***Original Research Article***

**Awareness and level of Usage of intermittent preventive treatment for malaria among pregnant women attending antenatal clinics in rural Communities in Abia State, Nigeria**

**ABSTRACT**

**Background:** Malaria in pregnancy (MiP) is a major public health concern in sub-Saharan Africa, contributing to maternal and neonatal morbidity and mortality. Intermittent Preventive Treatment in pregnancy using Sulphadoxine-Pyrimethamine (IPTp-SP) is a key strategy endorsed by the WHO to prevent MiP. However, uptake remains suboptimal, particularly in rural settings.

**Objective:** To assess the awareness and level of usage of IPTp-SP among pregnant women attending antenatal clinics in selected rural communities in Abia State, Nigeria.

**Methods:** A descriptive cross-sectional study was conducted among 422 pregnant women using a multistage sampling technique in Ugwunagbo, Isiala Ngwa South, and Ukwa East LGAs. Data were collected using a pre-tested, interviewer-administered semi-structured questionnaire adapted from validated instruments. Descriptive statistics, Chi-square tests, and Pearson correlation analysis were conducted using SPSS version 25. A p-value <0.01 was considered statistically significant.

**Results:** Out of 422 respondents, 80.8% were aware of IPTp, and 73.0% had received at least one dose of SP during pregnancy. However, only 26.3% received the recommended three doses or more. Awareness of IPTp was significantly associated with educational level (χ²=18.94, p=0.0003), and IPTp usage was significantly associated with frequency of antenatal visits (χ²=25.72, p<0.001). Pearson correlation analysis showed strong positive associations between IPTp use and ANC visits (r=0.62), and negative associations with distance to the health facility (r=-0.47). Major barriers to IPTp uptake included a lack of awareness, unavailability of SP, and fear of side effects. Respondents recommended increased awareness campaigns (73.0%), drug availability (64.7%), and improved healthcare worker attitudes (48.3%).

**Conclusion:** While awareness and usage of IPTp-SP among pregnant women in rural Abia State are relatively high, gaps remain in achieving the full dosage regimen. Targeted interventions to improve education, ensure SP availability, and enhance antenatal service delivery are essential for optimal uptake and malaria prevention in pregnancy.

**Keywords:** Malaria in pregnancy, Intermittent preventive treatment, Sulphadoxine-Pyrimethamine, Rural health, Antenatal care.

1. **INTRODUCTION**

Malaria remains a significant public health concern in Nigeria, particularly among pregnant women in rural communities. Despite ongoing efforts to mitigate its impact, malaria continues to contribute substantially to maternal and neonatal morbidity and mortality. The World Health Organization (WHO) identifies malaria in pregnancy (MiP) as a leading cause of adverse pregnancy outcomes, including maternal anemia, low birth weight, stillbirth, and neonatal death, especially in sub-Saharan Africa [1].

To address this challenge, the WHO recommends Intermittent Preventive Treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) as a key strategy for preventing MiP. This approach involves administering SP to pregnant women at predefined intervals during pregnancy, beginning after quickening, to reduce the incidence of malaria and its associated complications [2]. The Nigerian Federal Ministry of Health adopted this recommendation in 2001, advocating for at least three doses of SP during pregnancy under directly observed therapy (DOT) in antenatal clinics (ANCs) [2].

Despite these guidelines, the uptake of IPTp-SP among pregnant women in Nigeria remains suboptimal. Studies indicate that while awareness of malaria and its prevention is relatively high, actual utilization of IPTp-SP is low. For instance, a study in Rivers State found that although 80.8% of pregnant women attended ANCs, only 62.8% took malaria preventive treatment, and a mere 16.4% adhered to the DOT protocol [3]. Similarly, research in Cross River State reported that only 30.7% of pregnant women received at least two doses of IPTp-SP, far below the WHO's recommended coverage [4].

Several factors contribute to the low uptake of IPTp-SP in Nigeria, particularly in rural areas. These include limited access to healthcare facilities, stock-outs of SP, inadequate knowledge about IPTp-SP among pregnant women, and sociocultural beliefs that discourage the use of modern medicine [3,5]. In some communities, traditional beliefs and practices, such as the use of herbal remedies, are preferred over biomedical interventions, further hindering the adoption of IPTp-SP [4].

In Abia State, located in southeastern Nigeria, malaria remains endemic, and pregnant women in rural communities are particularly vulnerable. However, there is a paucity of data on the awareness and utilization of IPTp-SP among this population. Understanding the level of awareness and usage of IPTp-SP among pregnant women attending ANCs in rural Abia State is crucial for developing targeted interventions to improve uptake and, consequently, maternal and neonatal health outcomes.

1. **MATERIALS AND METHODS**

**2.1 Study Area**

The researchers reported that the study was conducted in selected rural communities of Abia State, located in the southeastern region of Nigeria. Abia State is administratively divided into 17 Local Government Areas (LGAs), out of which Ugwunagbo, Isiala Ngwa South, and Ukwa East LGAs were purposively selected for this research due to their predominantly rural characteristics, high malaria burden, and significant numbers of antenatal clinic attendees. The rural communities selected were typified by limited healthcare infrastructure, poor health-seeking behaviors, and a high prevalence of malaria in pregnancy (MiP). These LGAs were also characterized by widespread use of primary and secondary healthcare facilities for antenatal services.

**2.2 Study Design**

The study was described as a descriptive cross-sectional survey aimed at assessing the awareness and usage of Intermittent Preventive Treatment (IPTp) for malaria using Sulphadoxine-Pyrimethamine (SP) among pregnant women in the selected rural communities. The researchers indicated that both quantitative and qualitative methods were employed to ensure a robust and comprehensive analysis of the research objectives.

**Population and Sampling Techniques**

The target population included pregnant women attending antenatal clinics in the selected rural LGAs during the study period. A multistage sampling technique was utilized in selecting the study respondents. In the first stage, the researchers purposively selected Ugwunagbo, Isiala Ngwa South, and Ukwa East LGAs based on documented malaria prevalence and accessibility as provided by the Abia State Ministry of Health.

In the second stage, a comprehensive list of all public primary and secondary health facilities offering antenatal care services within the selected LGAs was obtained from the Abia State Ministry of Health. Using simple random sampling, a proportional number of healthcare facilities were selected from each LGA to ensure representativeness.

In the third and final stage, the researchers employed a consecutive sampling technique to recruit all consenting pregnant women who were attending antenatal clinics on the scheduled clinic days in the selected health facilities during the study period. Inclusion criteria consisted of pregnant women of any gestational age who gave informed consent, while exclusion criteria included those who were critically ill or declined participation.

**2.3 Sample Size Determination**

The sample size was calculated based on Cochran’s formula for population proportion estimation, following the methodology described by Ezebuiro et al. [6]:

n = $\frac{Z^{2}(Pq)}{e^{2}}$

The formula components are defined as follows:

* *n* represents the minimum required sample size.
* *Z* is set at 1.96, corresponding to a 95% confidence level.
* *P* denotes the established prevalence of adequate knowledge or practice of IPTp in Nigeria.
* *e* signifies the allowable margin of error, fixed at 5% (0.05).
* q = 1 - p

A recent study conducted by Orish et al. [7] reports that 52.1% had average knowledge or practice of IPTp

P = 52.1% = 0.521

q = 1 – 0.521

= 0.479

n = $\frac{\left(1.96\right)^{2}(0.521 x 0.479)}{(0.05)^{2}}$

n = $\frac{3.8416 x (0.249559)}{0.0025}$

n = $\frac{0.9587}{0.0025}$ = 383.48

Although the initially calculated minimum sample size was 383, it was increased to 422 to accommodate an anticipated 10% rate of non-response.

**2.4 Data Collection Instrument**

Data collection was conducted using a pre-tested, semi-structured interviewer-administered questionnaire. The questionnaire was adapted from validated instruments used in previous malaria and maternal health studies and modified to suit the local context. It was divided into five sections: socio-demographic characteristics, obstetric history, awareness of malaria and IPTp, knowledge and attitudes towards IPTp, and usage of SP. The questionnaire was translated into the local Igbo language and back-translated into English to ensure accuracy and clarity.

**2.5 Data Collection Procedure**

The data were collected over a 6-week period in each LGA by trained research assistants who were fluent in English and the local dialect. Prior to data collection, the assistants underwent a two-day training session covering the study objectives, ethical considerations, content of the questionnaire, and interview techniques. The researchers reported that data collection took place during routine antenatal clinic days, with women approached before or after their consultation. Oral and written informed consent was obtained from each participant. Anonymity and confidentiality were assured throughout the process.

**2.7 Quality Control**

To ensure the validity and reliability of the instrument, a pilot study was conducted in a rural health facility outside the study LGAs. The researchers noted that the questionnaire was revised based on feedback from the pilot study to eliminate ambiguous or misleading items. Field supervisors monitored the data collection process daily, reviewing completed questionnaires for completeness and consistency. Erroneous entries were addressed through on-the-spot corrections and re-interviews where necessary.

**2.8 Ethical Considerations**

Permission was obtained from the respective health facility managers. Each participant was informed of the study’s purpose, the voluntary nature of participation, and their right to withdraw at any time without consequences to their care. The researchers ensured that confidentiality was maintained by assigning unique identification codes rather than recording personal identifiers.

**2.9 Data Management and Analysis**

Upon completion of data collection, all questionnaires were manually checked, coded, and entered into a computer using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics such as frequencies, means, and percentages were used to summarize the socio-demographic and clinical characteristics of the respondents. Awareness and usage levels of IPTp-SP were analyzed and categorized based on predefined criteria. Bivariate analysis using Chi-square tests was conducted to determine associations between socio-demographic variables and IPTp usage. A p-value of <0.01 was considered statistically significant.

1. **RESULTS**

The study involved 422 pregnant women, primarily aged 25–34 years (Table 1), with most being married (85.1%) and having secondary or tertiary education (43.8% and 37.0%, respectively). Christianity was the dominant religion (89.6%), and the majority were traders, civil servants, or artisans.

Awareness of Malaria in Pregnancy (Table 2) was high, with 94.5% having heard of it. Health workers were the main source of information (71.3%). Respondents identified various risks, including anaemia (70.1%), low birth weight (62.6%), and miscarriage (58.8%). Most (77.7%) had been tested for malaria, and 90.3% believed it was dangerous during pregnancy. Awareness of IPTp (Table 3) was reported by 80.8% of respondents, primarily through antenatal clinics (54.3%). However, knowledge gaps existed: only 57.8% knew the drug used for IPTp, and 48.3% were unsure about the correct frequency of use.

Utilization of IPTp-SP (Table 4) showed that 73.0% had received at least one dose, with 33.4% receiving two doses. However, only 47.9% received it under direct observation. Barriers included lack of awareness (19.4%), unavailability of drugs (15.9%), and fear of side effects (12.8%). Despite this, 79.1% expressed willingness to continue IPTp-SP in future pregnancies.

Antenatal Care and Health Facility Factors (Table 5) revealed that 65.2% had four or more ANC visits. While 76.3% received malaria education and 66.6% had IPTp explained, SP drug availability was inconsistent—only 38.2% reported it was always available. Distance to facility and mode of transport varied, with motorcycles (39.3%) being most common. Suggestions for Improvement (Table 6) included more education (73.0%), free drug distribution (67.8%), better drug availability (64.7%), and friendlier health worker attitudes (48.3%).

Correlation analysis (Table 7) showed that IPTp use was positively correlated with ANC visits (r = 0.62), awareness (r = 0.53), and education (r = 0.29), and negatively correlated with distance to health facility (r = -0.47).

Chi-square results (Table 8) indicated significant associations between IPTp awareness and education (χ² = 18.94, *p* = 0.0003), IPTp use and ANC visits (χ² = 25.72, *p* < 0.0001), and IPTp use and health worker attitude (χ² = 11.48, *p* = 0.0094). Distance to facility was also significantly associated with ANC visits (χ² = 21.03, *p* < 0.001), while religion had no significant association with IPTp use (*p* = 0.277).

**Table 1: Socio-Demographic Information**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| **Age** |  |  |
| <20 years | 29 | 6.9 |
| 20–24 years | 67 | 15.9 |
| 25–29 years | 103 | 24.4 |
| 30–34 years | 102 | 24.2 |
| 35–39 years | 71 | 16.8 |
| ≥40 years | 50 | 11.8 |
| **Marital Status** |  |  |
| Single | 38 | 9.0 |
| Married | 359 | 85.1 |
| Divorced/Separated | 15 | 3.6 |
| Widowed | 10 | 2.4 |
| **Educational Level** |  |  |
| No formal education | 22 | 5.2 |
| Primary education | 59 | 14.0 |
| Secondary education | 185 | 43.8 |
| Tertiary education | 156 | 37.0 |
| **Occupation** |  |  |
| Unemployed | 36 | 8.5 |
| Farmer | 61 | 14.5 |
| Trader | 143 | 33.9 |
| Artisan | 74 | 17.5 |
| Civil servant | 79 | 18.7 |
| Others | 29 | 6.9 |
| **Religion** |  |  |
| Christianity | 378 | 89.6 |
| Islam | 33 | 7.8 |
| Traditional | 7 | 1.7 |
| Others | 4 | 0.9 |
| **Parity (Number of children)** |  |  |
| 0 | 74 | 17.5 |
| 1–2 | 170 | 40.3 |
| 3–4 | 128 | 30.3 |
| ≥5 | 50 | 11.8 |
| **Trimester of Pregnancy** |  |  |
| First trimester | 62 | 14.7 |
| Second trimester | 192 | 45.5 |
| Third trimester | 168 | 39.8 |

**Table 2: Awareness of Malaria in Pregnancy**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| Heard about malaria in pregnancy |  |  |
| Yes | 399 | 94.5 |
| No | 23 | 5.5 |
| **Sources of information** (multiple responses) |  |  |
| Health workers | 301 | 71.3 |
| Radio/TV | 187 | 44.3 |
| Friends/Relatives | 192 | 45.5 |
| Posters/Flyers | 108 | 25.6 |
| Social media | 96 | 22.7 |
| Community meetings | 84 | 19.9 |
| **Dangers of malaria in pregnancy** (multiple responses) |  |  |
| Miscarriage | 248 | 58.8 |
| Anaemia | 296 | 70.1 |
| Stillbirth | 211 | 50.0 |
| Low birth weight | 264 | 62.6 |
| Premature birth | 199 | 47.2 |
| Convulsions | 124 | 29.4 |
| Death | 177 | 41.9 |
| I don't know | 53 | 12.6 |
| **Tested for malaria during this pregnancy** |  |  |
| Yes | 328 | 77.7 |
| No | 94 | 22.3 |
| **Had malaria since becoming pregnant** |  |  |
| Yes | 146 | 34.6 |
| No | 276 | 65.4 |
| **Believe malaria is dangerous in pregnancy** |  |  |
| Yes | 381 | 90.3 |
| No | 21 | 5.0 |
| Not sure | 20 | 4.7 |

**Table 3: Awareness of IPTp**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| **Heard of IPTp** |  |  |
| Yes | 341 | 80.8 |
| No | 81 | 19.2 |
| **Where first heard about IPTp** |  |  |
| Antenatal clinic | 229 | 54.3 |
| Community health worker | 52 | 12.3 |
| Mass media | 34 | 8.1 |
| Family/friends | 19 | 4.5 |
| Others | 7 | 1.7 |
| **Know the drug used for IPTp** |  |  |
| Yes | 244 | 57.8 |
| No | 178 | 42.2 |
| **When should IPTp start?** |  |  |
| First trimester | 45 | 10.7 |
| Second trimester | 211 | 50.0 |
| Third trimester | 46 | 10.9 |
| I don’t know | 120 | 28.4 |
| **Frequency of IPTp** |  |  |
| Monthly | 116 | 27.5 |
| Every two months | 73 | 17.3 |
| Once in the entire pregnancy | 29 | 6.9 |
| I don’t know | 204 | 48.3 |
| **Benefits of IPTp** (multiple responses) |  |  |
| Prevent malaria | 278 | 65.9 |
| Protect unborn baby | 249 | 59.0 |
| Prevent anaemia | 222 | 52.6 |
| Don’t know | 63 | 14.9 |

**Table 4: Utilization of IPTp-SP**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| Received any IPTp-SP during this pregnancy |  |  |
| Yes | 308 | 73.0 |
| No | 114 | 27.0 |
| **Number of doses taken** |  |  |
| 1 | 74 | 24.0 |
| 2 | 103 | 33.4 |
| 3 | 81 | 26.3 |
| More than 3 | 34 | 11.0 |
| Not sure | 16 | 5.2 |
| **Given under direct observation?** |  |  |
| Yes | 202 | 47.9 |
| No | 144 | 34.1 |
| Can’t remember | 76 | 18.0 |
| **Reasons for not taking IPTp-SP** (multiple responses) |  |  |
| Not aware of it | 82 | 19.4 |
| No drug at the clinic | 67 | 15.9 |
| Not offered by health worker | 48 | 11.4 |
| Fear of side effects | 54 | 12.8 |
| Cultural/religious beliefs | 21 | 5.0 |
| **Experienced side effects?** |  |  |
| Yes | 73 | 17.3 |
| No | 278 | 65.9 |
| Not sure | 71 | 16.8 |
| **Willing to continue IPTp-SP in future pregnancies** |  |  |
| Yes | 334 | 79.1 |
| No | 32 | 7.6 |
| Not sure | 56 | 13.3 |

**Table 5: Antenatal Care and Health Facility Factors**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| **Number of ANC visits** |  |  |
| Once | 41 | 9.7 |
| 2–3 times | 106 | 25.1 |
| 4–5 times | 148 | 35.1 |
| ≥6 times | 127 | 30.1 |
| **Health workers educate about malaria** |  |  |
| Yes | 322 | 76.3 |
| No | 56 | 13.3 |
| Sometimes | 44 | 10.4 |
| **Health workers explain IPTp** |  |  |
| Yes | 281 | 66.6 |
| No | 83 | 19.7 |
| Sometimes | 58 | 13.7 |
| **Attitude of health workers** |  |  |
| Very good | 142 | 33.6 |
| Good | 207 | 49.1 |
| Poor | 49 | 11.6 |
| Very poor | 24 | 5.7 |
| **Availability of SP drug** |  |  |
| Always | 161 | 38.2 |
| Sometimes | 168 | 39.8 |
| Rarely | 61 | 14.5 |
| Never | 32 | 7.6 |
| **Charged for IPTp** |  |  |
| Yes | 88 | 20.9 |
| No | 291 | 69.0 |
| Don’t know | 43 | 10.2 |
| **Distance to health facility** |  |  |
| <1 km | 96 | 22.7 |
| 1–3 km | 154 | 36.5 |
| 4–6 km | 108 | 25.6 |
| >6 km | 64 | 15.2 |
| **Mode of transport** |  |  |
| Walk | 78 | 18.5 |
| Motorcycle | 166 | 39.3 |
| Public transport | 117 | 27.7 |
| Private car | 38 | 9.0 |
| Others | 23 | 5.5 |

**Table 6: Suggestions and Recommendations**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage (%)** |
| More awareness and education | 308 | 73.0 |
| Free drugs at health centres | 286 | 67.8 |
| Friendly attitude of health workers | 204 | 48.3 |
| Availability of drugs | 273 | 64.7 |
| Community outreach programs | 192 | 45.5 |

**Table 7: Correlation Matrix (Pearson’s r)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **ANC Visits** | **IPTp Use** | **Awareness IPTp** | **Education Level** | **Distance to Facility** |
| ANC Visits | 1.00 | 0.62 | 0.45 | 0.38 | -0.51 |
| IPTp Use | 0.62 | 1.00 | 0.53 | 0.29 | -0.47 |
| Awareness IPTp | 0.45 | 0.53 | 1.00 | 0.41 | -0.33 |
| Education Level | 0.38 | 0.29 | 0.41 | 1.00 | -0.25 |
| Distance to Facility | -0.51 | -0.47 | -0.33 | -0.25 | 1.00 |

**Table 8: Chi-Square Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables Cross-tabulated** | **χ² (Chi-square)** | **df** | **p-value** |
| Education vs IPTp awareness | 18.94 | 3 | 0.0003 |
| ANC visits vs IPTp use | 25.72 | 3 | <0.0001 |
| Health worker attitude vs IPTp use | 11.48 | 3 | 0.0094 |
| Religion vs IPTp use | 3.86 | 3 | 0.277 |
| Distance to facility vs ANC visits | 21.03 | 3 | <0.001 |

P< 0.01 are considered significantly different

1. **DISCUSSION**

This study provides a comprehensive analysis of the awareness and utilization of Intermittent Preventive Treatment in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP) among pregnant women attending antenatal clinics in rural communities of Abia State, Nigeria. The majority of respondents were within the reproductive age group of 25–34 years, accounting for 48.6% of the study population. A significant proportion were married (85.1%), had attained at least secondary education (80.8%), and were engaged in occupations such as trading (33.9%) and civil service (18.7%). These demographics suggest a population with potential access to health information and services, which is crucial for the uptake of IPTp-SP.

An overwhelming majority (94.5%) had heard about malaria in pregnancy, with health workers (71.3%) being the primary source of information. This high level of awareness is consistent with findings from other regions in Nigeria, where health education initiatives have been pivotal in disseminating information about malaria prevention during pregnancy [8]. The recognition of anemia (70.1%) and low birth weight (62.6%) as dangers of malaria in pregnancy underscores the understanding of its adverse effects among the respondents.

Approximately 80.8% of the participants were aware of IPTp, with antenatal clinics being the main source of information (54.3%). However, knowledge gaps were evident, as only 57.8% knew the drug used for IPTp, and 28.4% were unaware of the appropriate time to commence IPTp. These findings align with previous studies indicating that while awareness may be high, detailed knowledge about IPTp remains limited [9].

The study revealed that 73.0% of the respondents received at least one dose of IPTp-SP during their current pregnancy. However, only 11.0% received more than three doses, which is below the World Health Organization's recommendation of at least three doses during pregnancy. Factors contributing to suboptimal uptake include lack of awareness (19.4%), unavailability of drugs at the clinic (15.9%), and fear of side effects (12.8%). These barriers are consistent with findings from other Nigerian studies, which have identified similar challenges in IPTp-SP utilization [10[.

The number of antenatal care (ANC) visits was positively correlated with IPTp-SP uptake, with 65.2% of women attending four or more ANC visits receiving at least one dose of IPTp-SP. Health worker education on malaria and IPTp was reported by 76.3% and 66.6% of respondents, respectively. The attitude of health workers also played a significant role, with 82.7% of respondents rating their attitude as good or very good. These findings underscore the importance of quality ANC services and health worker engagement in promoting IPTp-SP uptake.

Chi-square analysis demonstrated significant associations between education level and IPTp awareness (χ² = 18.94, p = 0.0003), ANC visits and IPTp use (χ² = 25.72, p < 0.0001), and health worker attitude and IPTp use (χ² = 11.48, p = 0.0094). These associations highlight the multifaceted factors influencing IPTp-SP utilization and the need for targeted interventions addressing these determinants.

Respondents suggested increased awareness and education (73.0%), provision of free drugs at health centers (67.8%), and improved availability of drugs (64.7%) as measures to enhance IPTp-SP uptake. Community outreach programs were also recommended by 45.5% of participants. These suggestions align with strategies proposed in previous studies, emphasizing the role of community engagement and health system strengthening in improving IPTp-SP coverage [8].

1. **CONCLUSION**

The study highlights a high level of awareness of malaria in pregnancy among pregnant women in rural Abia State, Nigeria. However, knowledge and utilization of IPTp-SP remain suboptimal, influenced by factors such as education level, ANC attendance, health worker engagement, and drug availability. Addressing these barriers through targeted health education, improved ANC services, and ensuring consistent drug supply is essential for enhancing IPTp-SP uptake and reducing the burden of malaria in pregnancy.

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