shows that some infections remain unnoticed without testing and not necessarily relying solely on the symptoms and signs.

Conclusions

This study established a prevalence of malaria at 31.8% among primigravidas attending Antenatal Care at Masafu General Hospital Busia district, Uganda. The study revealed 20% asymptomatic malaria infections among primigravidas attending Antenatal Care at Masafu General Hospital Busia district, Uganda. The associated factors were occupation, sleeping under a mosquito net, Living near mosquito breeding sites, as well as limited health education.

Recommendations

All primigravidas should undergo routine malaria testing during antenatal visits regardless of whether they present with symptoms or not.

Comprehensive health education programs should be conducted continuously, focusing on the importance of malaria prevention and control measures.

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