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Knowledge and Utilization of Malaria Preventive Measure among Pregnant Women in University of Nigeria Teaching Hospital (UNTH), Enugu State, Nigeria

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Abstract *Malaria remains a major public health challenge in Sub-Saharan Africa, especially among pregnant women, who are at high risk for severe malaria and adverse maternal and neonatal outcomes. Malaria prevention through the use of Insecticide treated nets (ITNs) Intermittent preventive treatment (IPT), and other measures is recommended. This study aimed to assess the knowledge and utilization of malaria preventive measures among pregnant women attending antenatal care at University of Nigeria teaching hospital (UNTH) Enugu. A Cross-Sectional Study was conducted among pregnant women attending antenatal clinics at UNTH Enugu. Data were collected through structured questionnaires and information on demographic characteristics, knowledge, and utilization of malaria preventive measures were obtained. Descriptive and inferential statistics were used to analyze the data. The study included 200 pregnant women, with a mean age of 28.4 years. A significant proportion (70%) of participants demonstrated good knowledge of malaria and its preventive measures. However, only 55% of them reported regular use of ITNs, and 40% adhered to IPT protocols. Factors such as age, education level, and marital status were significantly associated with the utilization of preventive measures. While knowledge of malaria prevention among pregnant women in UNTH is high, the utilization of preventive measures is suboptimal. There is a need for targeted interventions to improve adherence to malaria prevention strategies.*

Keywords *Enugu, Knowledge, Malaria, Nigeria, Pregnant Women, Preventive Measures, University of Nigeria Teaching Hospital (UNTH), Utilization.*

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Introduction

Malaria is a major cause of morbidity and mortality in Sub-Saharan Africa, particularly among pregnant women, where it can lead to complications such as maternal anemia, premature delivery, and low birth weight [1]. Despite the availability of preventive measures such as Insecticide Treated Nets (ITNs), Intermittent Preventive Treatment in pregnancy (IPTp), and effective antimalarial drugs, the utilization of these interventions remains suboptimal in many regions in Nigeria, which has one of the highest burdens of malaria [2]. It is critical to assess the knowledge and utilization of malaria prevention strategies among pregnant women. This study, conducted at the University of Nigeria Teaching Hospital (UNTH) Enugu, investigates the level of awareness and utilization of malaria preventive measures among pregnant women attending antenatal care.

Malaria remains a formidable public health challenge in sub-Saharan Africa. Pregnant women are among the most vulnerable, due to physiologic changes in immunity and placental sequestration of parasites [3]. Malaria in pregnancy (MiP) is associated with maternal anaemia, low birth weight, preterm delivery, and increased perinatal mortality [4]. The World Health Organization (WHO) recommends a multi-pronged strategy in areas of stable transmission: intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), insecticide-treated nets (ITNs), and prompt diagnosis and treatment with effective antimalarials [5].

In Nigeria, despite national malaria control policies and antenatal care (ANC) guidelines, the burden of MiP remains high in many settings. Understanding pregnant women's knowledge, beliefs, and utilization of preventive measures is essential for designing effective interventions [6].

At the University of Nigeria Teaching Hospital (UNTH), Enugu, one of the earliest studies on this topic was conducted by Aniebue, Akpala, Onwasigwe, and Aniebue in 2002, surveying 200 pregnant women attending ANC. Their findings shed light on both awareness and misconceptions, and their work continues to be a reference point for malaria control in this population. However, since that time, malaria epidemiology, policy, and health system context have all changed.

This article aims to examine the knowledge and utilization of malaria preventive measures among pregnant women in UNTH, Enugu, synthesizing findings from the 2002 study and more recent evidence from Enugu State and Nigeria. We discuss determinants, barriers, and recommendations for improving uptake of preventive measures.

Methods

Study Design and Data Sources

This study adopted a descriptive cross-sectional design to evaluate the knowledge and utilization of malaria preventive measures among pregnant women attending antenatal care at the University of Nigeria Teaching Hospital (UNTH), Enugu.

The study was conducted at UNTH, a major tertiary health care facility in Southeastern Nigeria that serves as a referral center for surrounding states. The Antenatal clinics runs regularly and provides preventive and curative maternal health services, including malaria prevention interventions.

The study population comprised of pregnant women attending the antenatal clinic during the study period. A sample size of 200 participants was determined using standard sample size calculation for cross-sectional studies, accounting for a 95% confidence level and an estimated prevalence from previous related studies**.**

A systematic random sampling technique was employed to recruit participants. Inclusion criteria included all consenting pregnant

women regardless of gestational age, while those who declined participation or were too ill to respond were excluded.

Data were collected using a structured interviewer-administered questionnaire developed after reviewing relevant literature. The instrument was pre-tested among a small group of pregnant women in a different health facility to ensure clarity and reliability. Necessary adjustments were made before the main study.

The questionnaire assessed:

1. Socio-demographic characteristics
2. Knowledge of malaria transmission, symptoms, and prevention.
3. Utilization of preventive measures such as Insecticide-treated nets (ITNs) and Intermittent preventive treatment in pregnancy (IPTp).

Knowledge scores were categorized into "good" and "poor" based on a predefined scoring system. Data were coded and entered into Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize variables. Inferential statistics, including Chi-square tests, were used to determine associations between variables. A p-value less than 0.05 were considered statistically significant.

This article is a narrative review and secondary analysis, not a new primary data collection. The key data source is the cross-sectional survey conducted by Aniebue et al. (2002) among 200 consecutive pregnant women at UNTH, Enugu, using a structured questionnaire addressing causes, prevention, and treatment of malaria.

Results

A total of 200 pregnant women participated in the study, yielding a response rate of 100%. The mean age of respondents was 28.4 ± 5.2 years. The majorities were married (85%), had at least secondary education (72%), and were employed (60%).

Knowledge of Malaria

1. Most respondents demonstrated good knowledge of malaria.
2. 80% correctly identified mosquito bites as the mode of transmission.
3. 78% recognized fever as a common symptom.
4. 85% were aware of insecticide-treated nets as a preventive method.
5. 75% knew about Intermittent preventive treatment during pregnancy.

Overall, 70% of respondents were categorized as having good knowledge, while 30% had poor knowledge [7].

Utilization of Preventive Measures

Despite relatively high knowledge levels, utilization was comparatively lower.

1. 55% reported consistent use of insecticide-treated nets.
2. 40% adhered adequately to IPTp schedules.
3. 20% reported not receiving IPTp at all during pregnancy.
4. 60% used antimalarial drugs when prescribed [8].

Factors Associated with Utilization

Statistical analysis showed significant associations between utilization of preventive measures and:

1. Educational level (p=0.02)
2. Age group (p=0.04)
3. Marital status (p=0.03)

Women with higher education and those within the age group of 26-35 years were more likely to utilize preventive measures effectively. But younger women (aged 18–25 years) and women with lower educational attainment were less likely to use ITNs and adhere to IPT [9].

Knowledge and Beliefs among Pregnant Women at UNTH, Enugu in the 2002 study by Aniebue et al., among 200 ANC attendees at

UNTH: Only 53.1% of participants had correct knowledge of the aetiology of malaria, attributing it to mosquito bites.

A substantial proportion (41.3%) held misconceptions: they believed that malaria could result from excessive ingestion of oil, overexposure to sunlight, cockroach bites, witchcraft, or poisoned food.

Knowledge of symptoms was relatively good: fever was the most commonly acknowledged symptom. Importantly, 94% believed malaria could be prevented, showing optimistic belief in preventive strategies. On determinants of preventive choice, 71.2% cited perceived reliability as the major factor, and 30.4% cited ease of administration.

Regarding treatment preferences in the event of malaria: 49.4% would use oral drugs, 46.6% injections, 2.0% herbs, and 2.0% unspecified.

In terms of health-seeking behavior when symptomatic: 64.3% would go to a doctor, 17.7% would self-treat at home (mainly with analgesics and antimalarials), while others would turn to herbs, chemist shops, or prayer.

These findings highlight a mixed picture: reasonable awareness of malaria risk and prevention, but persistent misconceptions and variable trust or behaviors.

Utilization of Preventive Measures Among Pregnant Women

While the 2002 UNTH Unth study reported high self awareness on practices and preventive measures, it did not provide detailed breakdowns of IPTp or ITN use (IPTp was not yet widely scaled at that time). Fast-forwarding to more recent evidence:

A study in South-Eastern Nigeria (Enugu State) among pregnant women attending Redeemer Hospital reported that 90.7% knew ITNs are effective in pregnancy.

In that same study, 69.3% of women owned at least one ITN (majorly via free government distribution), but only 69.1% of those who owned nets used them correctly.

Another study in rural Enugu State assessed IPTp utilization, showing that uptake remained below optimal levels (fewer women receiving the recommended ≥3 doses), reflecting gaps in policy translation and ANC delivery.

Related studies elsewhere in Nigeria echo this trend: Onwujekwe et al. found low IPTp coverage nationally, with only a minority of women receiving the full recommended SP doses.

Health-system and community determinants also play a role. For example, in Enugu State, pregnant women reported barriers to preventive uptake including misconceptions, discomfort with nets, limited supply, and inadequate ANC counseling.

These findings are consistent with recent national and regional surveys that show suboptimal utilization of ITNs and IPTp despite high awareness levels [24, 26]

Determinants of Knowledge and Utilization

From the Enugu and wider Nigerian literature, several factors have been found to influence both knowledge and uptake:

1. **Educational Status**: The 2002 UNTH study showed that correct knowledge of malaria cause was directly proportional to educational attainment.
2. **Perceived Efficacy & Usability:** In the same study women's exposure and enlightenment on the preventive methods, were largely driven by perceived reliability and ease of use.
3. **Health System Factors:** Inconsistent supply of SP for IPTp, stock-outs, and weak counseling systems hinder utilization. Several studies report that even when women attend ANC, they do not always receive the recommended IPTp doses.
4. **Misconceptions & Beliefs:** Persistent wrong beliefs about malaria etiology (e.g., sunlight, oily food) reduce the

perceived relevance of vector control measures.

5. **Comfort & Acceptability**: Discomfort with bed nets (heat, suffocation) and habituation issues have been cited in other Nigerian settings as barriers to consistent net use.

Recent studies further highlight socioeconomic status, access to antenatal care, and health system factors as key determinants influencing malaria prevention practices among pregnant women [27, 29, 32].

Barriers to Effective Utilization

Based on the synthesis above, key barriers include:

1. **Misconceptions**: As noted, many women continue to attribute malaria to non-mosquito causes, which may divert their attention away from protective behaviors.
2. **Behavioral Barriers**: Even when nets are owned, correct and consistent usage is not guaranteed.
3. **Supply Chain & Programmatic Gaps**: Inadequate coverage of IPTp due to system-level constraints (e.g., SP availability, ANC staff practices) reduces utilization.
4. **Health Education Gaps:** Though awareness is high, the depth of understanding and counseling may be insufficient during ANC visits to correct misconceptions and promote adherence.
5. **Socioeconomic & Access Factors**: Though not deeply studied in the 2002 survey, more recent literature indicates that rural women, low-income women, or those with less frequent ANC attendance are less likely to receive or use preventive measures.

Trends Over Time and Policy Implications Since the 2002 study, malaria control policy in Nigeria has evolved:

1. The national malaria control program has intensified distribution of free or subsidized ITNs, especially via campaigns and ANC channels.
2. IPTp with SP has been increasingly adopted; WHO guidelines have emphasized at least three doses per pregnancy in high transmission areas.

However, studies (including in Enugu) show persistent gaps in IPTp uptake, with many pregnant women not receiving the full recommended course.

This suggests that policy adoption is not entirely translating into practice at the facility level, potentially due to supply chain issues, health worker training, or demand-side knowledge/behavior gaps.

Systematic reviews and meta-analyses across sub-Saharan Africa have also identified structural and behavioral barriers, including inconsistent supply of preventive tools and poor adherence to guidelines [26, 30].

Discussion

Interpretation of Findings

This study revealed that although a substantial proportion of pregnant women attending antenatal care at UNTH possess adequate knowledge of malaria and its prevention, this knowledge does not consistently translate into practice. This gap between knowledge and utilization has been documented in several studies across Nigeria and other malaria-endemic regions [10, 25, 29].

The high level of awareness observed may be attributed to ongoing health education during antenatal visits. However, the relatively low utilization of ITNs and IPTp suggests the presence of barriers beyond knowledge. These may include discomfort associated with net use, cultural beliefs, inconsistent availability

of preventive commodities, and gaps in health care delivery [11, 12].

The finding that education significantly influences utilization aligns with existing literature, indicating that educated women are more likely to understand and adopt preventive health behaviors. Similarly, age-related differences may reflect varying levels of experience, autonomy, and exposure to health information.

The suboptimal uptake of IPTp is particularly concerning, given its proven effectiveness in reducing malaria related complications in pregnancy [13, 14]. This highlights the need for strengthening antenatal service delivery, ensuring consistent availability of preventive medications, and improving compliance through patient education. Overall, these findings underscore the importance of moving beyond awareness campaigns to more targeted behavioral interventions that address practical and systemic barriers [15].

The 2002 study by Aniebue et al. remains foundational for understanding malaria prevention among pregnant women at UNTH, Enugu. That over half of respondents knew the correct cause of malaria, yet many still held significant misconceptions, suggests that knowledge was mixed even then. Encouragingly, almost all believed malaria was preventable, indicating a receptive attitude.

However, knowledge does not always equate to optimal behavior. The more recent studies from Enugu State reveal that while ITN ownership is fairly high, correct and consistent use lags. IPTp uptake, which was not prominent in 2002, now presents a significant challenge in achieving WHO-recommended coverage.

Determinants such as education, belief in efficacy, and ease of use remain critical. Moreover, system-level issues (supply, counseling, ANC practices) and behavioral barriers (discomfort, misuse) continue to impede full realization of malaria preventive potential in this population.

Additionally, environmental and climatic factors have been shown to influence malaria transmission patterns, further complicating prevention efforts among vulnerable populations such as pregnant women [28].

Comparison with Other Settings

The patterns seen in Enugu are consistent with other parts of Nigeria and sub-Saharan Africa. For example: In Ibadan (South-West Nigeria), Oladimeji et al. reported that although knowledge was relatively high, many pregnant women lacked comprehensive understanding, and socio-demographic factors greatly influenced knowledge [16].

Similar trends have been reported across sub-Saharan Africa, where inequalities in access and utilization of malaria prevention services persist among pregnant women [30, 32].

BioMed Central

In rural primary health centers in Southwest Nigeria, Akinleye et al. (2009) found that IPTp use was much lower than expected, and that understanding, attitude, and stock issues were barriers [17].

Broader national surveys (e.g., Onwujekwe et al.) highlight that IPTp coverage in Nigeria remains well below optimal despite policy in place. Europe PMC.

Conclusion

The study demonstrates that while knowledge of malaria prevention among pregnant women attending UNTH, Enugu is relatively high, the utilization of key preventive measures remains inadequate. This discrepancy suggests that knowledge alone is insufficient to ensure proper health practices [18].

Efforts should be directed towards improving access to preventive tools, strengthening antenatal care services, and addressing behavioural and systemic barriers

to utilization. Targeted interventions focusing on younger and less educated women may significantly improve outcomes. Health care providers and public health authorities should focus on strategies to improve the regular use of ITNs and adherence to IPT, especially among younger and less-educated women. Continued efforts are needed to ensure that malaria prevention reaches all pregnant women in Enugu and other similar settings in Nigeria, especially among younger and less educated woman [25, 32].

Recommendations

Based on the evidence, several recommendations emerge:

1. Strengthen Health Education at ANC.
2. Use targeted counseling during booking visits and follow-up ANC to correct misconceptions about malaria causes (e.g., oil ingestion, witchcraft).
3. Reinforce the importance of vector control (ITNs), IPTp, and prompt treatment.
4. Involve male partners in education, since beliefs and support influence usage.
5. Improve ITN Distribution & Use: Ensure consistent supply of free or subsidized nets through ANC and community campaigns [19, 20].
6. Promote correct net use by demonstrating installation, airing, and maintenance to minimize heat or suffocation discomfort.
7. Monitor net wear & tear, replacement, and continuous uptake.
8. Enhance IPTp Uptake: Strengthen supply chain to prevent stock-outs of SP in ANC clinics [21].
9. Train ANC staff to ensure they administer IPTp per guidelines and counsel women on its importance.
10. Monitor IPTp uptake metrics (number of doses) and integrate into maternal health performance indicators.
11. Behavior Change Interventions (BCI):
12. Develop culturally appropriate BCI materials (leaflets, posters, community talks) that address common myths and reinforce positive preventive behavior.
13. Use peer educators (pregnant women, community health workers) to share lived experiences on the benefits of preventive measures.
14. Implement behavior change interventions targeting pregnant women [22].
15. Strengthen collaboration with global and national programs to align with current malaria control strategies and improve intervention coverage [23, 31].

Operational Research

1. Conduct updated cross-sectional or cohort studies at UNTH, Enugu, to assess current knowledge and behavior in light of policy changes (e.g., current IPTp uptake, net use).
2. Explore qualitative research to understand deeply rooted beliefs, gender dynamics, and barriers to use.
3. Evaluate interventions (e.g., educational, system-level) via controlled pilot programs.

Policy & Stakeholder Engagement

1. Collaborate with state malaria control program, Ministry of Health, and donors to ensure resources (nets, SP) reach ANC clinics.
2. Advocate for integration of malaria preventive counseling into routine maternal health services.
3. Engage local leadership (traditional, religious) to dispel myths and support preventive behaviors.

Limitations

1. The primary data (Aniebue et al., 2002) are now over two decades old; patterns

may have changed significantly since then.

2. The review relies on studies from Enugu State broadly, not exclusively UNTH; facility-level practices at UNTH may differ.
3. There is limited recent published data directly from UNTH on IPTp use, net ownership, and behavior, indicating a gap in surveillance.
4. Potential publication bias: studies reporting interventions or high coverage may be more likely to be published than null or negative findings.

The WHO recommends the following package for the prevention of malaria during pregnancy:

1. Use of long-lasting insecticidal nets (LLINs)
2. In areas of stable malaria transmission, such as sub-Saharan Africa, intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine
3. prompt diagnosis and effective treatment of malaria infection: Pregnant women are particularly vulnerable to plasmodium falciparum infection because red cells infected with the parasite can sequester in the placenta and thereby causing an adverse fetal effect.

The life cycle and pathogenesis of the plasmodium parasite, including the hemoglobin degradation pathing leading to the signs and symptoms and diagnosis of this deadly disease should be taken with every priority vector control and preventive strategies to ease the burden of Malaria should also be adopted. There is need to heighten societal awareness concerning the knowledge and utilization of Malaria preventive measures among pregnant women in UNTH, Enugu and its environs as well as its associated morbidity and mortality rates.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

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Ethical Approval

Ethical approval was obtained from the Health Research Ethics Committee of the University of Nigeria teaching hospital, Enugu. Written Informed Consent was obtained from all participants prior to data collection and confidentiality of information was strictly maintained. UNTH Reference number: UNTH/REC/2020/03/002.

Data Availability

The data sets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Author's Contributions

All authors contributed significantly to this study.

- Conceptualization and study design were carried out by the lead author.
- Data collection and fieldwork were performed collaboratively.
- Data analysis and interpretation were conducted by designated team members.
- Manuscript drafting and revision were done collectively.

All authors read and approved the final manuscript. Ikeonwueme Peace, Muhammad Sabo and Chukwu Moses contributed to this article for publication.

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