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Research Article

## Awareness and compliance with intermittent preventive treatment of malaria (IPTp) among pregnant women in parts of South Eastern Nigeria

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### ABSTRACT

The WHO recommends intermittent preventive treatments (IPTp) for the reduction of malaria episodes and its attendant consequences among pregnant women in malaria endemic areas. This study was done to ascertain the awareness and compliance with IPTp among pregnant women in parts of South Eastern Nigeria. A cross-sectional design was adopted for this study. About 200 pregnant women of different gestational ages attending antenatal clinics in primary care health centres in Owerri, South Eastern Nigeria two randomly selected. Data on awareness and compliance with IPTp was collected from the consenting pregnant women using structured pre-tested questionnaire and analysed using SPSS. Generally, about 106(53%) of the study women were aware of IPTp whereas only 65(33%) complied with the malaria prevention strategy. Socio-obstetric factors such as parity, number of live births were significantly associated with awareness ( $P<0.05$ ) whereas ethnic group and religion were significantly associated with compliance ( $P<0.05$ ). This is an original study that investigated the level of awareness and compliance with IPTp for the prevention of malaria among pregnant women who attend antenatal clinics in primary care facilities in parts of South Eastern Nigeria. For there to be improved awareness and optimal compliance with IPTp among pregnant women in poor malaria endemic areas, it is very necessary enhance antenatal services in primary care facilities. This can be done through periodic training of health personnel particularly the nurses, adequate supply of necessary medicines and the use of the directly observed approach in ensuring compliance.

**Keywords:** IPTp, Awareness, Compliance, Malaria, Pregnant women

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### INTRODUCTION

Malaria is a disease of global concern with its high fatality rate and remains a major public health problem in sub-Saharan Africa [1]. In malaria endemic areas, malaria in pregnancy has been implicated in high rates of maternal and infant mortality, low-birth weight as well as other adverse economic and social consequences [2,3]. The effects of malaria in pregnancy have been reported to be worse in the first and second pregnancies compared to higher parities [4]. Theories explaining its occurrence point that increase in severity to malaria

as well as changes to the cellular immune responses and increased attractiveness of pregnant women to mosquitoes are associated with increased level of circulating maternal steroids in pregnancy [5].

Interventions for the prevention of malaria in pregnancy include the use of insecticide-treated bed nets (ITN), intermittent preventive treatment (IPT), and adequate case treatment of acute malaria [1]. Intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) ensures that the placenta is cleared of parasites at the time of rapid foetal growth. It is a key component of the WHO's strategy to mitigate the adverse impact of malaria on pregnancies in Africa [6]. The recommendation for IPTp stipulates at least three doses during pregnancy and to be administered at least 1 month apart at each scheduled antenatal care (ANC) visit, beginning from second trimester under direct observational therapy [1].

In sub-Saharan Africa, IPTp with SP has been shown to reduce maternal anaemia, low birth weight and perinatal mortality [1]. However, coverage level of IPTp-SP and ITNs remains low in sub-Saharan Africa even though a high proportion of pregnant women had an ANC visit at least once during pregnancy [7,8]. This has been attributed to low awareness and poor delivery of the intervention resulting in poor compliance [7]. However, given that about 60-70% of women attend antenatal clinics at least once during any pregnancy in Nigeria [9], antenatal care services remain a key medium to ensure the uptake and successful implementation of IPTp-SP and improving coverage of IPTp-SP [10,11].

Information on the awareness and compliance of pregnant women on IPTp in South Eastern Nigeria is limited. This situation does not encourage appropriate assessment of the impact of the intervention in the area as well as hinders data necessary for its optimization. This study therefore assessed the awareness and compliance with intermittent preventive treatment in malaria (IPTp) among pregnant women attending antenatal care in community health centres in Owerri municipality, South Eastern Nigeria.

## MATERIALS AND METHODS

### ***Study design***

A cross-sectional study design was employed in this study. This involved the collection of relevant data from pregnant women attending antenatal care services at the selected primary care facilities during the study period.

### ***Study area***

This study was carried out in Owerri. Owerri is the capital city of Imo State, South Eastern Nigeria. It is situated on an elevation of 1000ft above sea level and has a tropical climate with an average annual precipitation of 2219mm and average annual temperature of between 26.4°C and 30°C [12]. The vegetation of the area is predominantly tropical rainforest. The density of the vegetation has reduced drastically as a result of anthropogenic activities, such as urbanisation, deforestation and agricultural activities [13]. These climatic and environmental conditions support the breeding of mosquitoes and the transmission of malaria. The population of Owerri municipality is predominantly characterised with people of the low and middle class, mostly dominated by civil and public servants while some are traders, artisans and farmers.

### ***Study population and setting***

The study population consisted of pregnant women attending antenatal care at the Comprehensive Health Centre, Area M, and the HIV and Counselling Health Centre, Area L, both located in Owerri Municipality, South Eastern Nigeria. These two primary care facilities were purposefully selected because of their strategic locations and patronage. Residents in the communities surrounding these primary care centres are mostly low to middle income earners who highly patronize these health centres because the services are free of charge.

### ***Sample and Sampling Technique***

There were a total of 304 pregnant women attending antenatal clinics in the two primary care facilities, according to their records within the study period,

A minimum sample size (172) was determined using the Taro-Yamane formula.

$(n = \frac{N}{1 + N(e^2)})^2$ ; where n = sample size required, N = number of people in the population (304), e = acceptable error (0.05)<sup>2</sup>

We however oversampled an additional 20% of the calculated sample size to account for attrition to arrive at 206 participants. Five (5) of the participants did not give consent for the study while one (1) was not seen again after the first encounter, leaving us with a final sample size of 200. Systematic sampling was used to select study subjects from both primary care facilities. Patients were sampled over six weeks (three weeks for each facility) on the antenatal clinic days. Only those available on the antenatal clinic days were selected after informed consent was sought and obtained from them. On each occasion, we first divided the number of the available eligible participants by the required sample size to obtain an interval number. This interval number was then used to systematically sample the subjects based on their pattern of arrival. At situations when a selected subject declined to consent to participate, the next patient to arrive was selected. The records were constantly crosschecked to ensure that no subject was selected more than once. These women were also followed up until delivery.

#### ***Development and Pre-testing of study instrument***

The instrument for data collection was a structured pre-tested questionnaire. It was developed by the researchers in collaboration with three nurses/ midwives and one consultant obstetrician and gynaecologist. The questionnaire contained 35 open- and closed-ended questions on the respondents' Socio-Obstetric characteristics, awareness about IPTp and compliance with IPTp. The survey instrument was created in English and translated into Igbo and Pidgin English by the researchers. It was pre-tested using 16 pregnant women attending antenatal care at another primary health care centre in Imo state and the pre-test data were not included in the main study. After the pre-testing, they were validated for content and criterion, and tested for reliability using the Chronbach alpha test before use.

#### ***Data collection***

The questionnaire was self-administered hand-to-hand by trained research assistants after an informed consent was obtained from the study subjects and collected immediately after they were completed. The literate respondents were allowed to complete the questionnaires themselves but for the non-literate respondents, the questions were asked in the local language and their responses were filled out by the research assistants. Also, those who got confused in the process of answering the questions were cleared.

#### ***Data analysis***

The data collected was analysed using the Scientific Package for Social Sciences (SPSS) version 23. Descriptive statistics were presented as frequencies and proportion on tables whereas inferential statistics were performed to show relationship between variables.

#### ***Ethical Approval***

Ethical approval for this study was sought and obtained from the Ethical Committee of the Imo State Ministry of Health, Owerri and Institutional Review Board (IRB) of the School of Health Technology, Federal University of Technology, Owerri, Nigeria. Permission was also sought and obtained from the heads of the respective primary care facilities. Informed oral consent was sought and obtained from each study participant after they were introduced to the purpose of the study and informed about their rights to interrupt the interview at any time.

## **RESULTS**

Table 1 shows the socio-obstetric characteristics of the pregnant women. From the total of 200 pregnant women that were interviewed, 74(37.0%) were between the ages of 15-24, 103(51.5%) were 25-34 while 23(11.5%) of them were between 35-50 years of age. Married mothers were higher than single mothers. The number of women with tertiary education was higher whereas the highest occupation engaged by the women

was trading. Igbo dominated other ethnic groups, and many belong to Christian religion. 55(27.5%) of women had undergone delivery once. 66(33.0%) of the women had at least one (1) live birth.

**Table 1: Socio-obstetric Characteristics of the Respondents**

<b>Variables</b>	<b>Frequency (N=200)</b>	<b>Percentage (%)</b>
<b>Age</b>		
15-24	74	37.0
25-34	103	51.5
35-50	23	11.5
<b>Marital status</b>		
Married	185	92.5
Single	15	7.5
<b>Educational attainment</b>		
Primary	10	5.0
Secondary	52	26.0
Tertiary	138	69.0
<b>Occupation</b>		
House wife	40	20.0
Trading	57	28.5
Farming	11	5.5
Civil servant	44	22.0
Others	48	24.0
<b>Ethnic group</b>		
Igbo	182	91.0
Hausa	6	3.0
Yoruba	7	3.5
Others	5	2.5
<b>Religion</b>		
Christianity	192	96.0
Islam	8	4.0
<b>Parity</b>		
1	55	27.5
2	44	22.0
3	46	23.0
4 and above	25	12.5
Primid	30	15.0
<b>Live births</b>		
1	66	33.0
2	44	22.0
3	42	21.0
4 and above	18	9.0
Primid	30	15.0

**Table 2: Awareness about Malaria among Study Participants**

<b>Variables</b>	<b>Frequency (N=200)</b>	<b>Percentage (%)</b>
<b>Knowledge about malaria</b>		
Yes	194	97.0
No	6	3.0
<b>Previous malaria experienced during pregnancy</b>		
Yes	157	78.5
No	43	21.5
<b>Knowledge about malaria severity during pregnancy</b>		
Yes	175	87.5
No	25	12.5
Total	200	100.0
<b>Awareness about malaria preventive treatment in pregnancy</b>		
Yes	180	90.0
No	20	10.0

About 194(97.0%) of the respondents knew the disease called malaria and 157(78.5%) had experienced malaria during pregnancy in the past. However, only 175(87.5%) knew malaria could be severe during pregnancy, and 180(90.0%) were aware about preventive treatments for malaria in pregnancy (Table 2).

The level of awareness about intermittent preventive treatment amongst the pregnant women is depicted in Table 3. More than half of the population of women interviewed 105(52.5%) were aware of IPTp as a malaria control strategy. However, 121(60.5%) did not know the exact drug recommended for malaria control in pregnancy. Out of the 79 that knew the medicine for intermittent preventive treatment, only 63(31.5%) knew SP as the new correct medicine for intermittent preventive treatment.

There were diverse responses regarding knowledge and purpose for the use of IPTp. These include weight gain 8(4.0%), strong and healthy baby 40(20.0%), to prevent getting malaria 98(49.0%), to gain lot of blood 1(0.5%), to gain weight and prevent getting malaria 2(1.0%), strong baby, weight gain and to prevent getting malaria 2(1.0%). Regarding knowledge about the time to commence IPTp, 31(15.5%) mentioned between 1-3 months, 79(39.5%) mentioned between 4-6 months, 17(8.5%) mentioned between 7-9 months while 73(36.5%) did not know the time at all. In addition, the responses on knowledge about the intervals for IPTp administration among the study pregnant women were weekly (8.5%), monthly (49.0%), and fortnightly (4.0%) while 38.5% did not know.

**Table 3: Awareness about Intermittent Preventive Treatment for Malaria (IPT) amongst the Pregnant Women in New Owerri**

<b>Variables</b>	<b>Frequency (N=200)</b>	<b>Percentage (%)</b>
<b>Awareness about IPT</b>		
Yes	105	52.5
No	95	47.5
<b>Awareness about the medicine for IPT</b>		
Yes	79	39.5
No	121	60.5
<b>Knowledge of the medicine for IPT</b>		
Sulfadoxine-pyrimethamine	63	31.5
ACT	12	6.0
Quinine	4	2.0
Don't know	121	60.5
<b>Perception about IPT</b>		
To make me gain weight	8	4.0
To make me gain weight and to prevent me from getting malaria	2	1.0
To make my baby and I strong and healthy	40	20.0
To make my baby and I strong, gain weight and to prevent me from getting malaria	1	0.5
To prevent me from getting malaria	98	49.0
To give me a lot of blood	1	.5
Don't know	50	25.0
<b>Knowledge about Age of pregnancy to receive first dose of IPT</b>		
1-3	31	15.5
4-6	79	39.5
7-9	17	8.5
Don't know	73	36.5
<b>Knowledge of the number of times IPT should be received</b>		
Once	17	8.5
Twice	59	29.5
Thrice	37	18.5
More than three times	22	11.0
Don't know	65	32.5
<b>Knowledge about intervals for receiving IPT?</b>		
Weekly	17	8.5
Monthly	98	49.0
Fortnightly	8	4.0
Don't know	77	38.5

The level of compliance with intermittent preventive treatment amongst the pregnant women is shown in Table 4. Only 47 (23.5%) of pregnant women were registered early for antenatal clinics (1-3 months old). As much as 147(73.5%) reported to have received IPTp-SP during their current pregnancy. Though 135(68.5%)

received theirs from the health personnel, 5(2.5%) received theirs from a family member, 7(3.5%) received from the chemist (Proprietary Patent Medicine Vendor). About 53(26.5%) reported not to have received any medicine for malaria during pregnancy. To know if DOT as recommended for the intake of SP was done, only 29(14.5%) out of those who received from health personnel took theirs in the presence of a designated health personnel whereas 86(43%) took the medicine at home. About 76(38.0%) had received IPT only once since the course of their pregnancy, 46(23.0%) had received twice, 22(11.0%) had received thrice, 13(6.5%) had received more than three times while 53(26.5%) received none. About 25(12.5%) received the first dose at 1-3 months, 105(52.5%) received theirs at 4-6 months, 17(8.5%) had theirs at 7-9 months while 53(26.5%) did not receive at all. Also, 41(20.5%) received the second dose at 4-6months, 30(15.0%) received at 7-9 months while 129(64.5%) comprised those that received only once and those who did not receive at all. Those who received the third dose, or more than three times were 25(12.5%) and they received it at 7-9 months while 175(87.5%) comprised those that received once, twice and those who did not receive at all.

Most of the socio-obstetric factors were not associated with the level of awareness (Table 5). No significant relationship was found between level of awareness of IPTp and age ( $\chi^2=5.289$ , P-value=0.071), marital status ( $\chi^2=0.319$ , P-value=0.572), educational attainment ( $\chi^2=2.842$ , P-value=0.241), occupation ( $\chi^2=3.431$ , P-value=0.488), ethnic group ( $\chi^2=5.249$ , P-value=0.154) and Religion ( $\chi^2=2.623$ , P-value=0.105).

However, significant relationship was found between level of awareness of IPTp and parity ( $\chi^2=17.660$ , P-value=0.001) as well as number of live birth ( $\chi^2=17.465$ , P-value=0.002). Table 6 shows the relationship between socio-obstetric factors and the level of compliance with IPTp. There were no relationships between compliance with IPT p and age ( $\chi^2=1.428$ , P=0.490), marital status ( $\chi^2= 0.005$ , P-value= 0.943), educational attainment ( $\chi^2= 1.713$ , P-value= 0.425), occupation ( $\chi^2 = 3.298$ , p-value = 0.509), parity ( $\chi^2=4.475$ , P-value=0.346) and number of live births ( $\chi^2=2.339$ , P-value=0.674). However ethnicity ( $\chi^2=15.233$ , P-value=0.002), and religion ( $\chi^2= 6.861$ , P-value= 0.009), were found to have significant relationship with level of compliance with IPTp.

**Table 4: Compliance with Intermittent Preventive Treatment amongst Pregnant Women in New Owerri**

<b>Variable</b>	<b>Freq. (N=200)</b>	<b>(%)</b>
<b>Age of pregnancy when registered for antenatal</b>		
1-3	47	23.5
4-6	140	70.0
7-9	9	4.5
No response	4	2.0
<b>Were you educated about malaria in pregnancy?</b>		
Yes	161	80.5
No	39	19.5
<b>Did you receive any three-tablet medicine for malaria prevention?</b>		
Yes	147	73.5
No	53	26.5
<b>Who gave you the medicine?</b>		
Health personnel	135	67.5
Family member	5	2.5
Chemist	7	3.5
No response	53	28.5
<b>Did you take the medicine before the health personnel?</b>		
Yes	29	14.5
No	106	53.0
No response	65	32.5
<b>Did you take the medicine at home?</b>		
Yes	86	43.0
No	20	10.0
No response	94	47.5
<b>Reason for not taking the medicine at home</b>		
I did not know what the medicine was for	5	2.5

I did not feel like taking it	8	4.0
Somebody advised me not to take it	7	3.5
No response	180	90.0
<b>Number of times IPT was received</b>		
Once	76	38.0
Twice	46	23.0
Thrice	17	8.5
More than three times	8	4.0
None	53	26.5
<b>Age of pregnancy when first dose of IPT was received</b>		
1-3	25	12.5
4-6	105	52.5
7-9	17	8.5
No response	53	26.5
<b>Age of pregnancy when second dose of IPT was received</b>		
4-6	41	20.5
7-9	30	15.0
No response	129	64.5
<b>Age of pregnancy when third dose of IPT was received</b>		
7-9	25	12.5

**Table 5: Influence of socio-obstetric factors on the level of awareness about intermittent preventive treatment**

Variables	Awareness			Chi Square	P Value
	Aware	Unaware	Total		
<b>Age</b>					
15-24	40 (37.7%)	34 (36.2%)	74 (37.0%)	5.289	0.071
25-34	49 (46.2%)	54 (57.4%)	103 (51.5%)		
35-50	17 (16.0%)	6 (6.4%)	23 (11.5%)		
<b>Marital Status</b>					
Married	97(91.5%)	88(93.6%)	185(92.5%)	0.319	0.572
Single	9(8.5%)	6(6.4%)	15(7.5%)		
<b>Educational Attainment</b>					
Primary	7(6.6%)	3(3.2%)	10(5.0%)	2.842	0.241
Secondary	31(29.2%)	21(22.3%)	52(26.0%)		
Tertiary	68 (64.2%)	70(74.5%)	138(69.0%)		
<b>Occupation</b>					
House Wife	22(20.8%)	18(19.1%)	40(20.0%)	3.431	0.488
Trading	32(30.2%)	25(26.6%)	57(28.5%)		
Farming	6(5.7%)	5(5.3%)	11(5.5%)		
Civil Servant	26(24.5%)	18(19.1%)	44(22.0%)		
Others	20(18.9%)	28(29.8%)	48(24.0%)		
<b>Parity</b>					
1	26 (24.5%)	29 (30.9%)	55 (27.5%)	17.660	0.001
2	18 (17.0%)	26 (27.7%)	44 (22.0%)		
3	31 (29.2%)	15 (16.0%)	46 (23.0%)		
4 and above	20(18.9%)	5 (5.3%)	25 (23.0%)		
Primid	11(10.4%)	19 (20.2%)	30 (15.0%)		
<b>Live Births</b>					
1	30 (28.3%)	36 (38.3%)	66 (33.0%)	17.465	0.002
2	20 (18.9%)	24 (25.5%)	44 (22.0%)		
3	31 (29.2%)	11 (11.7%)	42 (21.0%)		
4 and above	14 (13.2%)	4 (4.3%)	18 (9.0%)		
Primid	11 (10.4%)	19 (20.2%)	30 (15.0%)		

**Table 6: Influence of socio-obstetric factors on the level of compliance with intermittent preventive treatment**

Variable	Compliance		Total	Chi-Square	P-Value
	Compliance	Non- Compliance			
<b>Age</b>					
15-24	23 (31.1%)	51 (68.9%)	74 (100.0%)	1.428	0.490
25-34	32 (31.1%)	71(68.9%)	103 (100.0%)		
35-50	10(43.5%)	13 (56.5%)	23 (100.0%)		
<b>Marital Status</b>					
Married	60 (32.4%)	125 (67.6%)	185 (100.0%)	0.005	0.943
Single	5 (33.3%)	10 (66.7%)	15 (100.0%)		
<b>Educational Attainment</b>					
Primary	5 (50.0%)	5 (50.0%)	10 (100.0%)	1.713	0.425
Secondary	15 (28.8%)	37 (71.2%)	52 (100.0%)		
Tertiary	45 (32.6%)	93 (67.4%)	138 (100.0%)		
<b>Occupation</b>					
House Wife	10 (25.0%)	30 (75.0%)	40 (100.0%)	3.298	0.509
Trading	21 (36.8%)	36 (63.2%)	57 (100.0%)		
Farming	5 (45.5%)	6 (54.5%)	11 (100.0%)		
Civil Servant	16 (36.4%)	28 (63.6%)	44 (100.0%)		
Others	13 (27.1%)	35 (72.9%)	48 (100.0%)		
<b>Parity</b>					
1	22 (40.0%)	33 (60.0%)	55 (100.0%)	4.475	0.346
2	10 (22.7%)	34 (77.3%)	44(100.0%)		
3	13 (28.3%)	33 (71.7%)	46 (100.0%)		
4 and above	8 (32.0%)	17 (68.0%)	25 (100.0%)		
Primid	12 (40.0%)	18 (60.0%)	30 (100.0%)		
<b>Live Births</b>					
1	24 (36.4%)	42 (63.6%)	66 (100.0%)	2.339	0.674
2	13 (29.5%)	31 (70.5%)	44 (100.0%)		
3	11 (26.2%)	31 (73.8%)	42 (100.0%)		
4 and above	5 (27.8%)	13 (72.2%)	18 (100.0%)		
Primid	12 (40.0%)	18 (60.0%)	30 (100.0%)		

## DISCUSSION

Prevention of malaria in pregnancy remains a major public health challenge in Nigeria and a key priority for the Roll Back Malaria (RBM) Partnership [14]. Antenatal Clinics on the other hand are considered an important entry point to target the pregnant women for necessary public health interventions [15]. In Nigeria, there are efforts to ensure that 60–70% of women attend antenatal clinic at least once during any pregnancy [16], where they receive appropriate information, education and care that will guarantee the health and safety of themselves and their babies. This includes education and care to prevent malaria during pregnancy.

In this study, about half of the population of women attending ANC at health centres in Owerri municipality showed poor knowledge about IPTp-SP for malaria in pregnancy. Majority of women who had heard about IPTp did not know Sulfadoxine- Pyrimethamine (SP) as the drug of choice for IPTp neither was they aware of the period and correct dose of IPTp-SP to receive. Previous studies in other parts of Nigeria [17, 18] and Africa [19,20] had reported similar patterns in awareness about IPTp. In these reports, low emphasis on IPTp in women’s health discussions by the health providers particularly at the health facilities where ANCs are received was a consistent factor attributed to poor awareness about IPTp. An observation in our study is that majority of the study women knew malaria to be among the biggest threats to health during pregnancy but rarely mentioned IPTp-SP as a way of preventing it. This could be linked to the possibility that IPTp is not a topic of priority during ANC discussions even though topics on malaria are, as observed in another study [19]. It is therefore necessary that topics concerning IPTp be given as much priority as other topics such as malaria, multivitamin use and nutrition during ANC discussions in other to promote awareness about this very important intervention.

The percentage of women who had received at least three doses of IPTp-SP in this study was low, pointing to missed opportunities such as either decline in the number of antenatal visits or the irregular and inconsistent pattern of distributing SP for IPTp in the study primary care centres. We observed that SPs were not always available for free distribution. When they were available, they were so limited that they were only given to a small number of women on first come first served basis. Similar patterns have also been respectively observed in a Tanzanian [21] and a Malawian study [22]. In both studies, the inadequate provision of SP drugs in health facilities hindered pregnant women from accessing IPTp. ANC clinic is the vehicle that carries the intervention from the healthcare provider to the pregnant woman. Hence compliance with IPTp-SP would largely depend on adequate provision of the recommended drugs as well as regular and appropriate distribution of same to pregnant women attending ANCs as recommended.

The guidelines for maternal and child health which stipulates that the first ANC visit should be at 6<sup>th</sup> week, second visit at 20-24<sup>th</sup>, third visit at 28-32<sup>nd</sup> week and the fourth visit at 36-40<sup>th</sup> week of gestation [23]. Late and irregular attendance to antenatal clinics could be another factor preventing more pregnant women from receiving the recommended doses of IPTp-SP, at the time of this study. Studies in Uganda [24] and Tanzania [25] had indicated late antenatal registration and irregular attendance to be affecting proper delivery and compliance with IPTp. Regular attendance to ANC should be encouraged among women in malaria endemic areas as it will not only help in improving IPTp coverage and compliance but also in the prevention, identification and treatment of other maternal illnesses and obstetric complications.

Though ANC visits are not sufficient to ensure complete IPTp coverage and compliance; the present study has shown that a good number of women who received IPTp-SP failed to complete the optimal dosage. This could be attributed to weak direct observational therapy (DOT) which is the recommended method for the administration of IPTp-SP. Pregnant women who did not take doses of SP before the health care provider failed to complete the recommended number of doses. One reason for this low compliance with IPTp-SP could be fear of side effects by the users and their inadequate knowledge of the correct dose. A similar study conducted in Uganda reported that pregnant women believed that SP is strong and weakens pregnant women, causes abortions and foetal abnormalities [26].

Nevertheless, incomplete IPTp-SSP may not be a problem deriving from pregnant women alone but a health centre strengthening issue [27,28]. Some previous studies have shown that problems such as shortage of SP in the health facility could hinder the use of IPTp and implementation of DOT scheme [8] as this drug is supplied in government hospitals in Nigeria by Federal Ministry of Health. Another factor could be high client-to-staff rations which reduces consultation times resulting in poor observation [29]. Furthermore, shortages of hygienic cup provided in the clinic and quality of drinking water have been noted to hinder the compliance with IPTp-SP in health facilities. For instances a study conducted in Nigeria, revealed that most women mentioned they will like to take the drug in the clinic if allowed to use their own drinking cups [14]. All these suggest that health facilities managements need to make efforts in ensuring that the challenges faced by their respective clinics are rectified in other to strengthen IPTp coverage including DOT. Providers could solicit with the women to always come with a cup when on a scheduled visit to ensure availability of cups.

In this study Parity was significantly associated with knowledge about IPTp-SP but not with compliance. The association with knowledge may imply that the number of births by a woman in a malaria endemic area may result in more experience with malaria, increased experience and knowledge of its effects and probably more encounter due to need for the use of IPTp. A similar study by Mutagonda *et al.* [25] in Tanzania found a similar relationship. The non-association with compliance may be as a result of the health facility inadequacies as earlier described or also due to issues relating to the women themselves, as knowledge or awareness does not always transcribe to compliance or adherence as observed in a previous study[30]. Furthermore, Ethnic group and religious belief were associated with level of compliance with IPTp. This could be as a result of beliefs and perceptions associated with different ethnic cultures and religions regarding illness causes and ways of managing them. In a similar study, cultural misconceptions were also identified as some of the factors influencing compliance with IPTp [19].

## CONCLUSION

There is need for continuous and sustained sensitization and education of pregnant women as well as women of child bearing age in malaria endemic areas to improve their awareness and compliance with intermittent preventive treatment in pregnancy (IPTp). Community health care facilities as primary contact of mothers in low-income settings should be well equipped to provide more qualitative ANC services including administration of IPTp for pregnant women. Furthermore, health workers in community or primary care facilities should be periodically trained on contemporary health interventions particularly for pregnant women, to enable them deliver appropriate education and services to their clients.

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