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PREVALENCE OF CONGENITAL MALARIA AND HAEMATOLOGICAL PROFILE OF NEONATES IN SAPELE AND EKU LGA, DELTA STATE.

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Abstract

Congenital Malaria (CM) remains an under-diagnosed cause of neonatal morbidity and mortality in Nigeria despite ongoing malaria control efforts. This study determined the prevalence of congenital malaria and the haematological profile of pregnant women in Delta State, Nigeria. A cross-sectional descriptive design was employed in Eku Baptist Hospital and Gana Primary Health Centre, Sapele. Between April and August 2025, 123 delivery mothers were enrolled (54 from Eku and 69 from Sapele). Cord blood samples were examined for malaria parasites using malaria microscopy, and haematology indices were assessed with XP-300^{TM} automated analyser. The prevalence of congenital malaria was 11.1% in Eku and 10.1% in Sapele. Maternal socio-demographic factors, including age, parity, education, and occupation, showed no significant ($p \leq 0.05$) association with congenital malaria; however, ANC, IPTp uptake and neonatal birth weight were significantly associated in Sapele, while history of malaria during pregnancy was significant in both sites ($p \leq 0.05$). Haemoglobin showed a significant association in both sites ($p \leq 0.05$), with mean of 16.15g/dL ± 1.19 (positives) and 15.41g/dL ± 0.86 (negative) in Eku, and 14.89g/dL ± 0.84 (positives) and 15.50g/dL (negative) in Sapele. Haematocrit was significant only in Sapele ($p \leq 0.05$) with mean of 46.57% ± 3.97 (positive) and 46.94% ± 4.01 (negative). Other haematology indices, including RBC, WBC and platelet counts showed no significant association ($p > 0.05$) with congenital malaria. This study shows that congenital malaria remains a relevant neonatal health

issue in Delta State. Strengthened maternal preventive strategies, and sustained surveillance are recommended.

Keywords: Congenital Malaria, Haematological indices, ANC, IPTp, Delta State.

Introduction

Malaria is a major contributor to maternal mortality, accounting for approximately 11% of maternal deaths in Nigeria affecting between 8.4% and 58.1% of pregnancies, with first and second-time mothers being the most vulnerable (Bello and Ayede 2019; Bassey *et al.,* 2015). Approximately 125 million pregnant women worldwide are at risk of malaria infection annually, with sub-Saharan Africa bearing the highest burden (Bauserman *et al.,* 2019). Diagnosis relies on the detection of Plasmodium parasites using microscopy, rapid diagnostic tests, or molecular methods, with microscopy remaining the gold standard in many endemic settings (Bilal *et al*., 2020; Oyerogba *et al*., 2023). The widespread resistance to older antimalarials has led to the adoption of artemisinin-based combination therapies (ACTs) as first-line treatment, and increase in deployment of long-lasting insecticide-treated nets (ITNs) across sub-Saharan Africa (Kumar *et al*., 2022; Kokori *et al*., 2025).

Congenital malaria remains a significant clinical condition resulting from the transplacental transmission of *Plasmodium* infection (Enweronu-Laryea *et al.,* 2013; Salahiddine *et al.,* 2020). Congenital malaria is typically caused by *P. falciparum* in sub-Saharan Africa, and is transmitted during parturition. It is said to affect 33.7% of people worldwide, with a prevalence of 0–37% in Sub-Saharan Africa and a range of 5.1 - 96.3% in Nigeria (Kajoba *et al.,* 2021; Danwang *et al.,* 2020). This condition poses risks to neonates including fever, anaemia, hepatosplenomegaly, poor feeding, and irritability which may overlap with other neonatal conditions like sepsis, meningitis, and metabolic disorders, complicating diagnosis and risks of misdiagnosis (Heinemann *et al.,* 2020; Venkatesan, 2024; Lopez-Perez *et al.,* 2016). Due to immunological changes that

occur during pregnancy and the special propensity of a fraction of *Plasmodium falciparum* parasites to sequester in the maternal blood compartments of the placenta, disrupting the transfer of oxygen and nutrients to the foetus (Rogerson, 2017; Ding *et al.,* 2023; McDonald *et al.,* 2015; Mehta, 2024). Congenital malaria is diagnosed through cord or peripheral blood smear of a newborn within seven days of life as, but passive immunity can delay symptoms, complicating early diagnosis (Tahirou *et al.,* 2020; Bilal *et al*., 2020; Shah *et al*., 2015).

Despite the regular screening of malaria carried out (WHO 2020; 2024), there have been no recent research or updates on the prevalence of congenital malaria in the past half-decade in Delta State, Nigeria. This will provided present data in understanding the current burden of congenital malaria in the region, which is essential for guiding effective prevention and management strategies. This study investigate prevalence of congenital malaria in Sapele and Ethiope East Local Government Area, Delta State, Nigeria.

Materials and Methods

Study Design and Population

The study used a cross-sectional descriptive design focusing on pregnant women and their neonate 0 to 7 days admitted to the Gana Primary Health Centre, Sapele and Eku Baptist Hospital, Eku, from April 2025 to August 2025. The study population consisted of 123 mothers delivering in Gana Primary Health Centre, Sapele and Eku Baptist Hospital, Eku (regardless of their gestational age) with consent and mothers who witheld consent was excluded. Purposive sampling was used to represent each of the two (2) health facility. Demographic data were collected through questionnaire administered to consenting participants in the study.

Study Area

Delta State, located in the South-South zone of Nigeria, has an estimated population exceeding 7.8 million in 2024 and spans approximately 18,050 km². The state features Central African mangroves in the coastal southwest, lowland forests

covering most area, and a small section Niger Delta swamp forests (Wikipedia). The Gana Primary Health Centre located Sapele with postal code/address of 5.89037 and coordinates: Long 0806-626-3728, Lat 0806-626-3728, is a Primary hospital that operates on a 24-hour basis. Sapele is one of the major urban centres in the oil-producing southern part of Delta State. The health facility has 13 beds providing services such as maternity care, antenatal care, immunisation, infant care, delivery, family planning, etc. The Eku Baptist Hospital, Secondary Health Care Centre with 133 beds providing 24hrs services including Haematology, General Surgery, Antenatal Care (ANC), Immunization, Family Planning, Accidents and Emergency, Maternal and newborn care, Gynecology, an onsite Laboratory, Pharmacy, Ambulance etc. The health care facility is located , Eku, Ethiope East Local Government, Delta State, with coordinates: Long 5.99798, Lat 5.99798.

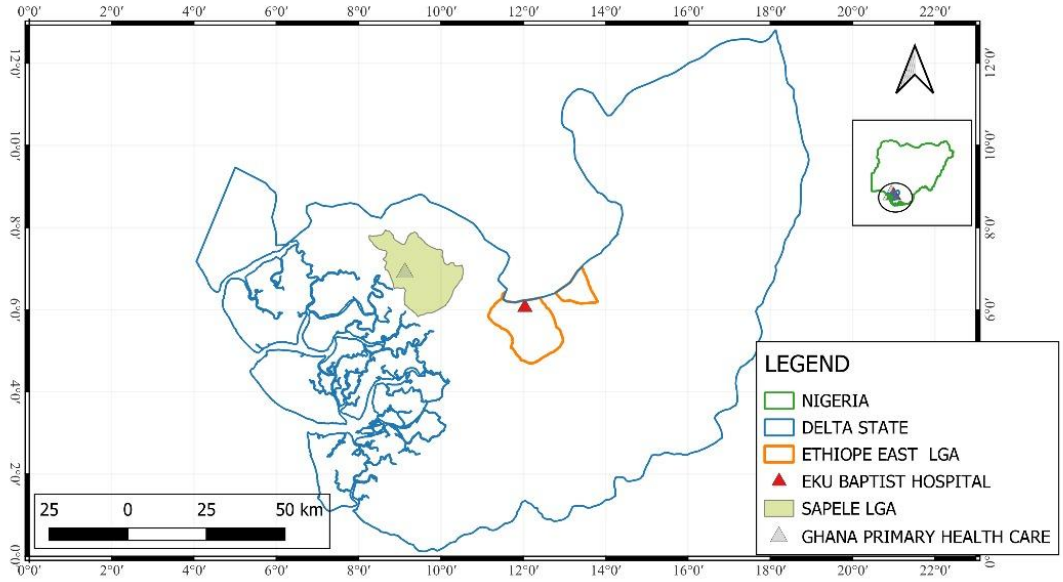

Fig 1. Map of Delta State Showing the location of Sapele and Eku.

Ethical Approval

Ethical clearance for this study was obtained from the Ethics and Research Committee of Delta State University Abraka, Nigeria.

Sample Collection

At delivery, cord blood of 3-4ml were collected immediately after clamping and cutting the cord by the nurse into EDTA bottles, labeled, preserved at 4°C and transported in a cold box to maintain sample integrity.

Laboratory Procedures

Malaria parasites were detected using thick and thin blood films stained with 3% Giemsa for 45-60 minutes for each sample. Slides were examined under an oil immersion objective lens, and parasite density was estimated per 200 WBCs, expressed as parasite /µL of blood, assuming 8,000 WBC/µL following the Malaria Microscopy Standard Operating Procedure – MM-SOP-09 (WHO, 2016). Haematological indices were acessed using the XP-300™ automated haematology analyser

Data Analysis

Data collected were entered and analysed using Microsoft Excel. Descriptive statistics was used to summarise sociodemographic variables. The prevalence of congenital malaria was calculated using the standard prevalence formula. Chi-square test was used to asses association of congenital malaria with risk factors and haematological alteration, with significance set at $p < 0.005$

Results

The prevalence of congenital malaria based on cord blood microscopy was 10.1% (7/69) in Sapele and 11.1% (6/54) in Eku (Fig 1). Although rates are close, the findings indicate that congenital malaria remains a public health concern in both urban (Sapele) and semi-rural (Eku) settings. The comparable rates across both sites suggest that malaria transmission and in utero exposure persist in urban communities with better healthcare access.

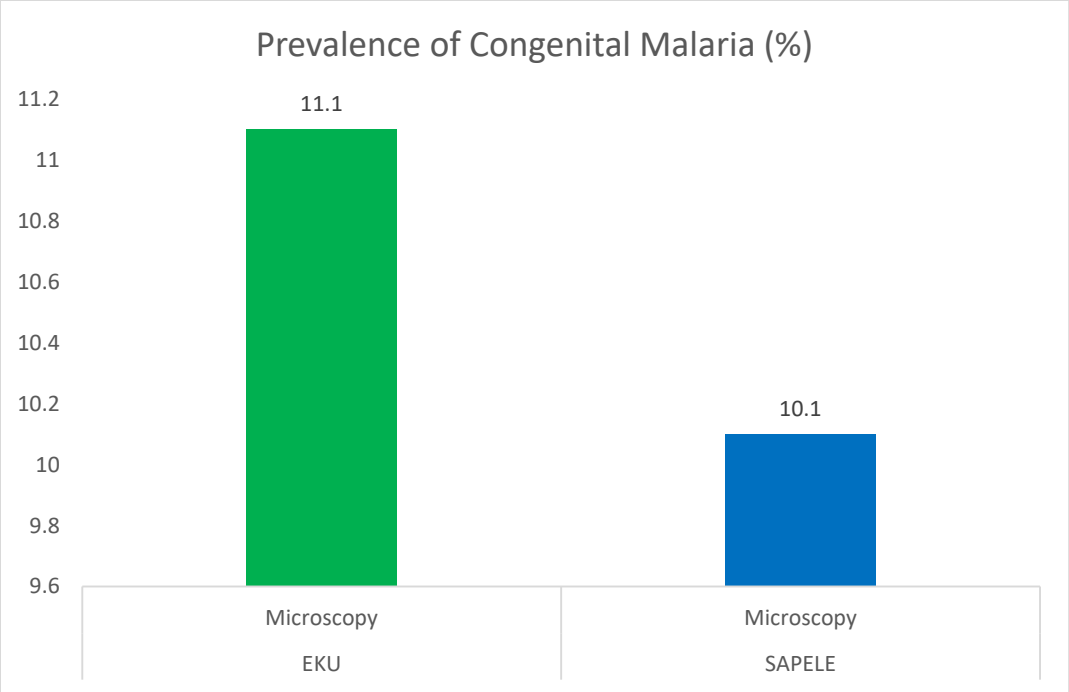

Fig 2. Prevalence of congenital malaria in Sapele and Ethiope East Local Government, Delta State, Nigeria

The epidemiological factors associated with the prevalence of congenital malaria such as maternal age, Education level, occupation, parity, gestational age at delivery, use of preventive measures (ITN, IRS) ANC, IPTp, birth weight and mode of delivery are shown in Table 4.1. There was no significant difference (<0.005) in the prevalence of congenital malaria among the maternal age, Education level, occupation, parity, gestational age, preventive measures, or mode of delivery, although there is a higher likelihood in Sapele than Eku. Malaria prevalence was lower among women who attended ANC, and took IPTp, significant in Sapele ($p \leq 0.05$). Low birth weight of neonates was reported to be 71% of positive cord blood in Sapele ($p \leq 0.05$), and malaria diagnosis during pregnancy was very significant in both communities ($p \leq 0.05$).

Table 1: Risk factors of malaria in pregnancy

		Congenital malaria				Congenital malaria		
Variables	n1 = 54 (%)	Positive, n = 6 (11.1)	Negative, n = 48 (88.9)	*P*-value	n2 = 69 (%)	Positive, n = 7 (10.1)	Negative, n = 62 (89.9)	*P*-value

Maternal age				0.711			0.095
<20	11 (20.4)	1 (16.7)	10 (20.8)		12 (17.4)	1 (14.3)	11 (17.7)
20-29	21 (38.9)	2 (22.3)	19 (39.6)		27 (39.1)	2 (28.6)	25 (40.3)
30-34	13 (24.1)	1 (16.7)	12 (25.0)		17 (24.6)	3 (42.8)	14 (22.6)
≥35	9 (16.7)	2 (22.3)	7 (14.6)		13 (18.8)	1 (14.3)	12 (19.4
Educational level				0.693			0.050
None	6 (11.1)		6 (12.5)		5 (7.2)	1 (14.3)	4 (6.5)
Primary	9 (16.7)		9 (18.8)		14 (20.30		14 (22.6)
Secondary	24 (44.4)	3 (50.0)	21 (43.7)		19 (27.5)	1 (14.3)	18 (29.0)
Tertiary	15 (27.8)	3 (50.0)	12 (25.0)		31 (44.9)	5 (71.4)	26 (41.9)
Occupation				0.892			0.115
Unemployed	6 (11.1)	1 (16.7)	5 (10.4)		4 (5.8)		4 (6.5)
Trader	18 (33.3)	3 (50.0)	15 (31.3)		25 (36.2)	3 (42.8)	22 (35.5)
Skilled worker	13 (24.1)	1 (16.7)	12 (25.0)		18 (26.1)	1 (14.3)	17 (27.4)
Professional	10 (18.5)		10 (20.8)		13 (18.8)	1 (14.3)	12 (19.4
Other	7 (13.0)	1 (16.7)	6 (12.5)		9 (13.0)	2 (28.6)	7 (11.2)
Parity				0.515			0.182
None	12 (22.2)		12 (25.0)		16 (23.2)	1 (14.3)	15 (24.2)
1--2	21 (38.9)	4 (66.7)	17 (35.4)		29 (42.0)	3 (42.8)	26 (41.9)
3--4	16 (29.6)	1 (16.7)	15 (31.3)		18 (26.1)	3 (42.8)	15 (24.2)
>= 5	5 (9.3)	1 (16.7)	4 (8.3)		6 (8.7)		6 (9.7)
Gestational age at delivery				0.836			0.295
Preterm (<37wks)	9 (16.7)		9 (18.8)		5(7.2)		5 (8.1)
Term (37–42wks)	38 (70.4)	5 (83.3)	33 (68.7)		59 (85.5)	6 (85.7)	53 (85.5)
Post-term (>42wks)	7 (12.9)	1 (16.7)	6 (12.5)		5(7.2)	1 (14.3)	4 (6.5)
Attended antenatal care				0.833			0.000*
No	16 (29.6)	2 (22.3)	14 (29.2)		11 (15.9)	5 (71.4)	6 (9.7)
Yes	38 (70.4)	4 (66.7)	34 (70.8)		58 (84.1)	2 (28.6)	56 (90.3)
Number of ANC visits				0.976			0.000*
None	16 (29.6)	2 (22.3)	14 (29.2)		11 (15.9)	5 (71.4)	6 (9.7)
1–3	17 (31.5)	2 (22.3)	15 (31.3)		22 (31.9)	1 (14.3)	21 (33.9)
4–7	8 (14.8)	1 (16.7)	7 (14.6)		26 (37.7)	1 (14.3)	25 (40.3)
8 or more	13 (24.1)	1 (16.7)	12 (25.0)		10 (14.5)		10 (16.1)
Received IPTp				0.545			0.000*
No	18 (33.3)	1 (16.7)	17 (35.4)		8 (11.6)	4 (57.1)	4 (6.5)
Yes	25 (46.3)	4 (66.7)	21 (43.7)		58 (84.1)	2 (28.6)	56 (90.3)
Don't Know	11 (20.4)	1 (16.7)	10 (20.8)		3 (4.3)	1 (14.3)	2 (3.2)
Number of IPTp doses				0.751			0.000*
None	13 (24.1)	1 (16.7)	12 (25.0)		11 (15.9)	5 (71.4)	6 (9.7)

1 dose	10 (18.5)	2 (22.3)	8 (16.7)		24 (34.8)		24 (38.7)	
2 doses	10 (18.5)	1 (16.7)	9 (18.8)		18 (26.1)	2 (28.6)	16 (25.8)	
≥3 doses	10 (18.5)	2 (22.3)	8 (16.7)		10 (14.5)		10 (16.1)	
Not sure	11 (20.4)		11 (22.9)		6 (8.7)		6 (9.7)	
Used insecticide-treated net				0.542				0.140
None	6 (11.1)		6 (12.5)		7 (10.1)	1 (14.3)	6 (9.7)	
Yes	19 (35.2)	2 (22.3)	17 (35.4)		33 (47.8)	2 (28.6)	31 (50.0)	
IRS	13 (24.1)	3 (50.0)	10 (20.8)		20 (29.0)	2 (28.6)	18 (29.0)	
Mosquito coil	16 (29.6)	1 (16.7)	15 (31.3)		9 (13.0)	2 (28.6)	7 (11.2)	
Diagnosed with malaria in pregnancy?				0.049*				0.003*
No	37 (68.5)	2 (22.3)	35 (72.9)		62 (89.8)	4 (57.1)	58 (93.5)	
Yes	17 (31.5)	4 (66.7)	13 (27.1)		7 (10.1)	3 (42.9)	4 (6.5)	
Mode of delivery				0.203				1.000
Vaginal	32 (59.3)	5 (83.3)	27 (56.3)		69 (100)	7 (100)	62 (100)	
Caesarean	22 (40.7)	1 (16.7)	21 (43.7)					
Birth weight				0.343				0.000*
<2.5kg (Low)	4 (7.4)		4 (8.3)		8 (11.6)	5 (71.4)	3 (4.8)	
2.5–3.9kg (Normal)	33 (61.1)	5 (83.3)	28 (58.3)		57(82.6)	2 (28.6)	55 (88.7)	
≥4kg (High)	11 (20.4)	1 (16.7)	10 (20.8)		4 (5.8)		4 (6.5)	

Note: ANC = Antenatal Care, IPTp = Intermittent Preventive Treatment in pregnancy, IRS = Indoor Residual Spraying, n1 = Eku, n2 = Sapele, p-value = statistical significance, Asterisk * = p-values statistically significant

Haematological parameters of cord blood were collected from pregnant women in Eku (n = 54) and Sapele (n = 69). Across both sites most mothers had normal values (Table 4.2). Haemoglobin >14 g/dL for most, with anaemia in 1.9% of Eku and 1.5% of Sapele. Haematocrit was largely >45%, RBC counts >3.5 $\times 10^6$/L, WBC counts >9 $x10^3$/L and platelet counts >150 $x10^3$/L, indicating normal maternal profiles with very few abnormalities. When compared with congenital malaria using Chi-square test (Table 4.2), haemoglobin was significantly associated with congenital malaria in both locations ($p \leq 0.05$) and haematocrit was significant in Sapele ($p \leq 0.05$) only. RBC count, WBC

count, and platelet count showed no significant differences ($p > 0.05$).

Table 2: Haematological profile and its relationship with congenital malaria

	Eku n1 = 54			Sapele n2 = 69		
Parameters	Positive, n = 6 (11.1)	Negative, n = 48 (88.9)	*P-value*	Positive, n = 7 (10.1)	Negative, n = 62 (89.9)	*P-value*
Haemoglobin (g/dL)			0.004*			0.0003*
< 14g/dL				1 (14.3)		
14g/dL	1 (16.7)			1 (14.3)	1 (1.6)	
> 14g/dL	5 (83.3)	48 (100)		5 (71.4)	61 (98.4)	
Haematocrit (%)			0.381			0.0008*
< 45%	1 (16.7)	14 (29.2)		1 (14.3)	19 (30.6)	
45%		2 (4.2)		2 (28.6)	1 (1.6)	
> 45%	5 (83.3)	32 (66.7)		4 (57.1)	42 (67.7)	
Red Blood Cell ($\times 10^6$/L)			1.000			1.000
< 3.5×10^6/L						
3.5×10^6/L						
>3.5×10^6/L	6 (100)	48 (100)		7 (100)	62 (100)	
White Blood Cell (x10^3/L)			1.000			1.000
< 9 x10^3/L						
9 x10^3/L						
> 9 x10^3/L	6 (100)	48 (100)		7 (100)	62 (100)	
Platelet (x10^3/L)			1.000			1.000
< 150 x10^3/L						
150 x10^3/L						
> 150 x10^3/L	6 (100)	48 (100)		7 (100)	62 (100)	

Note: p-value = statistical significance, Asterisk * = p-values statistically significant

Discussion

The prevalence of congenital malaria detected by microscopy in this study was 11.1% in Eku and 10.1% in Sapele (Figure 4.1), indicating a relatively high burden of congenital malaria in both communities. The slightly higher rate in Eku, may reflect differences in malaria endemicity between semi-rural and urban areas (Omidiji *et al.,* 2025). The Sapele prevalence (an urban area), above 10% highlights persistent malaria transmission and potential gaps IPTp and ITN usage. The results are higher than the 0% reported in Lagos (Omidiji *et al.,* 2025), but lower than the 28% observed by Okechukwu *et al. (*2011), faling within the 5.1% - 96.3% range reported in (Kokori *et al.,* 2025).

These findings reinforce a significant burden in Delta State (Bello and Ayede 2019; .Oluwafemi *et al*., 2025)

Most sociodemographic variables, including maternal age, education, occupation, parity, ITNs use and gestational age, were not significantly associated with congenital malaria in either community (Table 1), aligning studies reporting weak or inconsistent links in high endemicity region malaria high high-endemicity regions (Bello and Ayede 2019; Osungbade and Oladunjoye, 2012). ANC, IPTp uptake, and birth weight were significant in Sapele only, suggesting difference in healthcare access between the two locations. Maternal history of malaria during pregnancy was significantly associated with congenital malaria in both site, supporting the role of maternal parasitemia (Omidiji *et al.*, 2025; Saito *et al.*, 2020).

No marked matenal haematological abnormalitieswere observed; anaemia was rare, and most indices were normal recorded (Table 2). This contrast with other studies (Bello and Ayede 2019; Bassey *et al.*, 2015). but may reflect improved preventive practices such as ANC, IPTp, and ITN use (WHO, 2013; 2020). The absence of thrombocytopenia and leucocytosis showed that congenital malaria may be clinically silent (Omidiji *et al.*, 2025). The low anaemia prevalence suggests mitigation of haematological impact through effective preventive strategies (Osungbade and Oladunjoye, 2012; WHO, 2013).

Haemoglobin and haematocrit were the only parameters significantly associated with congenital malaria consistent with studies that noted on impaired maternal–foetal oxygen and nutrient transfer (Bello and Ayede 2019; Bassey *et al.*, 2015). The lack of association with RBC, WBC, and platelet count agrees with some studies, who emphasized minimal haematologial changes in many cases (Omidiji *et al*., 2025; Nwaneli *et al*., 2022). Differences between Sapele and Eku may relate to urban-rural variations in transmission and preventive uptake (WHO, 2020). Haemoglobin and haematocrit appear to be the most sensitive indicators of in-utero

infection and may serve as practical markers for congenital malaria screening in resource limited settings.

Conclusion

This study found prevalence of 11.1% in Eku and 10.1% in Sapele, showing that congenital malaria is still a relevant neonatal health problem in Delta State. Significant associations were observed with antenatal care attendance, uptake of IPTp, history of malaria during pregnancy, and neonatal birth weight. Haemoglobin concentration and haematocrit showed significant associations with congenital malaria. This study underscores the need for routine cord blood screening at delivery, strengthened uptake of IPTp-SP, consistent antenatal care, and improved preventive measures.

Limitation of Study

i. Most mothers did not consent to maternal or neonatal blood collection, leading to a small sample size and limited parasitaemia data.
ii. Early maternal discharge reduced the study,s scope and limited neonatal observation

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References

Bassey, G., Nyengidiki, T. K. and John, C. T. (2015). Prevalence of placenta Plasmodium parasitaemia and pregnancy outcome in asymptomatic patients at delivery in a university teaching hospital in Nigeria. *Nigerian Journal of Clinical Practice*, 18:27-32.

Bauserman, M., Conroy, A.L., North, K., Patterson, J., Bose, C. and Meshnick,

S. (2019). An overview of malaria in pregnancy. Seminars in Perinatology, 43(5):282-290.

Bello, F. A. and Ayede, A. I. (2019). Prevalence of malaria parasitaemia and the use of malaria prevention measures in pregnant women in Ibadan, Nigeria. *Annals of Ibadan Postgraduate Medicine*, 17:124-9.

Bilal, J. A., Malik, E. E., Al-Nafeesah, A. and Adam, I. (2020). Global prevalence of congenital malaria: A systematic review and meta-analysis. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 252: 534-542

Danwang, C., Bigna, J. .J., Nyah, R., Nzalie, T. and Robert, A. (2020). Epidemiology of clinical congenital and neonatal malaria in endemic settings: a systematic review and meta-analysis. *Malaria Journal*, 19(312):1-8.

Ding XC, Incardona S, Serra-Casas E, Charnaud SC, Slater HC, Domingo GJ, Adams ER, Ter Kuile FO, Samuels AM, Kariuki S and Dittrich S (2023). Malaria in pregnancy (MiP) studies assessing the clinical performance of highly sensitive rapid diagnostic tests (HS-RDT) for *Plasmodium falciparum* detection. *Malaria Journal*, 22(1):60.

Enweronu-Laryea, C. C., Adjei, G. O., Mensah, B., Duah, N. and Quashie, N. B. (2013). Prevalence of congenital malaria in high-risk Ghanaian newborns: a cross-sectional study. *Malaria Journal*. 12 (1): 17

Heinemann, M., Phillips, R. O., Vinnemeier, C. D., Rolling, C. C., Tannich, E. and Rolling, T. (2020). High prevalence of asymptomatic malaria infections in adults, Ashanti Region, Ghana, 2018. *Malaria Journal*, 19(1):366.

Kajoba, D., Ivan Egesa, W., Jean Petit, H., Omar Matan, M., Laker, G., Mugowa Waibi, W., and Asiimwe, D. (2021). Congenital Malaria in a 2-Day-Old Neonate: A Case Report and

Literature Review. *Case reports in infectious diseases*, 9960006.

Kokori E., Olatunji G., Ukoaka M. B., Abraham C. I., Komolafe R., Ajekiigbe O. V., Udam G. N., Eneh S., Ezenwoba C., Babalola E. A., Omoworare O. and Aderinto N. (2025). Prevalence, characteristics, and treatment outcome of congenital malaria in Nigeria: a systematic review. *Malaria Journal*, 24**:**24

Kumar, M.., Saadaoui, M. and Al, K.S. (2022). Infections and pregnancy: effects on maternal and child health. *Frontiers in Cellular and Infection Microbiology*, **12**: 873253.

Lopez-Perez M., Pacheco M. A., Buriticá L., Escalante A. A., Herrera S. and ArévaloHerrera, M. (2016). Malaria in pregnancy: a passive surveillance study of pregnant women in low transmission areas of Colombia, Latin America. *Malaria Journal*, 15:66

McDonald, C. R., Tran, V. and Kain, K. C. (2015). Complement activation in placental malaria. *Frontiers in Microbiology*, 6.

Mehta N. P. (2024). Pediatric malaria clinical presentation: history, physical examination. *medscape.*

Mohan, K., Mr, B. J., Singh, R.D., Maithani, M. M. and Chaurais, R. N. (2016). The clinico-hematological features and management outcome in neonatal malaria: a nine years analysis from North India. *Current Pediatric Reviews,* 12:286-291.

Nwaneli, E. I., Nri-Ezedi, C. A., Okeke, K. N., Edokwe, E. S., Echendu, S. T. and Iloh, K. K. (2022). Congenital cerebral malaria: a masquerader in a neonate. *Malaria Journal*, 21(1):34.

Okechukwu, A. A., Olateju, E. K. and Olutunde, E.O. (2011). Congenital Malaria Among Newborns Admitted for Suspected Neonatal Sepsis in Abuja. *Nigerian Journal of Paediatrics*, 38.

Oluwafemi, O. R., Folarin, J. B., Bello, O.E. and Irinyenikan, A.T. (2025).

Asymptomatic congenital malaria among neonates of mothers attending antenatal clinic in University of Medical Sciences Teaching Hospital, Akure. *International Journal of Advances in Medicine*, 12(4):350-355

Omidiji, O. M., Lesi, A. E. F., Esezobor, I. C., Fajolu, B.I., Oyibo, A. W. and Daramola, A. (2025). Prevalence of congenital malaria in an urban and a semi rural area in Lagos: a two-centre cross-sectional study. *Scientific Reports*, 15:10709

Osungbade, K..O. and Oladunjoye, O.O. (2012). Prevention of congenital transmission of malaria in sub-saharan african countries: challenges and implications for health system strengthening. *Journal of tropical medicine*, 2012: 648456.

Oyerogba, O. P., Adedapo, A., Awokson, T., Odukogbe, A. T. and Aderinto, N.O. (2023). Prevalence of malaria parasitaemia among pregnant women at booking in Nigeria. *Health Science Reports*, 6: e1337.

Rogerson, S. J. (2017). Management of malaria in pregnancy. *Indian Journal of Medical Research*, 146(3):328-333.

Saito, M., Briand, V., Min, A. M. and McGready, R. (2020). Deleterious effects of malaria in pregnancy on the developing fetus: a review on prevention and treatment with antimalarial drugs. *Lancet Child and Adolescent Health*, 4:761-774.

Salahiddine, S., Mounir, M., Jaouad, K., Naoufal, A., Rachid, A. and Aomar, A. (2020). What about the treatment of asymptomatic form of congenital malaria: case report and review of the literature. *Pan African Medical Journal*, 35: 116.

Shah, S. A., Ahmed, Z., Lodhi, M. A. and Malik, N.A..(2015) Congenital malaria. *Journal of Ayub Medical College Abbottabad*, 27:721-2.

Tahirou, I., Zara, M. O., Moustapha, M. L., Kamayé, M., Mahamadou, D., Ibrahim, A., Daou, M., Soumana, A. and Ibrahim, M.L. (2020). Congenital

malaria and its associated factors at Issaka Gazobi maternity of Niamey in Niger. *International Journal of Pediatrics*, 2020:7802560.

Venkatesan, P. (2024). The 2023 WHO World malaria report. *Lancet Microbe*, 5(3): e214.

WHO (2013). Policy brief for the implementation of intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP). *Geneva: World Health Organization*.

WHO (2016). Malaria parasite counting. *World Health Organization*.

WHO (2020). World malaria report. *Geneva: World Health Organization*.

WHO (2024). World malaria report 2024. *Word Health Organization*

Wikipedia contributors (2024). Sapele, Nigeria: Revision history. *Wikipedia, The Free Encyclopedia*