Malaria infection prevalence and associated factors among second and third trimester women attending antenatal care at Ober Health Center IV, Lira City, Uganda

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***Abstract*—Background: Malaria in pregnancy remains a major public health problem in Uganda despite the implementation of preventive interventions such as intermittent preventive treatment in pregnancy (IPTp), insecticide-treated mosquito nets (ITNs), and health education. Pregnant women, particularly those in the second and third trimesters, remain vulnerable to malaria infection and its adverse maternal and fetal outcomes.**

Objective: To determine the prevalence of malaria infection and associated factors among second and third trimester pregnant women attending antenatal care at Ober Health Center IV, Lira City.

Methods: A descriptive cross-sectional study was conducted among 217 pregnant women in the second and third trimesters attending antenatal care at Ober Health Center IV. Data were collected using interviewer-administered questionnaires and review of medical records. Data were analyzed using SPSS version 26. Descriptive statistics summarized participant characteristics, while Chi-square tests were used to determine associations between independent variables and malaria infection at a significance level of $p \leq 0.05$.

Results: The prevalence of malaria infection among pregnant women was 41.5% (90/217). Significant socio-demographic factors associated with malaria infection included age ($p<0.001$), educational level ($p<0.001$), marital status ($p<0.001$), and occupation ($p<0.001$). Health system factors significantly associated with malaria infection were distance to the health facility ($p=0.036$) and means of transport ($p<0.001$). Gestational age was the only significant obstetric factor ($p<0.001$). Community and behavioral factors significantly associated with malaria infection included living near swamps ($p<0.001$), presence of bushes around homes ($p<0.001$), pools of stagnant water around homes ($p<0.001$), use of mosquito repellents ($p<0.001$), and use of herbal mosquito repellents ($p=0.002$).

Conclusion: Malaria prevalence among second and third trimester pregnant women attending antenatal care at Ober Health Center IV was high. Socio-demographic, environmental, health-system, and behavioral factors significantly influenced malaria infection. Strengthened community-based malaria prevention interventions and environmental control measures are recommended.

***Index Terms*—Malaria in pregnancy, prevalence, associated factors, antenatal care, second trimester, third trimester, Uganda.**

I. INTRODUCTION

Malaria remains one of the leading causes of morbidity and mortality globally, particularly in sub-Saharan Africa (WHO, 2021). According to the World Health Organization (WHO), malaria is a life-threatening disease caused by Plasmodium parasites and transmitted through the bites of infected female Anopheles mosquitoes. Pregnant women are among the most vulnerable populations due to reduced immunity during pregnancy, making them more susceptible to malaria infection and its complications (Wylie, 2022)..

Globally, malaria continues to contribute significantly to maternal and neonatal morbidity and mortality (Gontie, Wolde, & Baraki, 2020). In 2022, approximately 12 million pregnant women in sub-Saharan Africa were exposed to malaria infection (Bihoun et al., 2022a). Uganda remains among the countries with the highest malaria burden worldwide and contributes substantially to malaria cases in East Africa (INDEPENDENT, 2021).

Malaria infection during pregnancy is associated with adverse outcomes including maternal anemia, miscarriage, intrauterine growth restriction, low birth weight, preterm delivery, stillbirth, neonatal mortality, and maternal death (Wylie, 2022). Despite Uganda's efforts through the Ministry of Health to implement malaria prevention interventions such as insecticide-treated mosquito nets (ITNs), intermittent preventive treatment in pregnancy (IPTp), indoor residual spraying (IRS), and prompt diagnosis and treatment, malaria continues to affect pregnant women (MOH, 2022).

Previous studies have mainly focused on malaria prevalence in all pregnant women, with limited evidence specifically addressing women in the second and third trimesters. Therefore, this study assessed the prevalence of malaria infection and associated factors among second and third trimester pregnant women attending antenatal care at Ober Health Center IV in Lira City.

II. MATERIALS AND METHODS

Study Design

A descriptive cross-sectional study design employing quantitative methods was used.

Study Area

The study was conducted at Ober Health Center IV, a public health facility located in Lira City West Division, Lira City, Northern Uganda. The facility provides comprehensive maternal and child health services including antenatal care, delivery services, postnatal care, and laboratory services.

Study Population

The study population comprised pregnant women in their second and third trimesters attending antenatal care services at Ober Health Center IV.

Sample Size and Sampling

Using the Krejcie and Morgan sample size determination table, a sample size of 217 participants was obtained from a target population of 500 pregnant women attending antenatal care monthly. Purposive sampling was used to recruit eligible participants.

Data Collection

Data were collected using interviewer-administered structured questionnaires. Information on socio-demographic characteristics, health system factors, obstetric factors, community factors, and behavioral factors was obtained. Malaria infection status was verified through review of antenatal records and laboratory results.

Data Analysis

Data were entered, cleaned, and analyzed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics including frequencies and percentages summarized participant characteristics. Chi-square tests were used to assess associations between independent variables and malaria infection. Statistical significance was considered at $p \leq 0.05$.

Ethical Considerations

Ethical approval was obtained from the Faculty of Health Sciences Research Ethics Committee of Lira University. Permission was obtained from Ober Health Center IV administration. Written informed consent was obtained from all participants before data collection. Confidentiality and anonymity were maintained throughout the study.

III. RESULTS

Socio-Demographic Characteristics

A total of 217 pregnant women participated in the study, yielding a response rate of 100%. Most respondents were aged 20–30 years (52.1%), married (82.5%), had attained primary education (50.7%), and were engaged in business activities (41.9%).

Prevalence of Malaria Infection

Of the 217 respondents, 90 tested positive for malaria parasites, giving an overall malaria prevalence of 41.5%.

Table 1. Prevalence of Malaria Infection

Malaria Status	Frequency (n)	Percentage (%)
Positive	90	41.5
Negative	127	58.5
Total	217	100

Factors Associated with Malaria Infection

Socio-Demographic Factors

Age, educational level, marital status, and occupation were significantly associated with malaria infection ($p<0.05$).

Health System Factors

Distance to the health facility and means of transport significantly influenced malaria infection ($p<0.05$). Women residing more than 2 km from the facility and those walking to the facility were more likely to be infected.

Obstetric Factors

Gestational age was significantly associated with malaria infection ($p<0.001$), with women in the second trimester exhibiting higher infection rates than those in the third trimester.

Community and Behavioral Factors

Living near swamps, presence of bushes around homes, stagnant water around homes, non-use of mosquito repellents, and non-use of herbal mosquito repellents were significantly associated with malaria infection ($p<0.05$).

IV. DISCUSSION

The study revealed a malaria prevalence of 41.5% among second and third trimester pregnant women attending antenatal care at Ober Health Center IV. This prevalence is considerably higher than findings reported in Ethiopia (Y. Tegegne et al., 2019), and, Somalia (Abdirahman Jama, 2021), but is comparable to findings from Busia District in Uganda (Okiring et al., 2019) and studies conducted in Nigeria (Abdirahman Jama, 2022).

The high prevalence may be attributed to favorable environmental conditions for mosquito breeding, inadequate environmental control measures, and varying levels of adherence to malaria prevention practices.

Age was significantly associated with malaria infection, with younger women experiencing higher infection rates. This finding may be explained by relatively lower acquired immunity among younger women compared to older mothers.

Educational level also influenced malaria infection. Women with lower educational attainment had higher infection rates, possibly due to reduced awareness and utilization of malaria prevention strategies.

Gestational age was a significant determinant of malaria infection. Women in the second trimester were more likely to be infected than those in the third trimester. This finding is consistent with studies from Somalia (Abdirahman Jama, 2022) and Bukinafaso (Bihoun *et* al., 2022b).
Environmental factors such as proximity to swamps, stagnant water, and bushes around homes significantly increased the risk of malaria infection because these environments provide breeding sites for mosquitoes.
The use of mosquito repellents demonstrated a protective effect against malaria infection, emphasizing the importance of personal protective measures during pregnancy.

V. CONCLUSION

The prevalence of malaria infection among second and third trimester pregnant women attending antenatal care at Ober Health Center IV was high at 41.5%. Significant factors associated with malaria infection included age, educational level, marital status, occupation, distance to the health facility, means of transport, gestational age, proximity to swamps, presence of bushes and stagnant water around homes, and use of mosquito repellents.
These findings indicate that malaria remains a significant public health challenge among pregnant women in Lira City and requires strengthened prevention and control interventions.

VI. RECOMMENDATIONS

1. The Ministry of Health should strengthen community sensitization programs on malaria prevention during pregnancy.
2. Environmental management interventions should be enhanced to eliminate mosquito breeding sites such as stagnant water, bushes, and swamps around residential areas.
3. Health workers should intensify education on the use of mosquito repellents, insecticide-treated mosquito nets, and adherence to IPTp.
4. Community leaders and non-governmental organizations should collaborate in implementing malaria prevention campaigns targeting pregnant women.
5. Further multicenter studies should be conducted in different health facilities within Lira City and Uganda to generate more representative evidence on malaria in pregnancy.

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