What has recommended Antenatal Care utilisation got to do with optimal intake of IPTp-SP among rural women aged 15-49 in Nigeria?: A population-based surveys

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Abstract

Background

Missing the WHO-recommended ANC visits augments the risk of receiving a sub-optimal level of Intermittent-preventive treatment of malaria in pregnancy using Sulphadoxine-Pyrimethamine (IPTp-SP). Earlier reports found low utilisation of IPTp-SP among rural women in Nigeria. This study seeks to examine the relationship between the recommended ANC visits and optimal IPTp-SP uptake among rural women aged 15–49 in Nigeria.

Methods

We used data from the Female files of 2008, 2013, and 2018 Nigeria Demographic and Health Survey (NDHS) waves. A sample of 9,085 women aged 15 to 49 with pregnancy history and complete information about the variables of interest were included in our analysis. Optimal intake of IPTp-SP was the outcome variable in this study (i.e., receiving three or more doses of IPTp-SP during pregnancy). The main explanatory variable for this study was recommended ANC visits defined as having four or more ANC visits. At 95% confidence interval, logistic regression was conducted to examine the association between recommended ANC and optimal intake of IPTp-SP.

Results

Descriptively, 29% (n = 2,644, CI = 0.28–0.30) of the rural women aged 15–49 received the optimal level of IPTp-SP. Inferentially, we found a higher likelihood of optimal IPTp-SP intake among women who met the recommended ANC visits [aOR = 1.44, CI = 1.29–1.61] compared to women that did not. The rich exhibited a lower likelihood of optimal level of IPTp-SP intake [aOR = 0.81, CI = 0.70–0.94]. Muslims had a higher likelihood of receiving an optimal intake of IPTp-SP [aOR = 1.32, CI = 1.15–1.53]. South East residents had a higher likelihood of receiving an optimal level of IPTp-SP [aOR = 2.54, CI = 2.09–3.10], while the likelihood of optimal uptake of IPTp-SP reduced among residents in the North West [aOR = 0.46, CI = 0.40–0.54].

Conclusion

Uptake of WHO-recommended optimal level of IPTp-SP was found to be low, which was linked mainly to the number of ANC visits. The results of this study call for implementing operational strategies, including Transforming IPT for Optimal Pregnancy in rural Nigeria. Appropriate prenatal care visits must be promoted to ensure accessibility of IPTp-SP in rural Nigeria. We suggest health education and awareness creation through mass media targeting women across the six geographical zones, particularly in North West Nigeria.

Background

Following the first safe motherhood conference conducted in Kenya in 1987, maternal health has emerged as one of the major issues in public health for developing nations (1). With 275,288 fatalities related to pregnancy and complications in 2015, maternal mortality is still an issue around the world (2). The term "maternal mortality" refers to the death of a woman who is pregnant or who passes away within 42 days of having her pregnancy terminated. This rate is still significant, particularly in sub-Saharan Africa. With the development of the Millennium Development Goals (MDGs) and, subsequenty, the Sustainable Development Goals (SDG), the problem of maternal death has been addressed globally for the past three decades (3). Goal 3 of the SDG includes lowering maternal death rates worldwide to fewer than 70 per 100,000 live births by 2030 as one of its objectives (4). Nevertheless, it is estimated that 810 maternal deaths occur worldwide every day (5). The majority of maternal deaths—nearly 99% of them—occur in developing areas, with sub-Saharan Africa and Southeast Asia having the highest rates (3, 6). About two-thirds (196 000) of maternal deaths occurred in Sub-Saharan Africa alone (7). In 2017, Nigeria was ranked among the 15 countries deemed to be in "very high alert" or "high alert" fragile states according to the Fragile States Index (7). Above 50% of all maternal mortalities occur in Nigeria, which is one of the top six nations in the world (8). With an estimated MMR of 840/per 100,000 live births in 2008, Nigeria had the second-highest documented number (50,000) of maternal mortality (9). On average, women in less developed countries are more probable to become pregnant than women in developed nations, and their lifetime danger of passing away from pregnancy is greater. The probability that a 15-year-old woman will ultimately dies from a maternal reason is the lifetime danger of maternal death for a woman. As opposed to 1 in 45 in low-income nations, this occurs in high-income nations at a rate of 1 in 5,400 (7). Additionally, research has shown that the country's various regions have different rates of maternal death. For example, northern states in Nigeria, including Kano, had an MMR of 1,600 deaths per 100,000 live births (10), whereas 1,049 deaths per 100,000 live births were found in Zamfara state in 2008 (11).

Maternal mortality rates have been shown to decrease in correlation with community health activities, such as educational programs, better access to care for women who are expecting children, and measures to increase product quality (12–14). A component of the right to care is the provision of antenatal care services. The relationship between antenatal care and maternal death is equivocal (15–17). Nevertheless, there is general covenant that antenatal care measures can result in better mother and neonatal wellbeing, which could also affect the endurance and health of the child (18). Proven successful antenatal intercessions include serologic screening for syphilis, provision of malaria prevention, anti-tetanus immunization, and preclusion of mother-to-child spread of HIV (19). These intercessions are frequently provided in conjunction with malaria and reproductive health initiatives through antenatal care (ANC) clinics (20).

Although malaria during pregnancy can have overwhelming repercussions on both the mother and the unborn child, these adverse effects are avoidable (21). In sub-Saharan Africa's malaria-endemic regions in 2007, almost 32 million pregnancies took place (22). For instance, 11% of maternal deaths in Nigeria are attributable to malaria (22). In Nigeria, there may be a 60–70% parasite prevalence among expectant mothers (23). Malaria avoidance during antenatal care

includes the administration of Sulphadoxine-Pyrimethamine (SP). The WHO Expert Committee on Malaria has recommended intermittent preventive therapy (IPTp) for malaria in pregnancy (SP) as a method to reduce pregnancy-related malaria in regions with moderate to high transmission (24). Almost all Sub-Saharan African (SSA) countries have high rates of ANC coverage (25), but the majority of these countries have very poor rates of coverage for the two doses of SP and ITNs that are advised by the WHO (26). In spite of the fact that the median ANC reportage for two or more visits was 84.6% (range 49.7–96.9%, 22 countries, 2003–2011), the median reportage of two doses of SP was only 24.5% (range 7.3–69.4%), according to a analysis of national survey data in 27 nations with survey data between the years 2009 and 2011 (27), which indicates that there were significant ANC opportunities that were missed (26). In 2001, Nigeria implemented SP-based intermittent preventative therapy for expectant mothers in the second and third trimesters of pregnancy. But with 8.0% and 4.6% correspondingly throughout Nigeria and 9.9% and 5.4% in southeast Nigeria, first and second dose coverage continue to be poor (28).

IPTp's implementation will be effective if pregnant women use ANC services at a high enough rate (29). Most sub-Saharan African countries have high ANC attendance rates (30), nonetheless up to 25% of pregnant mothers visit for the first time during the third trimester (31). This could have an effect on the success of ANC and IPTp-related therapies due to the significantly reduced delivery of the second dose of SP and the loss of the anticipated protection for the mother and fetus (32). When delivering IPT, a woman should go to ANC at the right stages (16th to 24th week), when the foetus' growth is at its fastest rate. This assists to prevent placental parasitaemia, restrict the foetus' growth, and prevent low birth weight (33). Every visit should be taken into account, whether a woman begins her ANC appointment early or late, to ensure that she doesn't miss out on opportunities to receive the necessary interventions (29). Nevertheless, literature have revealed that there are several missed chances, which present a difficulty for the delivery of IPTp (34, 35). According to previous studies, women in Nigeria's urban and rural areas had coverage rates of 12.6% and 6.0%, respectively (28). This disparity in coverage demonstrates the continued existence of obstacles between rural and urban areas. Although several studies have been done on ANC visits and SP administration, little is known regarding the connection between ANC attendance and SP intake among Nigerian rural women, which is why this study was conducted. To address the knowledge gap in ANC visits and SP uptake among rural women, it is crucial to look at the relationship between intake of IPTp-SP and ANC visits. In terms of application, the study will also offer empirical data that, at the very least, can be used as a reference point for initiatives that encourage rural women to use ANC visits and IPTp-SP.

Methods

Data source and extraction of data

The study used a cross-sectional design. Data for the study was taken from the female files of the Nigeria Demographic and Health Survey (NDHS) waves from 2008, 2013, and 2018. Since our outcome variable and certain important factors used in this study were not measured in the earlier surveys, we decided not to include them. The DHS Program, financed by the United States Agency for International Development (USAID), gives financial support and technical help for population and health surveys. The National Population Commission carried out the surveys while ICF provided technical assistance. These surveys gathered data on a variety of health-related topics, including disability and smoking, as well as fertility, knowledge of and use of family planning methods, breastfeeding practices, nutritional status of women and children, maternal and child health, adult and child mortality, women's empowerment, domestic violence, female genital cutting, the prevalence of malaria, HIV and AIDS awareness and behavior, and other STIs (36).

The same methodology underlies these survey waves. First, the surveys used the Federal Republic of Nigeria's Population and Housing Census's sampling frame (NPHC). Nigeria is separated into states administratively. The local government areas (LGAs) that make up each state are further divided into wards. Every locale is divided into practical regions known as census enumeration areas (EAs). The multistage stratified sample selection was applied and EAs are chosen in the first stage with a probability inversely correlated with EA size. All chosen EAs undergo a household listing procedure, and the lists of homes that emerge serve as a sampling frame for choosing households in the subsequent stage. A set number of households are chosen in each cluster in the second stage of selection using equal probability systematic sampling. In total, 9,085 women between the ages of 15 and 49 who had full information on the factors that were analysed for the study were included in the pooled sample. The 2018 NDHS report includes a full description of the sampling process (36).

Derivation of the outcome variable

To prevent malaria in pregnancy (MiP), it is advised that expectant women take IPTp-SP at least three times (37,38). The best method for reducing MiP in malaria endemic countries like Nigeria is to use insecticide-treated mosquito nets, treat malaria quickly and effectively, and treat it intermittently with sulphadoxine-pyrimethamine (IPTp-SP) while pregnant (39). An optimum intake of IPTp-SP was therefore the study's main outcome variable. Receiving three or more doses of IPTp-SP during pregnancy was the operational definition of this. Women were questioned in the surveys about whether they used SP/Fansidar to prevent malaria when they were pregnant. Women were additionally questioned about how often they took SP/Fansidar in order to specifically determine how frequently they took it. This was posed as “How many times did you take SP/Fansidar during this pregnancy?”. To be consistent with the literature (37,38,40), women who reported that they took less than three doses of SP/Fansiar were classified as “low intake of IPTp-SP” while those that took three or more doses of SP/Fansidar were classified as “optimal intake of IPTp-SP. We recoded “low intake of IPTp-SP” as “0” and “optimal intake of IPTp-SP” as “1”.

Derivation of the explanatory variable

Recommended ANC visits served as the study's main explanatory variable. To conceptualise recommended ANC visits in accordance with prior studies' conceptualization of recommended ANC visits and the WHO recommendation on minimum ANC visits for expecting mothers (41–43), our definition of recommended ANC visits included four or more ANC visits. The NDHS asks women about their past pregnancies as well as other vital examinations that are important for maternal and child health, like ANC visits. Therefore, during the survey, women who gave birth two years before the data collection were asked the number of times they attended ANC, "How many times did you receive antenatal care during this pregnancy?”. To be consistent with the literature (41,42),

all women who mentioned that they had less than four ANC visits were classified as “not recommended” while those who made four or more visits were classified as “recommended”. We recoded “not recommended” as “0” and recommended as “1”.

Derivation of covariates

Age, wealth position, education, marital status, parity, occupation, religion, access to mass media, sex of household head, region, autonomy in making health decisions, ability to pay for necessary transportation, and distance to a health center were the fourteen covariates considered in this study. These factors weren't predetermined, but their theoretical significance to IPTp-SP intake led to their selection (40). Some of these variables were recoded in order to make our results easier to interpret. Age was recoded into “15-19=1”, “20-34=2” and “35 and above=3”, wealth status recoded into “poor=1”, “middle=2” and “rich=3”, and education recoded as “no formal education=1” and “formal education=2”.

Considering the Nigerian fertility rate (which is Nigeria is 5.3 children per woman) (36), parity was recoded into “one birth=1”, “two births=2”, “three births=3”, “four births=4” and “five or more births=5”, employment recoded into “none working class=1” and “working class=2”, religion recoded into “Christians=1”, “Muslims=2”, “Others=3”, partner’s education recoded into “no formal education=1” and “formal education=2”, health decision-making autonomy recoded into “respondent alone=1”, “respondent with others=2” and “others=3”, money needed for transport recoded into “problematic=1” and “unproblematic=2” and distance to travel was recoded into “problematic=1” and “unproblematic=2”. Following Appiah et al. (44) derivation of mass media, we computed access to mass media from three variables: frequency of reading newspaper/magazine, frequency of listening to the radio, and frequency of watching television, which was asked during the surveys. Each of these variables had three responses: ‘not at all’, ‘less than once a week’, and ‘at least once a week’. A composite variable was created whereby all ‘less than once a week’ and ‘at least once a week’ responses were classified as having access to mass media whilst ‘not at all’ was considered as not having access to mass media.

Statistical analysis

The analysis proceeded with steps. Firstly, we applied the weighting factor inherent in the dataset (v005/100,000) to cater for sampling biases and over-generalization. Further, we calculated the proportion of rural women who had optimal intake of or otherwise, and the results were left in proportion and percentage. Additionally, proportionality calculations for ANC visits and the rest of the covariates were done to summarise the general background characteristics of the rural women. Next, we computed the distribution of IPTp-SP intake across ANC visits and other covariates. Then, we applied a chi-square test of independence between our main outcome variable and the explanatory variables to assess the association between them. At a cut-off point of 0.05, any explanatory variable that was not associated with the main outcome variable was not entered into our multivariate model.

Further, we conducted multicollinearity test to confirm whether the explanatory variables correlated with each other using variance inflation factor (VIF). The results showed no evidence of multicollinearity between the explanatory variables (Mean VIF=1.43, Maximum VIF=1.95, Minimum VIF=1.02) (see Appendix 1). Two logistic regression models were built at 95% two-tailed confidence intervals (95% CI). Model I only considered our main outcome variable and key explanatory variable, and the results were expressed in odds ratio (OR). In Model II, we accounted for the influence of other covariates on the outcome variable, and the results were presented in adjusted odds ratio (aOR). Our results were declared as having a higher likelihood to the outcome variable when the odds were above 1 and a lesser likelihood to the outcome variable when the odds were below 1. We assessed the model fit using *‘linktest’* and *‘goodness-of-fit’* commands, and the results indicated that our model was well-specified. All the analyses were done using Stata version 16.0.

Ethical considerations

This study relied on a secondary data source. As such, the authors were not directly involved in the data gathering, fieldwork, or any activity connected with the data generation. Therefore, ethical issues applicable to the conduct of the survey did not apply to this study. However, permission to use the dataset was sought from Measure DHS. The datasets were downloaded after Measure DHS gave authors clearance to use the data. Meanwhile, Measure DHS anonymised the dataset before making it available to the public. Also, they reported that all ethical standards applicable to human participation in a survey were followed (45).

Results

Descriptive statistics for the Study

Generally, 29% (n = 2,644, CI = 0.28–0.30) of the rural women aged 15–49 received the optimal level of IPTp-SP, with 71% (n = 6,441, CI = 0.70–0.71) of them not meeting the optimal intake of IPTp-SP (data not shown).

Table 1 summarises descriptive statistics for the study. It was evident that 32% of women who had the recommended ANC visits met the optimal intake of IPTp-SP. An optimal level of IPTp-SP intake peaked among women aged 35 or above (30%), the rich (33%), those with formal education (31%), and the cohabiting (31%). Not more than 30% of the women across the parity group met the optimal IPTp-SP intake. An optimal level of IPTp-SP intake was phenomenal among none working class (32%), Christians (33%), women whose partners had formal education (31%), had access to mass media (33%), women whose household head was a female (30) and residents of Southeast region (53%).

Table 1
Descriptive Statistics for the Study (*Weighted N = 9,085*)

Variable	Weighted (N)	Weighted (%)	IPTp-SP levels		X^2(p-value)
			< 3 doses (%)	≥ 3 doses (%)	
ANC Visit					78.71(< 0.001)
< 4 visits	2782	31	77	23	
≥ 4 visits	6303	69	68	32	
Aged (in years)					3.94(0.140)
15–19	457	5	74	26	
20–34	6134	68	71	29	
35≥	2494	27	70	30	
Wealth status					32.28(< 0.001)
Poor	4643	51	73	27	
Middle	2309	25	70	30	
Rich	2133	24	67	33	
Education					24.37(< 0.001)
No formal education	4437	49	73	27	
Formal education	4648	51	67	31	
Marital status					0.27(0.600)
Married	8834	97	71	29	
Cohabiting	251	3	69	31	
Parity					3.36(0.499)
One birth	1277	14	70	30	
Two births	1528	17	70	30	
Three births	1373	15	71	29	
Four births	1174	13	70	30	
Five or more births	3733	41	72	28	
Occupation					2.82(0.093)
Not working class	959	11	68	32	
Working class	8126	89	71	29	
Religion					40.06(< 0.001)
Christian	3378	37	67	33	
Muslim	5615	62	73	27	
Others	92	1	75	25	
Partner's education					21.61((< 0.001)
No formal education	3133	34	74	26	
Formal education	5952	66	69	31	
Access to Mass media					30.98(< 0.001)
No	6070	67	73	27	
Yes	3015	33	67	33	
Sex of Household Head					0.49(0.486)
Male	8395	92	71	29	
Female	690	8	70	30	

Source: Computed from 2008, 2013 & 2018 NDHS

Variable	Weighted (N)	Weighted (%)	IPTp-SP levels		X^2(p-value)
			< 3 doses (%)	≥ 3 doses (%)	
Region					301.42(< 0.001)
North central	1524	17	65	35	
North east	1901	21	75	25	
North west	3390	37	77	23	
South east	568	6	47	53	
South south	1044	12	70	30	
South west	658	7	70	30	
Health decision-making autonomy					4.84(0.089)
Respondent alone	625	7	75	25	
Respondent and Partner	2952	32	71	29	
Others	5508	61	70	30	
Getting medical help for self: Getting money needed for transport					0.00(0.983)
Problematic	4376	48	71	29	
Unproblematic	4709	52	71	29	
Getting medical help for self: Distance to a health facility					0.52(0.472)
Problematic	2726	30	70	30	
Unproblematic	6359	70	71	29	
Source: Computed from 2008, 2013 & 2018 NDHS					

Women whose health decision-making is made by others (30%), and whose distance to cover to access health facility was not problematic (71%) topped optimal intake of IPTp-SP. From the chi-square test of independence, with the exception of age (X^2 = 3.94, p-value = 0.140), marital status (X^2 = 0.27, p-value = 0.600), parity (X^2 = 3.36, p-value = 0.499), occupation (X^2 = 2.82, p-value = 0.093), sex of household head (X^2 = 0.49, p-value = 0.486), health decision-making autonomy (X^2 = 4.84, p-value = 0.089), getting money needed for transport (X^2 = 0.00, p-value = 0.983) and distance to health facility (X^2 = 0.52, p-value = 0.472), the rest of the independent variables were associated with the outcome variable (Table 1).

Survey wave and Regional composition of ANC visits across IPTp-SP intake

Table 2 depicts the Survey wave and Regional composition of IPTp-SP intake by ANC visits. The general outlook of IPTp-SP intake indicated a decline among rural women across the surveys. Specifically, optimal intake of IPTp-SP levels among women who met the recommended ANC visits increased from 31–36% from 2008 to 2013. However, this declined to 30% in 2018. Similarly, optimal intake of IPTp-SP among women who had the recommended ANC visits also declined from 34–26% between 2008 and 2013 and drastically fell to 20% in 2018.

On a regional basis, women in the South east region had the highest proportion of optimal IPTp-SP intake. Specifically, it was noticed that among women who had the recommended ANC visits, optimal intake of IPTp-SP was highest among South east residents (56%). Even for women who had less than four ANC visits, women in the South east region were the second highest to have had an optimal level of IPTp-SP intake (31%), with those in the North Central being the highest to have utilized optimum intake of IPTp-SP (32%) (Table 2).

Table 2
Survey wave and Regional composition of IPTp-SP intake by ANC visits

Variable	< 4 ANC visits		≥ 4 ANC visits	
	IPTp-SP levels		IPTp-SP levels	
	< 3 doses (%)	≥ 3 doses (%)	< 3 doses (%)	≥ 3 doses (%)
Survey wave				
2008	66	34	69	31
2013	74	26	64	36
2018	80	20	70	30
Region				
North central	68	32	57	43
North east	73	27	75	25
North west	83	17	75	25
South east	69	31	44	56
South south	75	25	69	31
South west	84	16	71	29
Source: Computed from 2008, 2013 & 2018 NDHS				

Inferential statistics for the Study

Table 3 is the inferential statistics for the study. The study noted that rural women who met the recommended ANC visits were a 1.6-fold likelihood of receiving an optimal level of IPTp-SP in the crude model (Model I) as compared to their counterparts that had less than 4 ANC visits [OR = 1.60, CI = 1.44–1.78]; and this observation remained unchanged when significant covariates were controlled in the adjusted model (Model II) [aOR = 1.44, CI = 1.29–1.61].

Table 3
Inferential statistics for the Study

Variable	Model I		Model II	
	OR	[95% CI]	aOR	[95%CI]
ANC visit				
< 4 visits	Ref	1,1	Ref	1,1
≥ 4 visits	1.60***	[1.44–1.78]	1.44***	[1.29–1.61]
Wealth status				
Poor			Ref	1,1
Middle			0.90	[0.80–1.02]
Rich			0.81**	[0.70–0.94]
Education				
No formal education			Ref	1,1
Formal education			0.89	[0.78–1.01]
Religion				
Christian			Ref	1,1
Muslim			1.32***	[1.15–1.53]
Others			0.93	[0.57–1.50]
Partner's education				
No formal education			Ref	1,1
Formal education			1.01	[0.89–1.15]
Access to mass media				
No			Ref	1,1
Yes			1.08	[0.96–1.21]
Region				
North central			Ref	1,1
North east			0.54***	[0.46–0.63]
North west			0.46***	[0.40–0.54]
South east			2.54***	[2.09–3.10]
South south			0.94	[0.79–1.12]
South west			0.80*	[0.65–0.98]
Survey wave				
2008			Ref	1,1
2013			0.93	[0.78–1.11]
2018			0.80**	[0.69–0.94]
Model fit testing				
Linktest				
Number of observations			9085	
_hat			0.83***	[0.58–1.09]
_hatsq			-0.13	[-0.30-0.05]
Goodness-of-fit test				

Exponentiated coefficients; 95% confidence intervals in brackets, OR = Odd Ratio,

aOR = Adjusted Odds Ratio, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, 1 = Reference category

Source: Computed from 2008, 2013 & 2018 NDHS

Variable	Model I		Model II	
	OR	[95% CI]	aOR	[95%CI]
Number of observations			9085	
Number of covariate patterns			836	
X^2			1241.24***	
Exponentiated coefficients; 95% confidence intervals in brackets, OR = Odd Ratio,				
aOR = Adjusted Odds Ratio, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, 1 = Reference category				
Source: Computed from 2008, 2013 & 2018 NDHS				

The odds of receiving an optimal level of IPTp-SP reduced among the rich compared to the poor [aOR = 0.81, CI = 0.70–0.94]. Compared to Christians, Muslims had higher odds to receive an optimal level of IPTp-SP [aOR = 1.32, CI = 1.15–1.53]. Compared with rural women in the North Central, South East residents had a higher likelihood of receiving an optimal level of IPTp-SP [aOR = 2.54, CI = 2.09–3.10], whilst the likelihood of optimal uptake of IPTp-SP reduced among residents in the North West [aOR = 0.46, CI = 0.40–0.54]. Finally, the likelihood of rural women towards optimal uptake of IPTp-SP reduced across the survey waves, especially in 2018 [aOR = 0.80, CI = 0.69–0.94] as compared to 2008 (Table 3).

Discussion

The current study examined the relationship between recommended ANC visits and optimal IPTp-SP uptake among rural women aged 15–49 in Nigeria. In general, the study found a low (29%) optimum level of fansidar (i.e. 3 doses or more) among rural women aged 15–49 in Nigeria, much below the national target (80%). This suggests that about 71% of the rural women did not receive the optimum uptake of IPTp-SP in Nigeria. This finding is comparable with previous studies in Malawi (46), Togo (40), Mozambique (47), Kenya (48), and Nigeria (49). The uptake level of IPTp-SP in this study is, however, much lower than those reported in other studies, including 90.6% in Cape Coast of Ghana (50), 93.2% in Sierra Leone (51), and 89% from Zambia (52). The low uptake of IPTp-SP among rural Nigerian women may be partly attributable to a modification in WHO IPTp-SP policy in 2014 (from two to three doses), as the country was still implementing the new recommendations at the time (53). It may also be due to plausible factors, including a poor commitment to implementing IPTp-SP intervention by individual healthcare providers as suggested in the WHO policy brief that includes pregnant women taking IPTp-SP dosages under Directly Observed Therapy (DOT) (37, 54), and complacency of health care providers in ensuring that women who attend ANC complete the optimal IPTp-SP dosage (29, 55). It is also possible that some women may not have access to ANC services (56) or that even when services were accessible, they did not make the necessary ANC contacts to receive optimal IPTp-SP (54).

The present study discovered that ANC visits, wealth status, religion, region, and survey wave were all significantly connected to the optimal levels of IPTp-SP uptake among rural Nigerian women. The IPTp-SP technique prevents adverse pregnancy outcomes for both mother and newborn in sub-Saharan Africa. The IPTp-SP technique is based on women's ANC contacts. ANC clinic provides a stage for vital healthcare services and intercessions targeted at improving mother and fetal health, such as health promotion, disease prevention, screening, and diagnosis (54, 57). In Nigeria, IPTp-SP intake is one of the preventive measures used in ANC clinics. ANC is the primary means of delivering IPTp-SP in Nigeria. Literature indicates that ANC visit continues to be low in some areas of the country and that women obtained IPTp-SP from other outlets than ANC (58). In this study, we found that women who had 4 or more ANC contacts with health care providers showed a higher likelihood of receiving an optimum level of IPTp-SP as compared to their counterparts who had less than 4 ANC contacts, which supports prior studies conducted in Cameroon (59), Ghana (60, 61) Malawi (53), and Uganda (62). Other research in Nigeria and other malaria-endemic areas in sub-Saharan Africa corroborate these findings, showing that optimal ANC interaction is connected with optimal IPTp-SP uptake (62–64). This could be because these countries' IPTp-SP rules require that IPTp-SP be given at ANC visits, usually as DOT. As a result, women with more ANC contacts are more likely to finish the IPTp-SP doses (29).

According to the most recent WHO IPTp-SP policy, each ANC contact should include three or more dosages of IPTp-SP spaced at least a month apart, with the first dosage given as timely as possible during the second trimester of pregnancy (40, 54). This indicates that starting ANC early augments the chances of receiving optimal IPTp-SP dosages because more ANC contacts will be realized (54). According toWHO, IPTp-SP should be integrated with programs to promote concentrated ANC services (65, 66). As a result, women who start ANC early are more likely to realize appropriate visits, optimize their interactions with healthcare providers and achieve more excellent health education and IPTp-SP administration. Pregnant mothers should be encouraged to begin ANC visits as early as the first trimester and to attend all slated appointments. In order to allow for early diagnosis and management of any medical issues, as well as to screen for any risk factors that could affect the pregnancy's progress and prognosis, all pregnant women are recommended to attend their first ANC visit in the first trimester (65, 67). According to findings from Tanzania and Ghana, women who started ANC in the first and second trimesters were more likely to use IPTp-SP (60, 68). On the other hand, other studies have found no such link, possibly due to the diverse study designs used in these investigations; for example, Kibusi et al. (68) used a quantitative study whereas Rassi et al. (69) used a qualitative analysis.

IPTp-SP uptake and pregnancy outcomes have been observed to improve when ANC is started earlier, and more contacts are made (58). Our research findings highlighted the importance of ANC contacts regardless of when they were initiated, implying that healthcare providers should urge late ANC starters to make regular ANC visits. According to WHO recommendations, a woman can receive three dosages even if she began ANC in the third trimester and took IPTp-SP every month, as long as she attends ANC checkups regularly after this late commencement (39). This means that this metric may no longer be a reliable predictor of IPTp-SP uptake in the future (70). Therefore, women who are late for ANC and have problems such as malaria may need to visit the clinic regularly

and receive more IPTp-SP. Women who go to ANC early in the third trimester may be able to finish the suggested IPTp-SP dosage, but those who delay may not (53).

In contrast to our findings, the Kenyan study revealed no link between ANC contacts and optimal IPTp-SP uptake (71). Numerous factors have been cited for influencing the time and number of ANC contacts, including employment, marital and financial status, residence, the desired pregnancy, the woman's educational level, husband's educational level, quality of ANC services provided, and distance to the hospital (67, 72–75). Addressing some of these economic and societal issues will increase the number of ANC contacts, augment optimum IPTp-SP uptake, and enhance pregnancy outcomes for women (67).

In this study, wealthy status was strongly associated with optimal IPTp-SP uptake among rural Nigerian women. According to the findings, wealthier women have a lower chance of receiving the optimal level of IPTp-SP than poor women. This conclusion corroborates a study by Kibusi et al. (68) in Tanzania, which found that wealthier women were less likely than poor women to receive IPTp-SP, contrary to what is commonly stated in the literature where uptake is related to wealth status. The higher uptake of IPTp-SP among poor rural women could be attributed to disparities in how the rich and poor rural women in Nigeria estimate malaria exposure danger (68). In other words, impoverished rural women may have a greater chance of acquiring malaria; therefore, they use more IPTp-SP than wealthy women (49). Another possibility is that most rural, wealthy women seek ANC services at private hospitals (70). It is also possible that because IPTp-SP is free of charge in Nigerian health institutions, impoverished women have no economic barriers to receiving it (49). Our finding is, however, contrary to other research in SSA (48), such as Nigeria (76), Ghana (46, 77), and Senegal (78).

In addition, we discovered that religion substantially impacted rural Nigerian women's uptake of IPTp-SP. Muslims were shown to have a better likelihood of receiving optimal levels of IPTp-SP than Christians. This is consistent with previous findings in East-Central Uganda, which showed that Muslim women were more partial to IPTp-SP than Christian women (55). There is a lack of information to explain the low uptake of IPTp-SP among Christian women, particularly in Nigeria, necessitating more research. This study finding suggests that Christian religious authorities should actively encourage women to practice IPTp-SP uptake in pregnancy during ANC contacts. Several studies show that people are more likely to use health services when religious authorities are involved in health promotion (79).

According to the current study, the optimal uptake of IPTp-SP among rural Nigerian women is strongly linked to the region. The findings demonstrate that rural women in the North Central and South East are more likely than rural women in the North West to receive the optimal dose of IPTp-SP. This could be because these rural women were from the North West's socioeconomically challenged region. Though women in Nigeria are given IPTp-SP for free, they are only offered to them when they attend as health centre for ANC care (49). According to literature, the cost and availability of transportation to the nearest ANC clinic deter women from attending (46). As a result, women in low-income areas like the North West are less likely to go to ANC for IPTp-SP because they may be unable to afford the visit to an ANC clinic (46). This could also be related to sociocultural variations, ethnicity, and women's empowerment in these locations (46, 76). Further research is needed to comprehend these regional differences fully. Our findings are in line with those of Chukwu et al. (76) in Nigeria, as well as Darteh et al. (46) in Ghana, who reported a substantial link between location or zone of residency and optimal IPTp-SP uptake. In addition, the likelihood of rural women receiving optimal IPTp-SP uptake decreased across survey waves, particularly in 2018 compared to 2008.

Strengths And Limitations

One of the strength of the study is the inclusion of a nationally representative sample that could improve the generalizability of our findings to rural Nigerian women. Our research also has policy and practice implications because it identifies the critical factors influencing rural women's uptake of IPTp-SP. Despite this, the current study had some limitations; therefore, concluding the data should be done with caution. The study used a secondary data source, which limited our control over the variables and measurements within the dataset. Furthermore, because the data utilised is cross-sectional, causal inferences cannot be formed; only relationships can be drawn. The factors used to determine the prevalence of IPTp-SP were self-reported and retrospective, exposing the participants to a possible recall bias. Nonetheless, we believe that the study's positives outweigh its drawbacks.

Conclusions

The study revealed low uptake of the WHO-recommended optimum levels of IPTp-SP for malaria prevention during pregnancy and that the tendency to receive optimal IPTp-SP increased when women obtain four or more ANC visits. Other factors linked to optimal IPTp-SP uptake include wealth status, religion, region, and survey wave. This calls for improvement in strategies to increase IPTp-SP uptake because national objectives are falling short. To help enhance IPTp-SP uptake, strategies such as the Transforming IPT for Optimal Pregnancy (TIPTOP) project can be implemented in rural Nigeria. TIPTOP uses community health volunteers to identify pregnant women in the early stages of their pregnancy, educate them on the benefits of early ANC attendance and IPTp-SP usage, and send them to clinics for ANC. Promoting appropriate prenatal care visits by assuring the accessibility of IPTp-SP could also be considered an essential approach for increasing IPTp-SP use in rural Nigeria. This should be done by healthcare providers, particularly midwives, by inspiring women in their reproductive years to attend ANC services early when they become pregnant and to have regular monthly consultations in order to boost IPTp-SP uptake and hence improve pregnancy outcomes. There should also be increased health education and mass media efforts targeting rural women across the six geographical zones, particularly in the North West. We recommend that other factors of IPTp-SP uptake that the NDHS in Nigeria does not capture should be explored in future studies.

List Of Abbreviations

ANC Antenatal Care

AOR Adjusted Odd ratio

CI Confidence Interval

DOT Directly Observed Therapy

EAs Enumeration Areas

IPTp-SP Intermittent Preventive Treatment – Sulphadoxine Pyrimethamine

LGAs Local Government Areas

MDGs Millennium Development Goals

MMR Maternal Mortality Ration

NDHS Nigeria Demographic and Housing Census

NPC National Population Commission

SDGs Sustainable Development Goals

TIPTOP Transforming IPT for Optimal Pregnancy

VIF Variance Inflation Factor

Declarations

Ethics approval and consent to participate

The study relied on a secondary data source. Therefore, the authors were not directly involved in the data gathering, fieldwork, or any activity connected with the data generation. As such, ethical issues applicable to the conduct of the survey did not apply to this study. However, permission to use the dataset was sought from Measure DHS. The datasets were downloaded after Measure DHS gave authors clearance to use the data. Measure DHS anonymised the dataset before making it available to the public. All methods were carried out in accordance with relevant guidelines and regulations. All experimental protocols were approved by the National Health Research Ethics Committee of Nigeria (NHREC) and the Institutional Review Board of ICF Macro, Calverton, Maryland, USA. Additionally, informed consent was obtained from all participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are available in the Measure DHS repository, https://dhsprogram.com.

Competing interests

The authors declare that they have no competing interests

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Author's contributions

FA* conceived the study and conducted the formal analysis. FA*, KB, TS, DAO and PAA interpreted the results and FA*, TS, KB, CID, EOA, PAA, GB, GA, DAO, AAA, JODF, and FA drafted the manuscript. All authors proof read the manuscript for important intellectual content.

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