Factors associated with uptake of intermittent preventive treatment of malaria among pregnant women in the Sene East District, Ghana

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https://doi.org/10.51867/ajernet.7.1.61

ABSTRACT

Malaria poses a significant risk to pregnant women and infants, particularly in sub-Saharan Africa. Intermittent Preventive Treatment with Sulfadoxine Pyrimethamine (IPTp-SP) for malaria in pregnancy is an effective intervention recommended by the World Health Organization (WHO) to protect this vulnerable group. However, uptake of IPTp has been suboptimal in most settings in Ghana, due to several factors. This study, therefore, sought to determine the factors associated with the uptake of IPTp-SP among pregnant women in the Sene-East District of Ghana. The study adopted the facility-based cross-sectional design, where the Cochrane formula for sample size determination was used to select 433 pregnant women with a gestational age of 36+ weeks, as well as postpartum women of at most 4 weeks after birth, at Antenatal Care (ANC) centres in six selected health facilities in the district. The theory underpinning this research was the Health Belief Model (HBM). The model seeks to explain and predict the pathways through which individuals behave to improve health based on their attitudes and beliefs. Data were collected using structured questionnaires and analyzed using logistic regression to assess factors associated with IPTp-SP uptake. Results showed that the level of IPT3+ uptake was 58.4% among the study participants, which is below the WHO-recommended optimal level of IPTp uptake among pregnant women. In the multivariate analysis, women who had some education had higher odds of completing 3+ doses (aOR=1.72, 95% CI:1.002-2.961, p=0.049) compared to those without education. Also, multiparous women were 2.4 times more likely to have 3+ doses of IPTp compared to nulliparous women (aOR: 2.35; 95% CI: 1.341 - 4.128, p=0.003). Pregnant women who took the first dose of IPTp in the 3rd trimester were about 95% less likely to adhere to 3+ doses of IPTp-SP compared to those who started uptake of IPTp-SP at the 2nd trimester (aOR=0.055, p<0.001). Other factors associated with IPTp-SP uptake included knowledge of the ideal number of doses, where women with higher knowledge were more likely to receive the optimal number of IPTp-SP doses. Gestational age at first IPTp-SP uptake was another factor that was associated with optimal uptake of IPTp-SP. Specifically, women who took their first IPTp-SP in the first trimester were more likely to receive all 3+ doses. To improve IPTp-SP adherence, it is essential for stakeholders to engage in the education of younger and first-time mothers about the importance of early IPTp-SP uptake.

Keywords: Antenatal care, Ghana, Intermittent Preventive Treatment, Malaria, Pregnancy, Sulfadoxine-Pyrimethamine

I. INTRODUCTION

The primary causes of death and disability among women of reproductive age in developing countries are related to pregnancy and childbirth (Orish et al., 2023). The complication of malaria during pregnancy is one of the major causes of death and disability among these vulnerable groups (World Health Organization [WHO], 2014). The devastating outcomes of malaria during pregnancy include miscarriages, intrauterine deaths, preterm births, low birth weights, neonatal deaths, severe anemia, hypoglycemia, acute pulmonary oedema, fetal distress, premature labor, spontaneous abortions, and maternal deaths (Buh et al., 2019). About 99% of maternal deaths worldwide occur in developing countries, and malaria is known as a contributory factor (WHO, 2025). There are 125 million women at risk of contracting malaria each year, and there are up to 10,000 pregnancy-related deaths in Sub-Saharan Africa (Desai et al., 2007; Lawn et al., 2016). Malaria in pregnancy also contributes 11% of neonatal deaths, as well as between 75,000 and 200,000 infant deaths (Desai et al., 2007; Lawn et al., 2016).

Intermittent Preventive Treatment with sulfadoxine pyrimethamine (IPTp-SP) is an anti-malaria medication given to pregnant women at predefined intervals. In 2014, the World Health Organization (WHO) revised that, in areas of moderate-to-high malaria transmission in Africa, IPTp-SP should be given to all pregnant women at each scheduled antenatal care (ANC) visit, starting at least in the second trimester, provided that the doses of SP are given at least one

month apart (WHO, 2025). The objective of the WHO recommendations is to ensure that pregnant women receive at least three doses of IPTp before full term.

In Ghana, 55% of outpatient visits to health facilities are due to malaria, with the disease contributing to 13.7% of admissions among pregnant women and 3.4% of maternal deaths (Agyeman et al., 2021). IPTp-SP is one of the key interventions of the National Malaria Program of the Ghana Health Service (GHS). It is part of the comprehensive antenatal package with other services and products. The dose of three Sulfadoxine Pyrimethamine (SP) tablets is given as direct observed therapy (DOT) during 16 weeks of gestation, or when mothers experience quickening, while subsequent doses are given at one monthly interval till delivery (Addai-Mensah et al.,2018; Agyeman et al.,2021). This means that a minimum of three doses of IPTp must be given during pregnancy.

According to the Ghana Malaria Indicator Survey, national IPTp uptake in 2016 was 64.1% for women who took only one dose. Those who took doses were 51.6%, while 36.7% took three doses. Women who took four or five doses were 16.7% and 6.7 %, respectively. Also, according to Bayuo, who analysed the 2022 GDHS report, of the 3,689 women sampled, 61.3% had received the required three or more doses of IPTp (Bayuo et al, 2025).

While uptake of the IPTp at the national level can be described as sub-optimal, coverage of IPTp-SP in the Sene East District, where this study was conducted, remains very low. For instance, in 2020, 52.7% of pregnant women attended ANC service four or more times. Of this, only 46.6% had received IPTp3+. Also, in 2021, the proportion of pregnant women making their fourth visit to ANC service was 58.7%, out of which 56.9% received IPTp3. Also, uptake of IPTp-SP in 2022 reduced to 49.8% for 56% of women making their fourth ANC visits pursuant to Sene-East District Health Directorate data in 2022.

Even though the national IPTp-SP uptake and coverage of the recommended minimum doses have increased steadily, the coverage levels of the Sene East District have been quite low and fluctuating, ranging between 46.6% and 56.9% of IPTp3+ over the period of 2020 and 2022 according to Sene-East District Health Directorate report in 2022. The sub-optimal levels of the IPTp uptake imply there exist factors inhibiting the uptake of IPTp among pregnant women in the district. Several studies in the country have outlined factors associated with the uptake of IPTp-SP (Agyeman et al., 2021; Agyeman et al., 2023; Orish et al., 2023). However, geographical and socio-cultural variations of these factors exist among various settings and population subgroups where these studies were conducted.

It is, therefore, imperative to understand the specific challenges confronting women in their quest to receive IPTp in a predominantly rural setting such as the Sene East District. This study, therefore, sought to assess the factors that are associated with IPTp uptake among pregnant women in the Sene East District. Conducting the study in this rural setting will provide us with an understanding of the context-specific factors associated with low IPTp uptake among pregnant women in the district. This will allow for the implementation of the appropriate interventions to improve IPTp uptake among women in the District, and beyond.

1.1 Research Objectives

i. Assess the level of IPTp-SP uptake among pregnant women in the Sene East District
ii. Assess the knowledge level of pregnant women about IPTp-SP
iii. Examine the factors that are associated with IPTp-SP uptake among pregnant women in the District
iv. Provide some recommendations to improve IPTp uptake in the District

II. LITERATURE REVIEW

2.1 Theoretical Review

The study is guided by the Health Belief Model (HBM), which is explained by the fact that individuals' behaviours are influenced by what they believe will bring about positive health outcomes. Specifically, the model provides us with an understanding of factors that influence individuals' decisions in implementing the appropriate health behaviours to avoid or ameliorate the impact of a particular disease (McArthur et al., 2018). The model has six elements, which include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy (Orji et al., 2012; Bandura, 1977). Given the relatively low coverage associated with IPTp, it is believed that some women do not perceive themselves as susceptible or being at risk of not taking the IPTp, and hence may not make efforts to receive IPTp.

In terms of severity, the individual's perception of the severity of malaria during pregnancy is likely to take the necessary steps to receive IPTp. On the other hand, if an individual does not perceive any serious health risk associated with the disease, she is unlikely to change their behavior to seek malaria vaccination during pregnancy. It has been shown that individuals with a high perception of the severity of a disease are more likely to change their behavior to prevent or minimize its impact (Simegn et al., 2023). Any health behaviour change towards avoiding a particular health condition is related to knowing and having the belief that there are benefits associated with the particular behaviour change.

Perceived barriers, which reflect obstacles to behaviour change, make the individual think about the perceived challenges they are likely to encounter in an attempt to take the necessary action to deal with the risk associated with the problem. This belief tends to discourage the individual from taking the necessary action to deal with the problem of malaria in pregnancy by taking the IPTp vaccine. On the other hand, an individual who trusts that any challenge, perceived or real, can be overcome is more likely to take the necessary action to deal with the particular health challenge.

Self-efficacy explains the individual's belief in their ability to effectively perform a certain action to achieve a certain health benefit. An individual's confidence will enable them to undertake behaviour change by making the effort to visit the health facility to receive IPTp. For instance, in their studies, Fathi et al (2017) and Vahedian-Shahroodi et al (2019) found a positive relationship between self-efficacy and positive behavioral change.

One critical factor in this model is cues to action. Under this construct, an individual is inspired to act to deal with a health problem. Specific cues from health personnel, relatives, or through observations can influence the individual's understanding of the severity of the disease and the need to engage in appropriate behaviour or take the appropriate action to minimize the risk associated with the refusal of taking the IPTp (Odwe et al., 2023).

2.2 Empirical Review

Intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine (IPTp-SP) has been widely documented as an effective intervention for reducing the incidence of malaria in pregnancy (Berchie et al., 2024). Several studies have been conducted to ascertain the factors that are associated with IPTp-SP uptake among pregnant women (Berchie et al, 2024; Orish et al, 2023; McArthur et al, 2018). Each of these studies has established varied, but sometimes common, factors that are associated with IPTp uptake. For instance, in their studies on factors associated with IPTp uptake in Ghana and Cameroon, Kumah et al. (2022) and Diengou et al (2020), respectively, found that education was a major determinant of IPTp uptake. Their findings revealed that pregnant women with higher levels of education were more likely to receive 3+ doses of SP compared to those with lower levels of education. It was explained that education beyond the primary level affords respondents some level of exposure that permits them to understand the benefits of IPTp-SP, either in terms of timing, frequency, or both.

Another important factor that influences the optimal uptake of IPTp-SP is gestational age at first initiation of ANC. Studies have established that uptake of adequate SP dosage varied significantly according to the timing of ANC initiation and the number of clinic visits (Anchang-Kimbi et al., 2020). Specifically, these studies found that pregnant women who attended the WHO-recommended four or more ANC sessions were found to receive adequate IPTp doses compared to those with less and late ANC attendance (De-Gaulle et al, 2021; Anchang-Kimbi et al, 2020).

Being aware of the importance of IPTp has been recognized to play a significant role in the use of IPTp-SP, and women who were seen to have knowledge in these regards were found to have optimal uptake. For instance, a study conducted in Uganda by Aporo et al. (2026) showed that most mothers had little or no knowledge about the dangers and prevention of malaria in pregnancy or the appropriate time to start IPTp-SP. As a result, their uptake of IPTp was suboptimal. Also, Ansong et al. (2025) found that women and mothers had the knowledge about IPTp are more likely to seek health interventions for health intervention about malaria prevention in pregnancy, thereby availing themselves to receive adequate doses of the IPTp medication. Taking IPTp medication under supervision is effective in the control of malaria in pregnancy. For instance, in their study in Malawi, Azizi et al (2018) found that pregnant women who took IPTp under Direct Observation Therapy (DOT) each time had a higher probability of completing three or more doses than those who took the medicine without supervision.

III. METHODOLOGY

3.1 Study Setting and Period

The study was conducted in the Sene East District, which is one of the eleven districts in the Bono East Region of Ghana. The district covers a total land area of 4,893 square kilometers and has a population of 72,081, giving a population density of 14.7 persons per square kilometer. Females constitute 46.7, with an average household size of 5.4 persons (Agyekum et al., 2024). The district is largely rural, and the majority of inhabitants are peasant farmers.

The district has three health centers and nineteen functional Community-Based Health Planning Services (CHPS), of which eight lack structures. There is no hospital nor any private health facilities in the district. The study was conducted between October 2022 and November 2023 in selected facilities that serve the majority of the population and are fairly distributed throughout the district. The distance to the nearest health center is approximately eight kilometers, while the farthest distance is about 25 kilometers. However, being the highest level of health facilities in the district, the three health centers serve as the major referral centers for ANC services.

3.2 Study Design

The study was a facility-based cross-sectional study, involving pregnant women and mothers of infants, and was carried out in six selected health facilities to assess IPTp-SP uptake. This study design is appropriate as it allows

for the collection of data within a relatively short period of time from a diverse group of respondents. This design also permits the collection of data at fewer designated points (health facilities). Applying this design, therefore, saves time and resources since researchers do not need to travel distances to respondents' homes for interviews. In all, this design allows for the assessment of the current situation regarding the levels, trends, and factors associated with the uptake of IPTp among pregnant women in the Sene East District of Ghana.

3.3 Study Participants/Population

The study involved pregnant women of gestational age of 36+ weeks and postpartum women within 4 weeks after delivery for easy recall of events during the period of pregnancy.

3.4 Sample Size Determination and Sampling Procedure

Cochran's sample size formula was used to determine the ideal number of women for the study (Cochran, 1977, p. 123). The formula is as stated below:

$$n = \frac{Z^2\left(1-\frac{\alpha}{2}\right)S^2}{e^2},$$

Where:

n=required sample size
Z=Standard normal variate for level of significance (α).
S=standard deviation of previous study
e=margin of error (5%)

Substituting the figures into the formula gives a sample size of 394. Adding 10% for non-response results in an overall total sample of 433 (394+39) study participants.

In terms of sampling, the multistage sampling technique was used to recruit the 433 respondents for the study. In the first stage, the three health centers were purposively selected because they are the major referral centers for obstetric care and are accessible and fairly distributed across the district. A simple random sampling method was also used to select three CHPS compounds from the 11 functional CHPS with permanent structures for their operations. At the facility level, pregnant women who met the inclusion criteria were selected using a systematic random sampling.

3.5 Data Collection

An electronic structured questionnaire using the KoboCollect app version 2023.2.4 was used to elicit information from respondents. The specific information collected was the socio-demographic characteristics of study participants, including age, residence, marital status, and educational level. Some aspects of participants' data were extracted from ANC registers. Such data included parity, gestational age at first ANC, and number of ANC visits made, gestational age of first dose of IPTp-SP, and number of total doses taken. The data collection instrument was pretested to check and correct any errors and inconsistencies in the questionnaire before actual data collection.

3.6 Study Variables

We measured the number of IPTp-SP doses taken by women as the **dependent variable.** This variable is measured as counts and later dichotomized into less than three doses (less than IPTp3) for suboptimal, and three or more doses of SP (IPTp3+) for optimal uptake. **Independent variables** included age, place of residence, marital status, educational level, distance to nearest health facility, as well as obstetric factors such as gestational age, parity, gestational age at first ANC, and number of ANC visits

3.7 Data Processing and Analysis

Data was exported into STATA version 17.0 for cleaning, management, and analysis. Descriptive statistics were used to summarize data on categorical variables. Numerical variables were summarized using means and Standard Deviation (SD). Bivariate and Pearson Chi2 test with p-values of less than 0.05 were used to determine the association between the dependent variable and the independent variables. Logistic regression analysis was performed to determine the strength of association between the independent and dependent variables. Analysis was performed at 95% CI and a level of significance of 0.05.

3.8 Ethical Approval and Informed Consent

Ethical approval was obtained from the University of Health and Allied Science (UHAS) Ethical Review Committee with reference number UHAS-REC B.10 [158]21-22. Permission was obtained from the Sene East District Health Directorate and the selected health facilities. Written informed consent was obtained from study participants who were 18+ years, and assent was obtained from those who were below 18 years.

IV. FINDINGS & DISCUSSION

4.1 Socio-Demographic Characteristics of Pregnant Women

Table 1 presents the socio-demographic characteristics of the 433 respondents. The average age is 27.6 years, with the majority (89.4%) being 20+ years; indicating a young adult-dominated sample. Ethnic diversity is notable, with the Konkomba group being the largest (31.6%), followed by Bassare (23.8%). Education levels were relatively high, with 76.0% having some formal education, while the rest had no formal schooling. Marital status shows a slight majority (56.8%) being married, while employment is nearly evenly split between employed (49.9%) and unemployed (50.1%) individuals. In terms of religion, Christians dominate (81.99%). Access to health facilities is generally good, with about 52.0% living within 30 minutes of the nearest facility, with 17.8% facing longer travel times.

Table 1

Socio-demographic Characteristics of Respondents

Variables	Freq. (433)	Percent (%)
Age groups (Year): Mean ±SD 27.58 ±5.95		
<20 years	46	10.6
20+	387	89.4
Ethnic group		
Akan	38	8.8
Bassare	103	23.8
Ewe	54	12.5
Konkomba	137	31.6
Others	101	23.3
Level of education		
No formal education	104	24.0
Some education	329	76.0
Marital status		
Currently married	246	56.8
Not currently married	187	43.2
Employment status		
Unemployed	217	50.1
Employed	216	49.9
Religion		
Christians	355	82.0
Others	78	18.0
Distance to Nearest Facility		
Less than 30 mins	225	52.0
30 mins to 1 hour	131	30.3
1+ hour	77	17.8

SD- Standard Deviation

4.1.1 Level of IPTp-SP Uptake among Pregnant Women

In terms of the IPTp uptake, the results show that about 9% took one dose, 32.6% took two doses, while 27.3%, 17.8%, and 13.4% took 3, 4, and 5 doses, respectively, as shown in Figure 1.

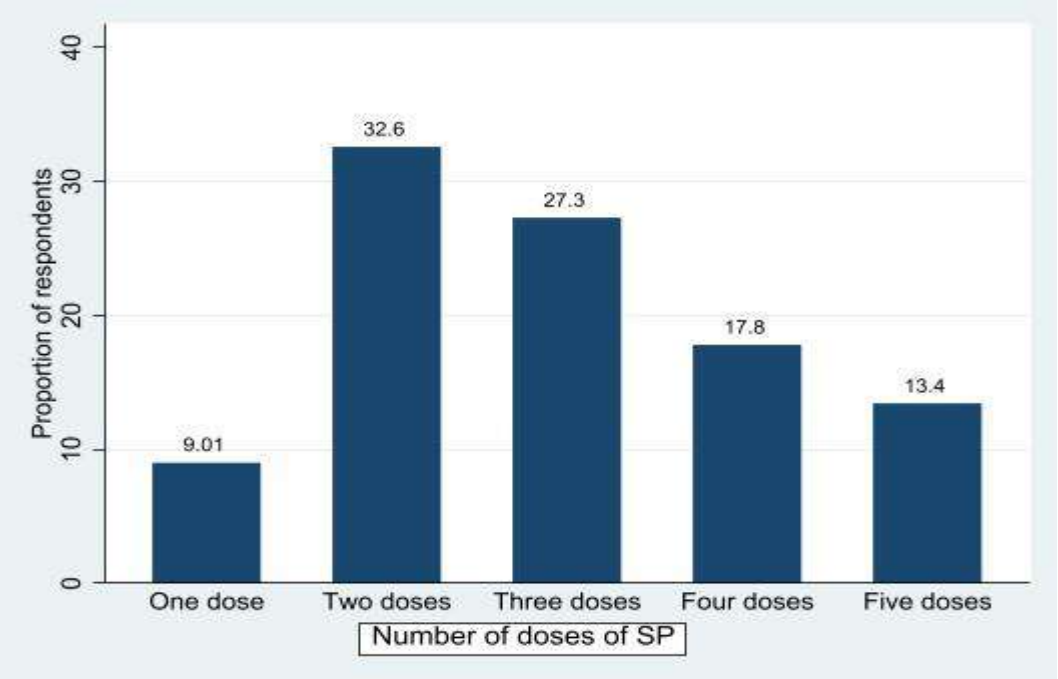

Figure 1
Distribution of IPTp Uptake by the Study Participants

4.1.2 Association of ANC attendance and IPTp-SP uptake

Table 2 presents the bivariate results of factors associated with IPTp uptake. The results show that 64.0% of women who attended ANC in their first trimester received IPTp3, versus 57.1% of those attending later, though this difference was not statistically significant. Also, about 71% of women with 5+ previous births received IPTp3+, while about 63% of women with between one and four children received IPTp3+. With regards to those with no previous births, only about 405 completed the optimal update of IPTp ($x2 = 17.95$, $p<0.003$). Additionally, 85% of women attending four or more ANC sessions received adequate IPTp doses ($x2 = 61.9$, $p <0.001$). Among those taking their first IPTp in the 2nd trimester, 60.5% received IPTp3+, compared to those starting in the 3rd trimester ($x2 = 16.3$, $p <0.001$). There was a notable positive correlation between DOT practices and IPTp3+ uptake, where 59.3% of women using DOTs received adequate doses, compared to 20% for those not using DOTs ($x2 = 0.68$, $p<0.017$). Staff attitude did not significantly correlate with IPTp uptake.

Table 2
Association of ANC Practices and Factors on Uptake of IPT-SP

Variables	IPT-SP DOSE N (%)		Chi Square	P-value
	Below IPT3	IPT3+		
First ANC Visit			1.35	0.809
1st trimester	31 (36.1)	55 (64.0)		
2nd-3rd trimester	149 (42.9)	198 (57.1)		
Parity			17.95	0.003
None	56 (60.2)	37 (39.8)		
1-4	111 (37.5)	185 (62.5)		
5 and above	13 (29.6)	31 (70.5)		
Number of ANC visits			61.91	0.000
< 4	140 (84.3)	26 (15.7)		
>=4	40 (15.0)	227 (85.0)		
Gestation at IPT1			16.28	0.000
2nd trimester	163 (39.5)	250 (60.5)		
3rd trimester	17 (85.0)	3 (15.0)		
DOT Practices			0.68	0.017
No	8 (80.0)	2 (20.0)		
Yes	172 (40.7)	251 (59.3)		
Staffs Attitude			0.68	0.222
Poor attitude	11 (50.0)	11 (50.0)		
Good attitude	169 (41.1)	242 (58.9)		

N: Number. %: Percentage.

In the chi-square test regarding respondents' knowledge level on IPTp-SP, awareness of the benefits associated with an adequate or optimal number of IPTp-SP doses showed a significant positive association with adherence to IPTp-SP ($x^2 = 5.19$, $p < 0.003$). Furthermore, there was a significant correlation between knowledge of the use or importance of SP and IPTp-SP uptake ($x^2 = 1.08$, $p < 0.049$). Likewise, women who understood that ANC visits occur monthly were more likely to meet the minimum requirement (57.9%) for IPTp-SP uptake (Table 3).

Table 3

Association of Respondent Level of Knowledge and Uptake of IPTp-SP

Variables	**IPT-SP DOSE N (%)**		**Chi-square**	**P-value**
	Below IPT3	**IPT3+**		
knowledge of respondents on ANC visits			4.33	0.04
Every two months	0 (0)	6 (100.0)		
Monthly	180 (42.2)	247 (57.9)		
Knowledge of IPT-SP benefits			1.08	0.049
Yes	140 (40.4)	207 (59.7)		
No	40 (46.5)	46 (53.5)		
Knowledge of the number of IPT doses			5.19	0.003
Yes	91 (47.6)	100 (52.4)		
No	89 (36.8)	153 (63.2)		
Knowledge of duration between doses			0.0	0.651
No	146 (41.6)	205 (58.4)		
Yes	34 (41.5)	48 (58.5)		
Source of information on SP			0.64	0.32
ANC staffs	176 (41.9)	244 (58.1)		
Other sources	4 (30.8)	9 (69.2)		

N: Number. %: Percentage.

4.1.3 Factors associated with IPTp-SP uptake: Logistic regression model

Table 4 presents the results of the adjusted Odd Ratio (aOR) of the logistic regression analysis. The aOR considers all the variables together to see the net effect of each of them on the outcome variable (IPTp-SP). In terms of education, women with some education were 72% more likely to receive IPT3+ as compared to those without formal education [*aOR=1.72; p=0.049; CI (1.00-2.96*)]. Parity also showed a significant association with IPTp-SP uptake. After adjusting for confounding factors, the results showed that women who had up to four deliveries were 2.4 times more likely to take IPTp-SP compared to those who had never delivered [*aOR=2.35; p=0.003; CI (1.34 - 4.13*)]. Similarly, women with 5+ deliveries were found to be 3.8 times more likely to take the optimal number of IPTp-SP compared to their counterparts who had never delivered before [*aOR=3.80; P=0.004; CI (1.54 - 9.14*)].

With respect to gestation at first IPT, the results showed that women who took IPTp-1 at the 3rd- trimester were 99.4% less likely to attain IPTp-3 uptake compared to those who started their first IPTp at the 2nd-trimester [*aOR=0.06; P= 0.0001; CI (0.01 - 0.24*)]. Unexpectedly, women who had no knowledge about the ideal number of IPTp were 2 times more likely to take up to IPTp-3 compared to those who had knowledge about the benefit of IPTp-SP [*aOR=2.02; P=0.005; CI (1.23 - 3.31*)]. Age, marital status, employment, religion, and distance to facility did not show a significant association with IPTp-SP uptake.

Table 1

Factors Associated with Uptake of IPTp-SP; Logistic Regression Model

Variables	aOR	95% CI		p-value	
Age group					
<20 years	Ref	.	.	.	
20+	1.802	0.826-3.932		0.139	
Level of education		.	.	.	
No formal education	Ref				
Some education	1.722	1.002- 2.961		**0.049**	
Marital status		.	.	.	
Currently married	Ref				
Not currently married	1.041	0.655- 1.653		0.866	
Employment status		.	.	.	
Unemployed	Ref				
Employed	0.753	0.477 - 1.187		0.221	
Religion		.	.	.	
Christians	Ref				
Others	1.498	0.867 - 2.588		0.147	
Distance to Nearest Facility		.	.	.	
Less than 30 mins	Ref				
30 mins to 1 hr	0.795	0.497 - 1.271		0.337	
Above 1 hr	1.068	0.563 - 2.024		0.84	
Parity		.	.	.	
None	Ref				
1 – 4	2.352	1.341 - 4.128		**0.003**	
5 and above	3.752	1.54 - 9.141		**0.004**	
First ANC Visit		.	.	.	
1st trimester	Ref				
2nd -3rd trimester	0.681	0.401 -1.156		0.155	
Gestation at IPT1					
2nd trimester	Ref				
3rd trimester	0.055043	0 .0125 - 0 .2426		0.0001	***
Knowledge of benefit of IPT		.	.	.	
Yes	Ref				
No	0.596	0.332 - 1.067		0.082	*
Knowledge of the number of IPT doses		.	.	.	
Yes	Ref				
No	2.021	1.23 - 3.309		0.005	***

*** p<.01, ** p<.05, * p<.1

4.2 Discussion

The study findings show that the proportion of women who took the recommended minimum of three doses of IPTp with SP is low (58.4%), compared to the Roll Back Malaria (RBM) benchmark target of at least 80% for all pregnant women residing in areas with moderate-to-high malaria transmission in Africa (WHO, 2014). This finding is consistent with a study conducted in northern Ghana and Nigeria, which reported IPTp3+ coverage of 56% and 53.0%, respectively (Agyeman et al., 2020; Akpa et al., 2019). However, this is higher than the 31.8% in a study conducted in Kumasi (Addai-Mensah et al., 2018), as well as 46.6% in a study conducted in the Cape Coast Metropolis (Amoako & Anto, 2021). These variations could be due to several factors, including differences in the geographical locations of study areas, in terms of rural-urban dichotomy, cultural factors, health system factors, among others. With about one-third of the women not meeting the minimal uptake of IPTp (IPTp3), there is a need to understand the context-specific factors associated with this low uptake. This will guide the implementation of appropriate policies to help achieve the vision of eliminating malaria by 2030.

The study findings also indicate that, though marginal, education has a positive relationship with IPTp update. Specifically, women with some level of education have a higher chance of achieving the optimal level of IPTp3+ uptake. This finding is consistent with a study conducted in Kenya, which found that women with higher (tertiary) levels of

education were 51% more likely to attain the optimal IPTp3+ doses (Mutanyi et al., 2021). Another study in Ghana revealed that pregnant women with tertiary education took 3 or more doses of IPTp compared to women without tertiary education (Orish et al., 2023). In general, several other studies have also confirmed that higher education is associated with better uptake of IPTp (Addai-Mensah et al., 2018; Fathi et al., 2017).

In addition, parity emerged as a strong predictor of IPTp-SP uptake. Women who have experienced at least one pregnancy were found to have higher odds of taking the optimal doses of IPTp compared to women who have never been pregnant before. These findings are consistent with some studies conducted in Malawi (Azizi et al., 2018; Azizi, 2020) and Tanzania (Mchwampaka et al., 2019), where having experienced at least two pregnancy were associated with higher uptake of IPTp-SP. Similarly, Bajaria et al. (2019) as well as Nsibu et al. (2016) reported a significant association between parity and IPTp-SP uptake. These findings indicate that experience with previous pregnancies may enhance awareness and utilization of IPTp uptake. Similarly, women who are multiparous and noticed the importance of SP in their previous pregnancies will be motivated to take IPTp-SP as required (Bajaria et al., 2019; Nsibu et al., 2016). To improve IPTp uptake among pregnant women, there is a need for targeted education for first-time mothers who may be less informed or have limited experience in malaria preventive measures.

Also, gestation at the first dose of IPTp uptake was statistically associated with IPTp3+ uptake. Specifically, the result showed that women who took their first IPTp-SP dose in the third trimester are less likely to receive IPTp3+. This is consistent with a study conducted in the Cape Coast metropolis, Ghana, which showed that taking the first dose of IPTp-SP during the third trimester and making four or more visits enabled the women to receive three or more doses of IPTp-SP. The findings suggest that increasing the frequency of ANC visits might improve IPTp-SP coverage, potentially enhancing maternal and fetal outcomes in malaria-endemic regions (Vahedian-Shahroodi et al., 2019).

Results of this study reveal that women who did not know the ideal number of IPT doses required during pregnancy were 2.3 times more likely to receive IPTp3+ compared to those who knew. This is surprising as it is expected that those who have knowledge would rather be better off in the uptake of IPTp. This suggests that while awareness is important, it may not be sufficient alone to drive behaviour change in this setting. Contrary to our findings, a study conducted in Bamenda health districts, Cameroon, found that knowledge on the ideal number of IPTp was significantly associated with increased uptake of IPTp among pregnant women (Diengou et al., 2020). Also, a study in Ghana by Orish et al. (2023) demonstrated that knowledge about IPTp was a predictor for uptake of IPTp.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The results of this study have highlighted the fact that IPTp update in the study area is low. It also highlights factors that are associated with optimal IPTp uptake in a typical rural setting in Ghana. The dominant factors that are found to be associated with IPTp uptake include higher maternal education, higher parity, early gestation, and, unexpectedly, lack of knowledge of IPTp uptake.

5.2 Recommendations

Given the factors enumerated above as those associated with IPTp uptake, there is a need for context-specific interventions to improve IPTp uptake in the study area. The following recommendations are therefore proposed to improve IPTp uptake in the Sene East District: Higher levels of female education are associated with IPTp uptake, as revealed by this study. It is therefore important to implement policies that enhance female education, particularly formal education. This requires collaborative efforts by all stakeholders, particularly parents, to ensure that the girl-child is given formal education to the highest level possible. In line with this, public health education should also be intensified by all relevant stakeholders, such as the Health Promotion Units of the GHS, Local Health Committees, and District Assemblies, among others. Education should emphasize the significance of early ANC visits, understanding the importance and benefits of taking the optimal number of IPTp.

Parity was also found to be associated with IPTp uptake, where nulliparous women were less likely to receive the full dose of the medication. Being young and inexperienced, much attention should be focused on them in terms of health education in the various aspects of malaria prevention methods, including the timely and adequate uptake of IPTp medication. Finally, further quantitative and qualitative studies are recommended to fully understand the socio-cultural factors, both at the individual and community levels that impede IPTp uptake among pregnant women in the community.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding Declaration

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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