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# Knowledge, Attitude and Preventive Practices of Malaria among Pregnant Women Accessing Antenatal Care Services in Ogbadibo Local Government Area, Benue State

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## Abstract

This study investigated knowledge, attitude and preventive practices of malaria among pregnant women accessing antenatal care services in Ogbadibo Local Government Area (LGA), Benue State. Three specific objectives, three corresponding research questions and 3 null hypotheses guided the study. The cross-sectional research design was adopted for the study. The population for the study consisted of 10,743 pregnant women accessing antenatal care services in all the 40 primary health centres in Ogbadibo LGA, Benue State. The sample size used in the study consisted of 432 pregnant women drawn using a multi-stage sampling procedure. Knowledge, Attitude and Preventive Practices of Malaria Questionnaire (KAPPMQ) was used for data collection. The split-half (Spearman-Brown Correlation Coefficient) method was used to establish the reliability (internal consistency) of sections B and D of the instrument with a reliability coefficient of .88 and .73 respectively while Cronbach's Alpha was used to establish the internal consistency of section C of the instrument with a reliability coefficient of .885. Data were analysed using Frequency, percentages, mean, standard deviation, t-test, chi-square and one-way analysis of variance (ANOVA). The results showed that overall, a high proportion (80.7%) of pregnant women accessing antenatal care services possessed knowledge of malaria, had positive attitude towards malaria ($\bar{X}$ =2.89; SD =.636), a high proportion (78.1%) adopted preventive practices for malaria. Additionally, there was a significant difference in the attitude towards malaria based on educational level (F(3,416)= 44.396; p=.000). It was recommended among others that public health educators should design and implement community-based malaria education programmes that emphasize preventive practices and correct misconceptions among pregnant women.

**Keywords:** Malaria, Knowledge, Attitude, Preventive practice, Pregnant women

## Introduction

The vulnerability to malaria among pregnant women likely in the pandemic areas has become a public health concern globally. According to Reddy et al. (2023) and World Health Organization (WHO, 2023a), pregnant women and young children are the most vulnerable to malaria, as it was indicated in 2020 that 121.9 million pregnancies were threatened by malaria infection in endemic areas. Nonetheless, in many nations with low malaria prevalence, strides have been made toward the eradication of the illness. For instance, in 2022, 34 nations reported less than 1000 cases of malaria (WHO, 2023b). Also, three more nations received WHO certification in 2023 as malaria-free, and many more are expected to do the same by 2024. Africa continues to carry a disproportionately high share of the global malaria burden.

The cases of malaria infection is on the rise in Africa. African Union [AU] (2021) asserted that malaria remains a significant global public health and socio-economic burden,

which has contributed to over 234 million infections in Africa, equivalent to 95 per cent of global cases. According to WHO (2023a), Africa was home to about 94 per cent of all malaria cases and 95 per cent of deaths in 2022. The authors further reported that four African nations: Nigeria (26.8%), the Democratic Republic of the Congo (12.3%), Uganda (5.1%), and Mozambique (4.2%), accounted for over half of all malaria deaths globally. Nyaaba et al. (2021) asserted that African has the highest rate of malaria cases during pregnancy worldwide. The highest prevalence of exposure to malaria during pregnancy (39.8%), was recorded in West Africa followed by Central Africa (39.4%), while East and Southern Africa recorded a prevalence of 22 per cent (WHO, 2021). Dwumfour et al. (2023) opined that malaria infection is one of the main factors contributing to maternal and foetal mortality in Sub-Saharan Africa including Nigeria.

Malaria remains one of the major infectious diseases in Nigeria. The WHO (2021) stated that Nigeria is a malaria-endemic country, with 97 per cent of the population at risk of contracting the disease. According to the World Malaria Report in 2021, Nigeria had the highest number of global malaria cases (26.6 % of global malaria cases) and the highest number of deaths (31 % of global malaria deaths) in 2021 (WHO, 2021). Nigeria has the highest burden of malaria globally, accounting for nearly 27 per cent of the global malaria burden (WHO, 2022). According to Federal Ministry of Health (2021), Nigeria has implemented several initiatives to roll back malaria, including the distribution of insecticide-treated mosquito nets (ITNs) and indoor residual spraying (IRS) to reduce mosquito populations. Yet, malaria continues to pose a serious threat in Nigeria despite efforts to lessen its prevalence, especially in susceptible groups like pregnant mothers (Oyerogba et al., 2023). This threat is felt in different arears of the country, and Ogbadibo Local Government Area (LGA), Benue State is not an exception.

Cases of malaria infection continue to rise in Benue State. Malaria is endemic in Benue State and Ogbadibo LGA, and its transmission peaks between May and September, reflecting the period of high mosquito density sustained by the climatic condition (Benue State Ministry of Finance and Economic Planning-BSMFEP, 2023). The BSMFEP reported that the rainy season lasts from April to October and the dry season begins in November and ends in March with temperature fluctuates between 21 and 37 °C in the year. According to Amede et al. (2022) although treatment of malaria in designated health facilities in the State is free for adults and children, including, pregnant women, malaria programmes in Benue State have failed to control the incidence of the disease, and the State's malaria burden remains high. Indicators of high prevalence of malaria in Ogbadibo LGA of Benue State include high reported cases of malaria in health facilities, increased incidence of malaria complications, especially among vulnerable populations such as children and pregnant women, and widespread presence of mosquito breeding sites due to environmental factors like stagnant water and indiscriminate dumping of refuse in the state (Federal Ministry of Health, 2021). By improving knowledge and attitude regarding malaria, pregnant women may adopt appropriate preventive practices against malaria. Hence, this study sought to investigate knowledge, attitude and preventive practices of malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State.

Malaria is a serious and life-threatening disease. Dahalan e al. (2019) defined malaria as a mosquito-borne infectious disease that affects humans and other vertebrates. The WHO (2023a) defined malaria as a preventable and curable acute febrile illness caused by Plasmodium parasites, which are spread to people through the bites of infected female Anopheles mosquitoes. Centre for Disease Control and Prevention [CDC] (2023) stated that when an individual is bitten by the female Anopheles mosquito, the parasite is released into the bloodstream. Once the parasites are inside the body, they travel to the liver, where they

mature. After several days, the mature parasites enter the bloodstream and begin to infect red blood cells. Within 48 to 72 hours, the parasites inside the red blood cells multiply, causing the infected cells to burst open. The parasites continue to infect red blood cells, resulting in symptoms that occur in cycles that last two to three days at a time (CDC, 2023). In this study, malaria is a preventable and curable mosquito-borne infectious disease caused by plasmodium parasites, which affects pregnant women in Ogbadibo Local Government Area, Benue State.

Malaria in pregnancy is a major public health problem in malaria endemic countries. According to CDC (2018), malaria infection during pregnancy can have adverse effects on both mother and foetus. The CDC further stated that malaria is a particular problem for women in their first and second pregnancies and for women who are HIV-positive. The effects of malaria in pregnancy include: maternal anaemia, foetal loss, premature delivery, intrauterine growth retardation, and delivery of low birth-weight infants (<2.5kg) which is a risk factor for death (CDC, 2018). Chua et al. (2021) asserted that immunologic tolerance occurs during pregnancy which makes a woman physiologically susceptible to malaria infection once the gestation period begins. Emmanuel et al. (2023) opined that pregnant women with relatively lower levels of previously acquired immunity are particularly at risk for the most serious malarial complications during pregnancy. The authors further asserted that these complications include cerebral malaria, severe anaemia, abortions, intrauterine foetal death, premature delivery, stillbirths, and maternal and infant mortality. In spite of the severe and fatal consequences of malaria during pregnancy for the mother, foetus, and new born child, the harmful effects can be substantially prevented and reduced especially if mothers have adequate knowledge of malaria.

Knowledge is an energizing force that empowers individuals to have sense of worth and maintain positive disposition towards health practices and actions. According to Hetherington (2022), knowledge implies seeking relevant and essential information such as health information, which will be understood and assimilated by individuals that would enable them to function optimally in social setting. According to Steup and Neta (2020), knowledge is defined as the degree to which individuals can obtain, process, and understand basic information and services needed to make appropriate decisions. Contextually, knowledge refers to understanding of facts and information, enriched with skills and ideas regarding malaria and its prevention by pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State. Adequate knowledge of malaria infection would lead to developing a positive and favourable attitude towards malaria and its prevention.

Attitude depicts the way one thinks and feels about things or ideas. Perloff (2017) defined attitude as a psychological construct, a mental and emotional entity that inheres or characterizes a person. Cherry and Gns (2018) defined attitude as learned tendency to evaluate things in a certain way which may include assessing people, issues, objects, or events. Such evaluation or assessments are often positive or negative or favourable or unfavourable. In this study, attitude refers to emotional responsiveness of feelings either favourable or unfavourable towards malaria and its prevention by pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State. Attitude becomes favourable when pregnant women are positively disposed to proper malaria prevention practices, and when pregnant women are negatively disposed to malaria prevention practices, their attitude will be termed unfavourable towards malaria.

Preventive practices for malaria are essential in reducing the risk of infection among pregnant women. According to Esomonu et al. (2022), preventive practices are actions meant to safeguard, advance, or preserve health and wellbeing while also assisting in the prevention of illness, incapacity, or death. Also, WHO (2023a) defined prevention as actions that are

targeted, population-based, and individual-based, with the goal of reducing the burden of diseases and related risk factors. In this study, preventive practices are actions aimed at protecting, improving or preserving the health of pregnant women with the goal of reducing the occurrence of malaria and its associated complications in pregnancy. Malaria preventive practices according to WHO (2023b) involves chemoprophylaxis and mosquito avoidance. Chemoprophylaxis which refers to the use of drug in disease prevention, is an important practice in preventing malaria. In the prevention of malaria during pregnancy, chemoprophylaxis involves the use of intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) which is recommended for malaria prevention at each scheduled antenatal care visit, starting at the second trimester, in areas of high and moderate transmission (WHO, 2023b). To lower the risk of getting malaria by avoiding mosquito bites involves: use of insecticide-treated nets (ITNs) when sleeping in places where malaria is present, use of mosquito repellents, use of coils and vaporizers, wearing protective clothing, and use of window screens (WHO, 2023b). These preventive practices need to be adopted by pregnant women.

A pregnant woman is a female who is carrying an embryo. Shehan (2016) asserted that pregnancy usually occurs by sexual intercourse, but can also occur through assisted reproductive technology procedures. A pregnancy may end in a live birth, a miscarriage, an induced abortion, or a stillbirth. Downe et al. (2018) defined pregnant women as those who are expecting the birth of a child and is actively engaged in the physical, emotional, and social changes associated with pregnancy. Oyerogba et al. (2023) opined that Nigerian pregnant women are especially susceptible to contracting malaria because of a number of factors, including limited access to high-quality healthcare facilities, poverty, and certain demographic traits. In this study, a pregnant woman is a female of reproductive age who is currently carrying an embryo in the development phase and receiving antenatal care services in health care facilities in Ogbadibo LGA, Benue State.

Antenatal care service is a type of preventive healthcare. According to Ohamaeme et al. (2017), antenatal care services are umbrella term used to describe medical care and procedures that are carried out to and for pregnant women. It is the healthcare that is rendered to the pregnant women throughout pregnancy until the child's birth and is aimed at detecting the already existing problems and/or problems that can develop during pregnancy, affecting the pregnant woman and/or her unborn child (Pattinson, 2018). The care includes various screening tests, diagnostic procedures, prophylactic treatments, some of which are done routinely, and others are provided to the women based on identified problems and risk factors. According to Hlongwane et al. (2021), antenatal care services benefit both the mother and the baby; it assists in screening, diagnosing and managing or controlling the risk factors that might adversely affect the pregnant women and/or the pregnancy outcome. In this study, antenatal care services refer to the care given to pregnant women attending health facilities in Ogbadibo LGA, Benue State so that they have safe pregnancy and healthy babies. The knowledge, attitude and preventive practices of malaria among pregnant women may be influenced by certain factors.

Certain socio-demographic variables may be associated with knowledge, attitude and preventive practices of malaria among pregnant women. These factors include: age, educational level, place of residence, marital status, religion, income level, school type, occupation, parity, gravidity, employment status and others. In this study, socio-demographic variables of interest is education level.

Education level is another factor capable of influencing knowledge, attitude and preventive practices of malaria among pregnant women. Wraga et al. (2012) defined education level as subdivisions of learning, typically covering no formal education, primary

education, secondary education and tertiary (or higher) education. Oladimeji et al. (2019) found that educational attainment was significantly associated with knowledge of malaria prevention and control among pregnant women and non-pregnant mothers of children aged under five years in Ibadan, South West Nigeria. Moreover, Mavoungou et al. (2022) found that pregnant women with no education are eight times more likely to have insufficient knowledge of malaria prevention in Brazzaville. Also, Adum et al. (2023) found significant association between level of education and attitude towards malaria prevention among mothers with children under five years old in a rural setting in Ghana. Therefore, this study sought to investigate knowledge, attitude and preventive practices of malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State based on educational level.

Improving pregnancy outcomes is a key maternal health priority in Nigeria. The federal government has implemented several malaria control measures, such as distributing insecticide-treated nets, conducting indoor residual spraying, providing antimalarial drugs, and promoting public health education. These efforts are expected to enhance the survival of pregnant women and reduce malaria-related morbidity and mortality, especially with free malaria treatment and antenatal care services available in Benue State.

Despite these interventions, Ogbadibo LGA in Benue State is still not on track to meet global malaria-reduction targets. The area continues to record high malaria cases in health facilities, increased complications among children and pregnant women, and persistent mosquito breeding sites caused by poor environmental conditions. Malaria control programmes in the state have not substantially reduced the disease burden.

Although many studies have examined malaria, none have simultaneously assessed knowledge, attitude, and practice of malaria among pregnant women, nor have they been conducted in the present study area. Therefore, this study investigated the knowledge, attitude, and preventive practices of malaria among pregnant women attending antenatal care services in Ogbadibo LGA, Benue State.

**Purpose of the Study**

The purpose of this study was to investigate knowledge, attitude and preventive practices of malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State. Specifically, the study sought to ascertain the:

1. proportion of pregnant women accessing antenatal care services who possess knowledge of malaria in Ogbadibo LGA, Benue State;
2. attitude towards malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State;
3. proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria in Ogbadibo LGA, Benue State;

**Research Questions**

The following research questions were posed to guide the study:

1. What is the proportion of pregnant women accessing antenatal care services who possess knowledge of malaria in Ogbadibo LGA, Benue State?
2. What is the attitude towards malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State?
3. What is the proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria in Ogbadibo LGA, Benue State?

**Hypotheses**

The following null hypotheses were postulated to guide the study and were tested at .05 level of significance:

1. There is no significant difference in the proportion of pregnant women accessing antenatal care services who possess knowledge of malaria in Ogbadibo LGA, Benue State based on educational level.
2. There is no significant difference in the attitude towards malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State based on educational level.
3. There is no significant difference in the proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria in Ogbadibo LGA, Benue State based on educational level.

## Methods

The study adopted a cross-sectional survey research design. Cross-sectional survey research design according to Setia (2016) is a type of research design in which a potentially related factor is measured at a specific point in time for a defined population. The population for the study consisted of all the 10,743 pregnant women accessing antenatal care services in all the 40 primary health centres in Ogbadibo LGA, Benue State. The sample size was 432 pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State. This was in line with the suggestion of Cohen et al. (2018), that when a population size is 10,000 or above at 95% confidence level (5% intervals), the sample size should be 370 or above. A multistage sampling technique was adopted in drawing the sample size for the study. The instrument for data collection was a researcher-structured instrument titled "Knowledge, Attitude and Preventive Practices of Malaria Questionnaire (KAPPMQ)". The instrument was validated by five experts from the Department of Human Kinetics and Health Education, Faculty of Education, University of Nigeria, Nsukka. The split-half (Spearman-Brown Correlation Coefficient) method was used to establish the reliability (internal consistency) of sections B and D of the instrument with a reliability coefficient of .88 and .73 respectively, while Cronbach's Alpha was used to establish the internal consistency of sections C of the instrument with a reliability coefficient of .885. Out of the 432 questionnaire forms administered, only 420 were duly filled out were used for analyses which gave a return rate of 97.2 per cent. Frequency, percentages, mean, standard deviation, t-test, chi-square and one-way analysis of variance (ANOVA) were used to answer the research questions and test the null hypotheses at 0.05 level of significance.

## Results

Table 1
**Proportion of Pregnant Women Accessing Antenatal Care Services Who Possessed Knowledge of Malaria in Ogbadibo LGA, Benue State (n=420)**

| s/n | Items | True f(%) | False f(%) |
|---|---|---|---|
| 1. | Malaria is a disease transmitted by mosquitoes. | 356(84.8) | 64(15.2) |
| 2. | Malaria is caused by a parasite that infects human red blood cells. | 358(85.2) | 62(14.8) |
| 3. | The *Plasmodium* parasite is responsible for causing malaria. | 367(87.4) | 53(12.6) |
| 4. | Malaria is not caused by bacteria but by the *Plasmodium* parasite. | 354(84.3) | 66(15.7) |
| 5. | Malaria spreads through the bite of an infected mosquito. | 390(92.9) | 30(7.1) |
| 6. | Malaria cannot be transmitted through casual contact between people. | 361(86.0) | 59(14.0) |
| 7. | Blood transfusions from an infected person can spread malaria. | 39(9.3) | 381(90.7) |
| 8. | Symptoms of malaria include fever, chills, and flu-like illnesses. | 378(90.0) | 42(10.0) |
| 9. | Malaria does not always cause a rash on the skin. | 358(85.2) | 62(14.8) |
| 10. | Severe malaria can result in anaemia and damage to vital organs. | 354(84.3) | 66(15.7) |
| 11. | Pregnant women with malaria are at risk of premature delivery and having low birth weight babies. | 342(81.4) | 78(18.6) |
| 12. | Pregnant women are more susceptible to contracting malaria compared to non-pregnant women. | 324(77.1) | 96(22.9) |
| 13. | Using insecticide-treated bed nets is an effective way to prevent malaria. | 389(92.6) | 31(7.4) |
| 14. | Effective treatments for malaria are currently available. | 338(80.5) | 82(19.5) |
| 15. | Indoor residual insecticide spraying is an effective method for reducing malaria risk. | 386(91.9) | 34(8.1) |
| | **Overall %** | **80.7** | **19.3** |

Key: 0-39%= Low proportion; 40-60%= Moderate proportion; 70% and above= High proportion

Table 1 shows that overall, a high proportion (80.7%) of pregnant women accessing antenatal care services possessed knowledge of malaria in Ogbadibo LGA, Benue State. However, only a low proportion (9.3%) knew that blood transfusions from an infected person can spread malaria.

Table 2

**Attitude towards Malaria among Pregnant Women Accessing Antenatal Care Services in Ogbadibo LGA, Benue State (n=420)**

| s/n | Items | $\bar{X}$ | SD |
|---|---|---|---|
| 1. | Taking preventive measures against malaria during pregnancy is important for the health of both the mother and the baby | 3.28 | .728 |
| 2. | 1 am very concerned about the risk of contracting malaria during your pregnancy | 2.94 | .799 |
| 3. | Malaria is a serious health threat to pregnant women | 2.91 | .761 |
| 4. | I am confident in my knowledge about the causes of malaria | 2.79 | .928 |
| 5. | Malaria prevention measures are important during pregnancy | 2.89 | .792 |
| 6. | Taking antimalarial drugs during pregnancy is safe | 2.70 | .724 |
| 7. | I would seek medical help if I experience symptoms of malaria during pregnancy | 2.87 | .757 |
| 8. | Pregnant women are more susceptible to malaria than non-pregnant women | 2.59 | .632 |
| 9. | Self-medicating for malaria during pregnancy is harmful | 3.10 | .881 |
| 10. | Herbal mixtures are best for treating malaria during pregnancy | 1.72 | .678 |
| 11. | I trust the effectiveness of malaria prevention measures recommended for pregnant women | 2.74 | .868 |
| 12. | Malaria can affect the health of my unborn baby | 2.95 | .769 |
| 13. | I am confident in my ability to recognize the signs of malaria infection during pregnancy | 2.83 | .586 |
| 14. | I am comfortable with discussing malaria-related concerns with my healthcare provider | 3.24 | .696 |
| 15. | It is important to go for laboratory analysis before any form of treatment for malaria. | 2.85 | .822 |
| 16. | I feel well-informed about the various methods available for preventing malaria during pregnancy | 2.69 | .627 |
| 17. | Pregnant women should receive regular screening for malaria, even if they don't have symptoms. | 3.32 | .947 |
| 18. | I trust the advice given by healthcare providers regarding malaria prevention methods during pregnancy. | 3.52 | .500 |
| | **Overall** $\bar{X}$ | **2.89** | **.636** |

*Key: Positive attitude,* $\bar{X}$ $=\geq$ *2.50; Negative attitude,* $\bar{X}$ $=\leq$ *2.50*

Table 2 shows that overall, pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State had positive attitude towards malaria ( $\bar{X}$ =2.89; SD =.636).

Table 3

**Proportion of Pregnant Women Accessing Antenatal Care Services Who Adopted Preventive Practices of Malaria in Ogbadibo LGA, Benue State (n=420)**

| s/n | Items | Yes f(%) | No f(%) |
|---|---|---|---|
| 1. | Do you sleep under a mosquito net treated with insecticide? | 381(90.7) | 39(9.3) |
| 2. | Have you received antimalarial drugs during your pregnancy? | 378(90.0) | 42(10.0) |
| 3. | Do you use insect repellents like mosquito coils, insecticide sprays or aerosols indoors to prevent mosquito bites? | 255(60.7) | 165(39.3) |
| 4. | Did you seek medical advice before traveling to malaria-endemic areas? | 286(68.1) | 134(31.9) |
| 5. | Do you wear long-sleeved clothing and pants to prevent mosquito bites? | 263(62.6) | 157(37.4) |
| 6. | Have you undergone regular malaria testing during your pregnancy? | 341(81.2) | 79(18.8) |
| 7. | Do you avoid outdoor activities during peak mosquito biting times? | 306(72.9) | 114(27.1) |
| 8. | Have you taken antimalarial drugs under the supervision of a healthcare provider? | 373(88.8) | 47(11.2) |
| 9. | Do you eliminate standing water around your home to prevent mosquito breeding? | 322(76.7) | 98(23.3) |
| 10. | Do you continue malaria prevention practices after giving birth, especially if breastfeeding? | 378(90.0) | 42(10.0) |
| 11. | Would you seek immediate medical attention if you experience symptoms of malaria? | 361(86.0) | 59(14.0) |
| 12. | Do you encourage other pregnant women in your community to adopt malaria prevention practices? | 353(84.0) | 67(16.0) |
| 13. | Do you regularly apply insecticide to outdoor areas where mosquitoes breed? | 263(62.6) | 157(37.4) |
| | **Overall %** | **78.1** | **21.9** |

Key: 0-39%= Low proportion; 40-60%= Moderate proportion; 70% and above= High proportion

Table 3 shows that overall, a high proportion (78.1%) of pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State adopted preventive practices for malaria. Specifically, a high proportion adopted sleeping under a mosquito net treated with insecticide (90.7%), receiving antimalarial drugs during your pregnancy (90.0%), and continue malaria prevention practices after giving birth, especially if breastfeeding (90.0%).

Table 4

**Chi-square Test of No Significance Difference in the Proportion of Pregnant Women Accessing Antenatal Care Services Who Possessed Knowledge of Malaria in Ogbadibo LGA, Benue State Based on Education Level (n=420)**

| Variable | N | True O(E) | False O(E) | $x^2$ | df | p-value |
|---|---|---|---|---|---|---|
| **Education Level** | | | | | | |
| No Formal Education | 45 | 33(36.3) | 12(8.7) | | | |
| Primary Education | 249 | 201(201.0) | 48(48.0) | 2.360 | 3 | .501 |
| Secondary Education | 84 | 71(67.8) | 13(16.2) | | | |
| Tertiary Education | 42 | 34(33.9) | 8(8.1) | | | |

***** Significant at $p \leq 0.05$

*Key: O = Observed frequencies; E = Expected frequencies*

Table 4 shows the Pearson Chi-square value with the corresponding p-value for hypothesis of no significant difference in the proportion of pregnant women accessing antenatal care services who possess knowledge of malaria in Ogbadibo LGA, Benue State based on education level ($x^2$= 2.360, p= .501> .05). Since the p-value was greater than .05 level of significance, the null hypothesis was therefore not rejected. This implies that there was no significant difference in the proportion of pregnant women accessing antenatal care services who possessed knowledge of malaria in Ogbadibo LGA, Benue State based on education level.

Table 5

**Summary of One-way ANOVA Testing Difference in the Attitude Towards Malaria among Pregnant Women Accessing Antenatal Care Services in Ogbadibo LGA, Benue State Based on Education Level (n=343)**

| Source of Variance | Sum of Squares | df | Mean Square | F | *p*-value |
|---|---|---|---|---|---|
| Between Groups | 41.147 | 3 | 13.716 | | |
| | | | | 44.396 | .000 |
| Within Groups | 128.517 | 416 | .309 | | |
| **Total** | 169.664 | 419 | | | |

***Note**: F = F-ratio value; df = Degree of freedom*

**Significant at P < 0.05*

Table 5 shows hypothesis of no significant difference in the attitude towards malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State based on education level ($F_{(3,416)}$= 44.396; *p*=.000). Since the p-value is less than 0.05 level of significance, the null hypothesis was rejected. This implies that pregnant women differ in their attitude towards attitude towards malaria based on education level.

Table 6

**Chi-square Test of No Significance Difference in the Proportion of Pregnant Women Accessing Antenatal Care Services Who Adopted Preventive Practices of Malaria in Ogbadibo LGA, Benue State Based on Education Level (n=420)**

| Variable | N | Yes O(E) | No O(E) | $x^2$ | df | p-value |
|---|---|---|---|---|---|---|
| **Education Level** | | | | | | |
| No Formal Education | 45 | 31(35.1) | 14(9.9) | | | |
| Primary Education | 249 | 193(194.5) | 56(54.5) | 3.758 | 3 | .289 |
| Secondary Education | 84 | 69(65.6) | 15(18.4) | | | |
| Tertiary Education | 42 | 35(32.8) | 7(9.2) | | | |

* Significant at $p \leq 0.05$

Table 6 shows the Pearson Chi-square value with the corresponding p-value for hypothesis of no significant difference in the proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria in Ogbadibo LGA, Benue State based on education level ($x^2$= 3.758, p= .289> .05). Since the p-value was greater than .05 level of significance, the null hypothesis was therefore not rejected. This implies that there was no significant difference in the proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria in Ogbadibo LGA, Benue State based on education level.

**Discussion of Findings**

Findings in Table 1 showed that overall, a high proportion of pregnant women accessing antenatal care services possessed knowledge of malaria in Ogbadibo LGA, Benue State. The finding was expected and not surprising. This is because it aligns with the assumption that antenatal care services often serve as a platform for health education, equipping pregnant women with knowledge about malaria due to its known adverse effects on maternal and foetal health. The findings agree with Shehu et al. (2018) who found that 85.5 per cent of pregnant women attending the antenatal care clinic of Usmanu Danfodiyo University Teaching Hospital, Sokoto, Northwest, Nigeria had good knowledge of malaria and malaria prevention. Also, Goshu and Yitayew (2019) reported that 73.2 per cent of pregnant women attending antenatal clinic of Adis Zemen Hospital, North-western Ethiopia had good knowledge on malaria. However, contrasting findings such as those by Mavoungou et al. (2022) in Brazzaville revealed that the level of knowledge was insufficient in 53.8 per cent of pregnant women. The disagreement may stem from differences in health infrastructure, literacy levels, and outreach efforts in the respective study locations. The finding of the present study may have been influenced by robust health campaigns, the integration of malaria education into antenatal services, and possibly higher antenatal care attendance rates in Ogbadibo LGA. These factors likely facilitated the dissemination of malaria-related knowledge to pregnant women in the area.

Findings in Table 2 show that overall, pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State had positive attitude towards malaria. The finding is expected and this is likely due to increased awareness campaigns and education provided

during antenatal care visits, which emphasize the dangers of malaria in pregnancy and the importance of prevention. Similar findings are reported by Flatie and Munshea (2021), who found that pregnant women attending antenatal clinics in exhibited a positive attitude toward malaria prevention due to regular counseling by healthcare workers. Similarly, Kalu et al. (2022) reported positive attitudes among pregnant women in a study conducted in four communities of Nnewi Southeast Nigeria, attributing it to robust public health campaigns. However, contrasting findings by Adeniji et al. (2023) in Lagelu LGA, Oyo State, Nigeria the attitude of pregnant women towards malaria prevention was low. Such contrasts may arise from differences in the quality of antenatal care services, health education, and exposure to public health campaigns in various regions. The positive attitudes observed in this study may be attributed to effective health education programs in Ogbadibo LGA and consistent messaging by healthcare workers during antenatal visits, which likely reinforced the importance of proactive malaria prevention.

Findings in Table 3 show that overall, a high proportion of pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State adopted preventive practices for malaria. The finding is encouraging and somewhat expected. This expectation is based on the assumption that antenatal care facilities emphasize malaria prevention strategies such as the use of insecticide-treated nets (ITNs), intermittent preventive treatment in pregnancy (IPTp), and health education. Similar findings have been reported by Okafor et al. (2019), who observed high adoption rates of malaria preventive practices among pregnant women attending antenatal clinics in Lagos, Nigeria due to structured health education campaigns. Likewise, Oladimeji et al. (2019) found that consistent access to antenatal care significantly influenced malaria prevention practices among pregnant women. Conversely, studies by Adeneye et al. (2020) and Ibegu et al. (2020) reported lower adoption rates, attributing the disparity to limited availability of preventive tools such as ITNs and inconsistent supply of IPTp drugs in rural areas. The contrast in findings may arise from differences in resource availability, health system functionality, and the intensity of malaria prevention campaigns in the study areas. The high adoption rate observed in this study may be attributed to effective antenatal care services in Ogbadibo LGA, which likely provide women with access to both malaria preventive tools and health education. Additionally, cultural acceptance of these practices and increased awareness about the dangers of malaria in pregnancy may have contributed to the positive outcome.

Findings in Table 4 showed no significance difference in the proportion of pregnant women accessing antenatal care services who possess knowledge of malaria in Ogbadibo LGA, Benue State based on education level. This aligns with studies suggesting that antenatal services provide similar health education regardless of prior education. The findings agree with Adum et al. (2023) who found that level of education had no statistically significant association with knowledge of malaria preventive measures among mothers with children under five years old in a rural setting in Ghana. The findings disagree with the findings of Oladimeji et al. (2019) that having a tertiary level education was associated with better knowledge on malaria and that educational attainment was significantly associated with knowledge of malaria prevention and control among pregnant women and non-pregnant mothers of children aged under five years in Ibadan, South West Nigeria. The contrast may be due to variations in the quality and focus of health education provided at different educational levels or regional disparities in campaign outreach. In this study, consistent health education during antenatal care services may have minimized differences, while secondary education might have struck the right balance between foundational literacy and exposure to practical health messages.

Findings in Table 5 showed a significant difference in the attitude towards malaria among pregnant women accessing antenatal care services in Ogbadibo LGA, Benue State based on education level. This finding is somewhat expected, as antenatal care services typically provide uniform health education to all women, irrespective of their educational backgrounds. However, the significant difference observed suggests that higher levels of education may enhance comprehension and proactive attitudes toward malaria prevention. Similar findings were reported by Flatie and Munshea (2021), who observed that women with secondary or tertiary education were more likely to adopt positive attitudes due to greater health literacy. Conversely, studies like that of Lopez and Brown (2023) found no significant influence of education on attitudes toward malaria, arguing that consistent antenatal education can equalize knowledge and attitudes across educational levels. The contrast could stem from variations in how educational attainment influences health behaviour. Women with higher education may be better equipped to process and apply health information, while less-educated women may rely more on direct guidance from healthcare providers. The overall positive attitudes observed in this study likely result from effective antenatal health education, which emphasizes malaria prevention for all attendees, bridging gaps caused by educational disparities.

Findings in Table 6 showed no significance difference in the proportion of pregnant women accessing antenatal care services who adopt preventive practices of malaria based on education level suggests a contrasting picture. Similar findings in the literature, such as those by Alhassan (2021) and Esomonu et al. (2022), report that higher educational levels are associated with a greater likelihood of adopting malaria prevention methods, including the use of insecticide-treated nets and antenatal care. In contrast, studies by Peters and Naidoo (2022) and Tshivhase et al. (2022) found no significant difference in malaria prevention practices across different educational levels, suggesting that factors beyond education, such as accessibility to healthcare facilities, socio-cultural norms, and community-based interventions, could also influence preventive behaviour. The lack of significance in the hypothesis despite the observed trend in Table 13 could reflect the universal dissemination of health information through mass media, community health workers, and outreach programs that reach pregnant women of all educational backgrounds. In Ogbadibo LGA, where health education and malaria prevention campaigns are actively promoted, this may reduce the influence of formal education levels on the adoption of malaria preventive practices.

## Conclusion

The study concludes that pregnant women in Ogbadibo LGA generally have high knowledge of malaria, positive attitudes toward its prevention, and widely adopt preventive practices, indicating progress in malaria education and antenatal care. While knowledge and preventive practices did not greatly differ by education level, attitudes toward malaria did vary, suggesting that education influences how women perceive and respond to malaria prevention. Overall, the findings show strong malaria prevention behaviour but highlight the need for continued health education to strengthen positive attitudes, particularly among women with lower educational attainment, in order to further improve maternal health outcomes.

## Recommendations

Based on the findings of the study, the following recommendations are made.

1. Public health educators should design and implement community-based malaria education programs that emphasize preventive practices, correct misconceptions, and promote the use of insecticide-treated nets (ITNs) among pregnant women.
2. The Ministry of Health, in collaboration with local government health departments and community leaders in rural and underserved communities should organize regular outreach programs at community centres, markets, and religious gatherings to provide tailored malaria education, emphasizing preventive practices and addressing misconceptions.
3. Pregnant women should actively engage in antenatal care services, apply malaria prevention strategies like consistent use of ITNs, and seek reliable health information to protect themselves and their unborn babies.
4. Local government health authorities and research institutions should organize and implement periodic surveys and assessments to evaluate the impact of malaria education programs and identify areas for improvement, ensuring the sustainability of interventions.
5. Health Ministries and professional training institutions should conduct regular capacity-building workshops to equip healthcare providers with the latest knowledge on malaria prevention, diagnosis, and treatment to effectively educate pregnant women.
6. Healthcare providers in antenatal care clinics should include a standardized malaria education module in routine antenatal care visits, with practical demonstrations on the proper use of insecticide-treated nets (ITNs) and other preventive measures for all pregnant women attending antenatal care services.

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