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Research Article

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Socio-Demographic Factors Responsible for Uptake of Intermittent Preventive Treatment and Health Seeking Behaviours for Malaria in Pregnancy among Women of Reproductive Ages in Nigeria

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Factors Influencing Malaria in Pregnancy in Nigerian Women

Abstract

Introduction: Malaria in pregnancy is a serious public health concern that could result in detrimental health outcomes for pregnant women and their foetuses. In Nigeria, there is still a significant risk of the disease epidemic and adverse effects especially in pregnancy. The aim of this study is to assess the socio-demographic factors associated with Intermittent Preventive Treatment and health seeking behaviours for malaria in pregnancy among women of reproductive ages in Nigeria

Methods: Using the National Demographic Survey (NDHS) 2018 data, a cross sectional study was conducted to assess socio-demographic factors associated with Intermittent Preventive Treatment (IPT) for Malaria among Nigerian women of reproductive ages.

Result: Majority were between ages 30-39 years (39.5%), married/cohabiting (91.8%), Muslims (59.5%), from the north (68.9%), uneducated (49.9%), poor (47.5%), and grand parous (65.7%). 63.4% of the women had taken fansidar for malaria in pregnancy while only 6.1% had received healthcare for malaria from informal sources. Except for marital status, all socio-demographic variables (regions, highest educational level, wealth index, age group, religion and parity) were significantly associated with intake of IPT. Additionally, region, education, wealth index, age group, marital status and religion were associated with health

seeking behaviour for malaria in pregnancy (*P<.05*).

After control for other variables, wealth index, highest educational level, married/cohabiting marital status and religion was significantly associated with intake of IPT while region, primary and secondary education, poorer and richest wealth index, widowed/separation influenced health seeking for malaria in pregnancy (P<.05).

Conclusion: The National Malaria Elimination programme should evaluate existing policies that develop interventions that are centred on high risk population in order to prevent malaria in pregnancy while improving health seeking behaviours of women of reproductive ages.

Introduction

Malaria has been identified as one of the most severe public health problems globally [1]. It is a threat to about 40% of the world's population and characterised with recurrent and repeatedly large scale epidemics [2]. The economic burden of malaria remains high with an estimated US$ 12 billion spent annually for prevention and treatment and about 25% of household income spent on treatment [3].

This disease remains one of the main causes of mortality and morbidity especially in Sub –Saharan Africa. Africa accounts for the highest burden of malaria with 95% of all cases and 96% of the deaths occurring globally [3]. Additionally, the burden of malaria is greatest in Nigeria and as a result, Nigeria accounted for the largest proportion (25%) of cases which is equivalent to 84 million cases [4]. Nigeria also accounted for 24% of the global mortality among the 19 countries with 85% of the global burden [4].

Although malaria affects all Nigerians, children and pregnant women have been found to be at higher risk of severe malaria infection and mortalities. In 2018, about 39% of the 11 million malaria cases among pregnant women occurred in Nigeria [4]. While this disease increases the risk of birth complications and mortalities among pregnant women, there are evidence of malaria in pregnancy leading to low birth weight, anaemia and other health impacts on children born to malaria infected mothers [5].

In Nigeria, malaria accounts for 60 % of all Out-patient visits to hospitals, 11 % maternal mortality and 30 % child mortality [6]. As a result, over 200,000 deaths was recorded which resulted in about 31.9% of the 627,000 deaths that occurred due to malaria in 2020 [7]. Malaria in pregnancy is a serious public health concern that could result in detrimental health outcomes for pregnant women and their foetuses. As a result, strategies have been adopted to prevent the occurrence of malaria in pregnancy. Intermittent Preventive Treatment (IPT) for malaria has been recommended by World Health Organization (WHO) which includes the intake of sulfadoxine-pyrimethamine (SP) at least 3 times during the course of pregnancy [8].

Despite the numerous programmes that have been implemented to mitigate the risk of malaria in Nigeria, there is still a significant risk of the disease epidemic and adverse effects especially in pregnancy. Considering that the malaria is epidemic and occurs throughout the year, there are limited population based studies assessing certain socio-demographic factors that influences individual as well as community risks for the disease. With pregnant women being at risk of malaria during pregnancy and poor health outcomes, it is important that studies are conducted to assess these risks and improve access to preventive care for this high risk population. The aim of this study is to assess the socio-demographic factors associated with uptake of IPT among pregnant women in Nigeria. This will be achieved through the following objectives;

- To assess the uptake of IPT among pregnant women in Nigeria
- To determine socio-demographic factors associated with uptake of IPT for prevention of malaria in pregnancy
- To determine socio-demographic factors associated with health seeking behaviours for malaria in pregnancy

Methods

Study Design

A cross sectional study was conducted to assess socio-demographic factors associated with the uptake of IPT during malaria in pregnancy among women of reproductive ages in Nigeria.

Study Setting

Nigeria is the most densely populated country in Africa. Occupying a land area of about 910,770 km^2, the Nigerian population was estimated at 196,000,000 inhabitants in 2018 [9, 10]. Nigeria is divided into 36 states including the Federal Capital Territory which is divided into 6 geopolitical zones including North-central, North West, North-East, South- West, South-East and South-South Respectively. The Nigerian population is made up of over 250 ethnic groups and 52% of the population occupying the urban region [11]. In Nigeria, malaria is the most endemic infectious diseases with 76% of the population at risk of one infection annually [12]. The Nigerian climate is tropical with majorly rainy and dry seasonal conditions of which the rainy season gives rise to increase in the density of mosquitoes and the resultant increase in vector borne diseases including malaria. The prevention and control of malaria is primarily coordinated by the Federal Ministry of Health which collaborates with other implementing partners through the National Malaria Elimination Programme [13]. This programme ensures malaria prevention measures, diagnosis and treatment, through the provision of infrastructures, technical expertise that are targeted at strengthening of coordination of stakeholders for effective implementation of malaria programmes in Nigeria.

Data Source and Sampling

The study utilized 2018 NDHS data of women of reproductive ages in Nigeria. This survey was conducted using a multi-stage random sampling of the 6 geo-political zones in Nigeria. This includes a stratification of households as urban-rural in all states followed by the mapping and documentation of households and cluster random sampling of households. All women aged 15-49 years within the selected clusters were recruited and included into the survey. With 99% response rate, a total of 41,821 women aged 15-49 years from 40,427 households were interviewed in 2018.

Data Collection and Study Variables

The 2018 NDHS survey was presented in an excel spreadsheet. From the 2018 NDHS data, information such as socio-demography, socio-economic status, incidence of malaria in pregnancy, and uptake of IPT for malaria in pregnancy were retrieved and transcribed in to statistical software SPSS version 24 for data cleaning and coding. Outcome variables for this study were presented as self-reported maternal malaria in pregnancy and uptake of IPT for malaria in pregnancy. Intake of fansidar for malaria in pregnancy was defined as either yes or no. Health seeking for malaria in pregnancy was also categorized as either formal or informal. Formal health seeking was defined as receiving healthcare from a healthcare treatment facility while informal was defined as receiving healthcare from a place other than a healthcare treatment facility.

Data Analysis

Statistical analysis was conducted using statistical software SPSS version 24. Descriptive statistics were presented in frequency and percentages while continuous variables were presented in mean and standard deviation. In this study, Chi-squared analysis was used to determine association between socio-demographic variables and outcome variables (intake of fansidar for malaria in pregnancy, health seeking for malaria in pregnancy) while logistic regression analysis was conducted to determine the strength of association between predictor and outcome variables.

Results

Table 1 presents the descriptive statistics of women of reproductive ages (15-49 years) in Nigeria. As indicated in Table 1, majority were between ages 30-39 years (39.5%) and 40-49 years (37.8%) compared to only 0.7% of women that were between ages <18 years. Also, 91.8% of the women were married or cohabiting while only ≤ 5% were either widowed or separated. Islam was

Table 1. Descriptive Statistics of Women of Reproductive Ages in Nigeria

S/No	Variables	Frequency	Percent	Valid Percent
1.	Age Group			
	<18 years	889	0.7	0.7
	19-29 years	28115	22.0	22.0
	30-39 years	50358	39.5	39.5
	40-49 years	3300	37.8	37.8
2.	Marital Status			
	Never in union	1581	1.2	1.2
	Married/Cohabiting	117150	91.8	91.8
	Widowed	5569	4.4	4.4
	Divorced/Separated	3245	2.5	2.5
3.	Religion			
	Christianity	50451	39.6	39.6
	Islam	75942	59.5	59.5
	Traditional	677	0.5	0.5
	Others	475	0.4	0.4
4.	Geo-Political Zone			
	North Central	21656	17.0	17.0
	North East	26293	20.6	20.6
	North West	39928	31.3	31.3
	South East	14072	11.0	11.0
	South South	12436	9.8	9.8
	South West	13169	10.3	10.3
5.	Highest Educational Level			
	None	63699	49.9	49.9
	Primary	25311	19.8	19.8
	Secondary	30756	24.1	24.1
	Higher	7779	6.1	6.1
6.	Wealth Index			
	Poorest	31148	24.4	24.4
	Poorer	29448	23.1	23.1
	Middle	27120	21.3	21.3
	Richer	23210	18.2	18.2
	Richest	16619	13.0	13.0
7.	Parity			
	Low	14167	11.1	11.1
	Multi	29545	23.2	23.2
	Grand	83833	65.7	65.7
8.	Presentation of self-reported symptoms of febrile illness			
	No	13705	10.7	63.4
	Yes	7916	6.2	36.6
	Missing	105924	83.0	
9.	Health Seeking Behaviour for self-reported symptoms of febrile illness			
	Formal	12,874	10.1	93.9
	Informal	831	0.7	6.1
	Missing	113840	89.3	

Table 2. Chi-Squared Analysis Assessing the Association between Socio-Demographic Variables and Intake of Intermittent Preventive Treatment During Malaria in Pregnancy among Women of Reproductive Ages

S/No	Variable	Took Intermittent Preventive Treatment for Malaria During Pregnancy			$X^2(df)$	*P-Value*
		No	Yes	Total		
1.	Region of Residence				452.31(1)	.000
	Urban	2075(27.2)	5559(72.8)	7634(35.3)		
	Rural	5841(41.8)	8146(58.2)	13987(64.7)		
2.	Highest Educational Level				1212.76(3)	.000
	None	4636(48.8)	4862(51.2)	9498(43.9)		
	Primary	1141(33.8)	2232(66.2)	3373(15.6)		
	Secondary	1811(26.0)	5162(74.0)	6973(32.3)		
	Higher	328(18.5)	1449(81.5)	1777(8.2)		
3.	Wealth Index				1372.83(4)	.000
	Poorest	2639(52.7)	2368(47.3)	5007(23.2)		
	Poorer	2179(44.8)	2686(55.2)	4865(22.5)		
	Middle	1477(32.5)	3072(67,5)	4549(21.0)		
	Richer	996(25.0)	2990(75.0)	3986(18.4)		
	Richest	625(19.4)	2589(80.6)	3214(14.9)		
4.	Age Group				43.56(3)	.000
	<18 years	364(46.7)	415(53.3)	779(3.6)		
	19-29 years	3723(36.7)	6431(63.3)	10154(47.0)		
	30-39 years	2893(35.2)	5330(64.8)	8223(38.0)		
	40-49 years	936(38.0)	1529(62.0)	2465(11.4)		
5.	Marital Status				5.72(3)	.126
	Never in union	222(37.0)	378(63.0)	600(2.8)		
	Married/cohabiting	7438(36.7)	12821(63.3)	20259(93.7)		
	Widowed	102(37.4)	171(62.6)	273(1.3)		
	Divorced/Separated	154(31.5)	335(68.5)	489(2.3)		
6.	Religion				269.76(3)	.000
	Christianity	2653(30.1)	6148(69.9)	8801(40.7)		
	Islam	5191(41.1)	7454(58.9)	12645(58.5)		
	Traditional	25(34.7)	47(65.3)	72(0.3)		
	Others	47(45.6)	56(54.4)	103(0.5)		
7.	Parity				84.20(2)	.000
	Low	2588(34.8)	4840(65.2)	7428(34.4)		
	Multi	2083(33.7)	4095(66.3)	6178(28.6)		
	Grand	3245(40.5)	4770(59.5)	8015(37.1)		

Note: X^2: Chi squared value, *P value*: level of significance, *df*: degree of freedom, S/No: Serial number

Table 3. Chi-Squared Analysis Assessing the Association between Socio-Demographic Variables and Health Seeking Behaviours of Women Diagnosed with Malaria in Pregnancy

S/No	Variable	Health Seeking Behaviour of Women of Reproductive Ages Diagnosed with Malaria in Pregnancy			$X^2(df)$	*P-Value*
		Formal	Informal	Total		
1.	Region of Residence				63.21(1)	.000
	Urban	5331(95.9)	228(4.1)	5559(40.6)		
	Rural	7543(92.6)	603(7.4)	8146(59.4)		
2.	Highest Educational Level				144.42(3)	.000
	None	4414(90.8)	448(9.2)	4862(35.5)		
	Primary	2110(94.5)	122(5.5)	2232(16.3)		
	Secondary	4938(95.7)	224(4.3)	5162(37.7)		
	Higher	1412(97.4)	37(2.6)	1449(10.6)		
3.	Wealth Index				188.28(4)	.000
	Poorest	2092(88.3)	276(11.7)	2368(17.3)		
	Poorer	2509(93.4)	177(6.6)	2686(19.6)		
	Middle	2917(95.0)	155(5.0)	3072(22.4)		
	Richer	2843(95.1)	147(4.9)	2990(21.8)		
	Richest	2513(97.1)	76(2.9)	2589(18.9)		
4.	Age Group				17.61(3)	.001
	<18 years	380(91.6)	35(8.4)	415(3.0)		
	19-29 years	6008(93.4)	423(6.6)	6432(46.9)		
	30-39 years	5060(94.9)	270(5.1)	5330(38.9)		
	40-49 years	1426(93.3)	103(6.7)	1529(11.2)		
5.	Marital Status				14.01(3)	.003
	Never in union	342(90.5)	36(9.5)	378(2.8)		
	Married/cohabiting	12064(94.1)	757(5.9)	12821(93.5)		
	Widowed	163(95.3)	8(4.7)	171(1.2)		
	Divorced/Separated	305(91.0)	30(9.0)	335(2.4)		
6.	Religion				50l.04(3)	.000
	Christianity	5868(95.4)	280(4.6)	6148(44.9)		
	Islam	6910(92.7)	544(7.3)	7454(54.4)		
	Traditional	41(87.2)	6912.8)	47(0.3)		
	Others	55(98.2)	1(1.8)	56(0.4)		
7.	Parity				3.85(2)	.146
	Low	4564(94.3)	276(5.7)	4840(35.3)		
	Multi	3855(94.1)	240(5.9)	4095(29.9)		
	Grand	4455(93.4)	315(6.6)	4770(34.8)		

Note: X^2: Chi squared value, *P value*: level of significance, *df*: degree of freedom, S/No: Serial number

Table 4. Relationship between Socio-Demographic Variables and Intake of Intermittent Preventive Treatment for Malaria in Pregnancy among Women of Reproductive Ages

Variable	Took Intermittent Preventive Treatment for Malaria During Pregnancy			
Socio-demography	OR (95% CI)	*P-Value*	AOR (95% CI)	*P-Value*
Region of Residence				
Urban	Ref	Ref	Ref	Ref
Rural	0.52(0.49-0.55)	.000	0.97(0.91-1.05)	.487
Highest Educational Level				
None	Ref	Ref	Ref	Ref
Primary	4.21(3.71-4.78)	.000	2.43(2.07-2.84)	.000
Secondary	2.26(1.96-2.60)	.000	1.52(1.30-1.7)	.000
Higher	1.55(1.40-1.77)	.000	1.22(1.06-1.41)	.005
Wealth Index				
Poorest	Ref	Ref	Ref	Ref
Poorer	4.62(4.16-5.12)	.000	2.72(2.38-3.11)	.000
Middle	3.36(3.03-3.73)	.000	2.18 (1.92-2.49)	.000
Richer	1.99(1.79-2.22)	.000	1.50(1.33-1.69)	.000
Richest	1.38(1.23-1.55)	.000	1.19(1.06-1.35)	.004
Age Group				
<18 years	Ref	Ref	Ref	Ref
19-29 years	1.43(1.22-1.69)	.000	1.12(0.93-1.36)	.232
30-39 years	0.95(0.86-1.04)	.228	1.01(0.90-1.13)	.836
40-49 years	0.89(0.81-0.97)	.011	1.04(0.94-1.15)	.459
Marital Status				
Never in union	Ref	Ref	Ref	Ref
Married/cohabiting	1.28(0.99-1.65)	.057	1.39(1.07-1.81)	.014
Widowed	1.26(1.04-1.53)	.018	1.11(0.91-1.36)	.307
Divorced/Separated	1.30(0.95-1.77)	.100	1.23(0.89-1.70)	.207
Religion				
Christianity	Ref	Ref	Ref	Ref
Islam	0.51(0.35-0.76)	.001	0.45(0.30-0.67)	.000
Traditional	0.83(0.56-1.23)	.347	0.39(0.26-0.58)	.000
Others	0.63(0.34-1.18)	.150	0.26(0.14-0.48)	.000
Parity				
Low	Ref		Ref	Ref
Multi	0.79(0.74-0.84)	.000	1.05(0.96-1.16)	.278
Grand	0.75(0.70-0.80)	.000	0.96(0.88-1.04)	.286

Note: OR: Odds ratio, AOR: Adjusted odds ratio, *P value*: level of significance, CI: confidence interval, S/No: Serial number

Table 5. Relationship between Socio-demographic Variables and Health Seeking Behaviour of Women of Reproductive Ages Diagnosed with Malaria in Pregnancy

Variable	Health Seeking Behaviour of Women of Reproductive Ages Diagnosed with Malaria in Pregnancy			
Socio-demography	OR (95% CI)	*P-Value*	AOR (95% CI)	*P-Value*
Region of Residence				
Urban	Ref	Ref	Ref	Ref
Rural	0.54(0.46-0.63)	.000	0.80(0.67-0.97)	.019
Highest Educational Level				
None	Ref	Ref	Ref	Ref
Primary	3.87(2.76-5.45)	.000	2.17(1.44-3.27)	.000
Secondary	2.21(1.52-3.21)	.000	1.52(1.01-2.30)	.045
Higher	1.73(1.22-2.46)	.002	1.34(0.92-1.94)	.125
Wealth Index				
Poorest	Ref	Ref	Ref	Ref
Poorer	4.36(3.36-5.66)	.000	2.22(1.59-3.09)	.000
Middle	2.33(1.77-3.07)	.000	1.31(0.94-1.82)	.114
Richer	1.76(1.33-2.32)	.000	1.18(0.86-1.61)	.312
Richest	1.71(1.29-2.27)	.000	1.36(1.01-1.83)	.041
Age Group				
<18 years	Ref	Ref	Ref	Ref
19-29 years	1.28(0.86-1.90)	.233	1.03(0.65-1.64)	.889
30-39 years	0.98(0.78-1.22)	.822	1.00(0.76-1.31)	.971
40-49 years	0.74(0.58-0.93)	.011	0.82(0.64-1.04)	.106
Marital Status				
Never in union	Ref	Ref	Ref	Ref
Married/cohabiting	1.07(0.64-1.78)	.794	1.31(0.77-2.20)	.318
Widowed	0.64(0.44-0.94)	.021	0.57(0.39-0.84)	.004
Divorced/Separated	0.50(0.22-1.11)	.090	0.51(0.23-1.15)	.102
Religion				
Christianity	Ref	Ref	Ref	Ref
Islam	2.62(0.36-19.03)	.340	2.72(0.37-19.91)	.324
Traditional	4.33(0.60-31.35)	.147	2.98(0.41-21.90)	.283
Others	8.05(0.93-69.46)	.058	4.96(0.56-43.57)	.149
Parity				
Low	Ref		Ref	Ref
Multi	0.86(0.72-1.01)	.066	0.95(0.75-1.20)	.660
Grand	0.88(0.74-1.05)	.150	1.05(0.85-1.28)	.676

Note: OR: Odds ratio, AOR: Adjusted odds ratio, *P value*: level of significance, CI: confidence interval, S/No: Serial number

the most practiced religion and accounted for 59.5% of the religion practiced by women of reproductive ages while 39.6% were Christians and <1% practicing traditional or other religion. Majority of the study participants were located in the north where 31.3% were from the north-west, 20.6% and 17.0%from the north-east and north-central respectively. The south-east account for 11.0% of the population while <11% were found in the south-south and south-west. About 49.9% of the population were uneducated compared to only 6.1% of the population that had acquired a higher level of education. In addition, there were declining proportions of women from poorest to richest wealth index as majority of the population were either in the poorest (24.4%), poorer (23.1%) and middle (21.3%) while the richest accounted for only 13.0% of the population. Also majority were either grandparous (65.7%) or multiparous (23.2%) compared to only 11.1% that had low parity.

In this population, 63.4% of the women of reproductive ages had taken fansidar for malaria in pregnancy while only 6.1% had received healthcare for malaria from informal sources.

Table 2 represents the chi-squared analysis to assess the association between socio-demographic variables and initiation of IPT for malaria in pregnancy. As indicated in table 2, there was a statistically significant association between region of residence and intake of IPT for malaria in pregnancy among women of reproductive ages (X^2=452.31, *P:.000*). Similarly, educational level (X^2=1212.76, *P:.000*), wealth index (X^2=1372.83, *P:.000*) and age group (X^2=43.56, *P:.000*) of women were significantly associated with intake of IPT intake for malaria in pregnancy among women of reproductive ages. Also, religion (X^2=269.76, *P;.000*) and parity (X^2=84.20, *P:.000*) were significantly associated with IPT intake for malaria in pregnancy among women of reproductive ages. However, marital status was no significantly associated with intake of IPT for malaria in pregnancy (X^2=5.72, *P:.126*).

As represented in Table 3 below, there was a statistically significant association between region of residence and health seeking behaviour for malaria among women of reproductive ages (X^2=63.21, *P;.000*). Similarly, educational level (X^2=144.42, *P;.000*), wealth index (X^2=188.28, *P;.000*) and age group (X^2=17.61, *P;.001*) of women were significantly associated with health seeking behaviour for malaria in pregnancy among women of reproductive ages. Also, marital status (X^2=14.01, *P;.003*) and religion (X^2=501.04, *P;.000*) were associated with health seeking for malaria in pregnancy among women of reproductive ages. However, parity (X^2=3.85, *P; .146*) was not significantly associated with health seeking for malaria in pregnancy among women of reproductive ages.

Table 4 represent the summary of statistics assessing the relationship between socio-demographic variables and intake of IPT for malaria in pregnancy among women of reproductive ages. The logistic regression model was statistically significant (*P<.001*). As represented in table 4, rural residents had 97% reduced likelihood of taking IPT for malaria in pregnancy compared to urban women [AOR = 0.97 (CI: 0.91-1.05), *P>.05*]. Adjusted odds ratio revealed increased odds of taking IPT for malaria during pregnancy among women of reproductive ages that had primary [AOR = 2.43 (CI: 2.07-2.84), P<.05], secondary [AOR = 1.50 (CI: 1.30-1.70), P<.05] and higher education [AOR = 1.22 (CI: 1.06-1.41), P<.05].

All wealth index categories were significant associated with increased likelihood of taking IPT for malaria in pregnancy including poorer [AOR = 2.72 (CI: 2.38-3.11), *P<.05*], middle [AOR = 2.18 (CI: 1.92-2.49), *P<.05*], richer [AOR = 1.50 (CI: 1.33-1.69), *P<.05*] and richest [AOR = 1.19 (CI: 1.06-1.35), *P<.05*]. On the other hand, the odds of taking fansidar for malaria in pregnancy were insignificant among the different age groups (*P>.05*). Married/cohabiting [AOR = 1.39 (CI: 1.07-1.81), *P<.05*] women were more likely than women that were never in a union to take IPT for malaria in pregnancy. Similarly, Muslim women [AOR = 0.45 (CI: 0.30-0.67), *P<.05*], traditional women [AOR = 0.39 (CI: 0.26-0.58), *P<.05*] and women that practice other religion [AOR = 0.26 (CI: 0.14-0.48), *P<.05*] had reduced likelihood of taking IPT for malaria in pregnancy compared to Christian women of reproductive ages. However, parity had no influence over

intake of IPT for malaria in pregnancy among women of reproductive ages in Nigeria.

Table 5 below represents the relationship between socio-demographic variables and health seeking behaviour for malaria in pregnancy. Women living in the rural region were 80% less likely to seek formal healthcare compared to women living in the urban region [AOR = 0.80 (CI: 0.67-0.97), *P<.05*]. Also, women that had primary [AOR = 2.17 (CI: 1.44-3.27), *P<.05*] and secondary [AOR = 1.52 (CI: 1.01-2.30), *P<.05*] education had higher likelihood of seeking formal healthcare for malaria during pregnancy compared to women that had no form of education. However, there was significant relationship between health seeking behaviour for malaria in pregnancy among women with tertiary education compared to women that had not form of education [AOR = 1.34 (CI: 0.92-1.94), *P>.05*].

Women categorized into the poorer wealth index were 2.22 times more likely than the poorest women to seek formal healthcare for malaria in pregnancy [AOR = 2.22(1.59-3.09), *P<.05*]. Similarly, the richest women were 1.36 times more likely than the poorest women to seek formal healthcare for malaria in pregnancy [AOR = 1.36 (1.01-1.83), *P<.05*]. Other socio-demographic variables were insignificantly related with health seeking for malaria in pregnancy among women of reproductive ages in Nigeria.

Discussion

This study was conducted to assess how socio-demographic factors affect the occurrences and health seeking for malaria in pregnancy among Nigeria women of reproductive ages. The socio-demographic factors assessed in this study includes region of residence, highest educational level, wealth index, age group, marital status, religion and parity. After controlling for other variables, some socio-demographic variables were found to be significantly associated with intake of IPT and health seeking for malaria in pregnancy.

It is also important to note that recommendation has been made by the World Health Organization that countries should adopt intermittent preventive treatment (IPT) for malaria in pregnancy [14]. In this study, region of residence was not associated with intake of IPT for malaria in pregnancy. However, health seeking for malaria in pregnancy was significantly influenced by region as women from rural region were less likely to access conventional source for malaria in pregnancy. Some of the challenges associated with healthcare seeking in rural regions compared to urban include lower socio-economic status as represented in this study and other studies that have been conducted [15-20]. Also, distance to health facility and poor perception of healthcare practitioners have been found to influence health seeking for women seeking healthcare [21-24].

Despite numerous programs and policies developed and implemented to prevent disease and improve access to healthcare services in African countries, socio-economic status significantly impacts the occurrence and health seeking behaviours for infectious disease [23]. In this study, increasing wealth index was found to increase the likelihood of women utilizing preventive treatment for malaria in pregnancy. Health seeking behaviour for malaria in pregnancy was also significant in the poorer and richest group compared to the poorest. A previous study conducted in Nigeria provides an evidence of the prevailing challenges of socio-economic status of pregnant women and its negative impact on the likelihood to seek conventional source for treatment of malaria in pregnancy[17]. Other findings have revealed increased likelihood of pregnant women with higher socio-economic status to seek IPT [24-25].

Education plays a critical role on health awareness and literacy especially in populations where there are limitations in the health systems and health care service delivery [26]. In turn, health literacy also influences actions and decisions to prevent disease occurrences. In this study increase in the level of education was associated with increased likelihood of taking IPT for malaria in pregnancy among women of reproductive ages while increasing education was significantly associated with increased likelihood to seek healthcare from formal sources.

Although there are limited studies assessing

relationship between socio-demographic variables and intake of preventive treatment for malaria in pregnancy, finding from this study is consistent with a previous study that revealed the influence of educational level in increasing the likelihood to utilize preventive method for malaria in pregnancy [16, 17, 24, 27-31]. As a result, less educated women in Nigeria may lack adequate information about the prevention of adverse effects of malaria in pregnancy and this in turn influence their decisions to take preventive measures. Also, women that are less educated may be less likely to seek conventional healthcare for malaria in pregnancy. While socio-economic status influencing health seeking behaviours of women, education also influences wealth index of women and therefore influence health seeking for malaria in pregnancy.

In this study, there was a significant increase in the likelihood of women to take IPT during pregnancy among married/cohabiting women compared to single women. On the other hand, there was a significantly increased likelihood of widowed women to seek formal healthcare for malaria in pregnancy compared to single women. It is expected that married women due to their experiences in pregnancies and increased knowledge of malaria in prevention, should seek formal healthcare for malaria in pregnancy However, another Nigerian study found the divorced/separated were less likely than single women to seek formal healthcare for malaria in pregnancy [24]. Additionally, this study showed that Muslim, traditional and women of other religions were less likely to initiate IPT for malaria in pregnancy compared to their Christian counterpart. It could be suggested that as a result of certain religious beliefs among the other religions, choice to initiate IPT may be prevented due to women's dependence on their religious beliefs.

This study is however not without limitations. Due to the use of NDHS, there were many missing variables which may have affected the statistical strength of our findings. Also, due to incomplete data, it was impossible to assess the influence of other socio-demography on other key healthcare indices relevant to this study. Also, the use of survey data increases the risk of measurement errors, and information bias as some of the variables assessed were dependent on the participant's ability to recall previous experiences.

However, this research has provided evidence of the existing limitations in strategies adopted in the prevention of malaria in pregnant women in Nigeria. It also provides adequate data to compare findings from previous studies and track progress in the awareness of IPT and utilization for appropriate healthcare for maternal illnesses. By using NDHS data, this study provides a more representative finding that can be generalized on the Nigerian population. With findings from this study, strategies can be adopted to improve prevention of malaria in pregnancy while improving health seeking behaviour of women of reproductive ages in Nigeria. Also, using NDHS data, the potential of selection bias has been reduced.

Conclusion

This study has revealed that socio-demographic factors predispose women of reproductive ages to the risk of malaria in pregnancy. Also, health seeking for malaria in pregnancy has been shown to be affected by socio-demographic factors.

It is therefore important that strategies are adopted to reduce missing survey data. In order to improve the volume of missing data, the NDHS should adopt a semi-structure survey questionnaire that allows surveyors to provide adequate direction towards completion of the questionnaires without influencing participant's decisions and choices. Also, knowledge about the prevention of malaria in pregnancy should be improved through awareness and campaigns programs that are targeted at high risk populations for malaria occurrence in pregnancy as indicated in this study. Although this study does not address other limitations to health seeking behaviour among women of reproductive ages, it is recommended that strategies be adopted to eliminate the barriers to access to healthcare service delivery among this population such as cost, distance and quality of healthcare service delivery. While the choices of women to seek healthcare can also influence household

health seeking, more resource and public health actions must be targeted at this population in order to achieve universal healthcare coverage especially for high risk populations. This can be achieved to collaborations with both private and public stakeholders and program implementers involved in malaria prevention and care in Nigeria.

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Conflict of Interest

The authors declare no conflict of interest regarding the conduct and publication of this manuscript

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Authors Contribution

TAA designed the study. AA, TAA, IE and JL supervised the conduct of the research. TAA carried out data analysis. JE, BI, ZS performed literature review. TAA drafted the first version of the manuscript. All authors (TAA, AA, JL, BI, JE, ZS, IE) reviewed and approved the final version of the manuscript.

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