
*PREVALENCE OF MALARIA AMONG PREGNANT WOMEN IN AGUATA LOCAL
GOVERNMENT AREA, ANAMBRA STATE, NIGERIA.*

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ABSTRACT

Malaria in pregnancy is a major public health concern and poses a considerable threat to the pregnant mother and developing foetus especially in hyper endemic areas like Nigeria. This study is aimed at investigating the prevalence of malaria among pregnant women in Aguata Local Government Area of Anambra State. The study was carried out between June and October, 2023. Three hundred and seventy six (376) consented pregnant women within the age bracket ≤ 20 years to >35 years from six (6) communities in Aguata; three (3) sub-urban (Ekwulobia, Umuchu and Uga) and three (3) rural communities (Nkpologwu, Eziniifite and Umuona), who attended antenatal clinic during the research period constituted the subjects for this study. Blood samples were collected and examined for malaria infection using the standard parasitological method of Giemsa stained thick and thin blood films. Out of 376 sampled pregnant women, two hundred and thirty four (234) (62.23%) were positive to malaria. The prevalence of malaria infection by communities was highest in Eziniifite (80.00%) and lowest in Ekwulobia (50.69%). The difference in the prevalence of malaria by communities was statistically significant ($P < 0.05$). By conducting a thorough investigation on the prevalence of malaria among pregnant women in the study area, the high burden of malaria in the population was determined, which is essential for planning and implementing targeted intervention. Aggressive integrated malaria control measures should be employed. This will help to reduce substantially malaria and its risks to pregnant women and developing foetuses.

KEY WORDS: Malaria, Pregnant women, Prevalence, Aguata, Anambra State.

INTRODUCTION

Malaria is a disease caused by blood-protozoan parasites of the genus *Plasmodium*.

There are many species of *Plasmodium*, but it is only five of these species that are responsible for causing malaria in man. They are *Plasmodium falciparum*, *P. ovale*, *P. malariae*, *P. vivax*, and *P. knowlesi*. *Plasmodium falciparum* is the commonest and most vicious of these species (Sherman, 1998 **OLD**). Malaria is transmitted to humans by an infected female Anopheles mosquito, during blood meal on a susceptible host.

Malaria is one of the world's killer diseases. According to the World Health Organization (WHO), report in 2016, around 216 million new cases of malaria occur globally.

Most of the malaria cases were in the African region (90%), followed by the Southeast Asian region (7%) and Eastern Mediterranean region (2%). An estimated 6 million deaths occur worldwide yearly as a result of malaria. Most of these deaths occurred in the African region (91%) followed by the Southeast Asian region (6%) and Eastern Mediterranean region (2%) (World Health Organization, 2016, 2017).

The Federal Ministry of Health (FMH, **DATE?**) reported that approximately 97% of Nigerians live in malaria risk regions. Nigeria suffers the greatest malaria burden with approximately 51 million cases and 207,000 deaths reported annually (approximately 173 million) is at risk of the infection (WHO, 2014).

Apart from children below 5 years, pregnant women are the highest risk group for malaria infection and they are also at risk to develop a severe form of the disease which lead to mortality (**AUTHOR?**). Malaria in pregnancy is a major health challenge that is a threat to life to both the mother and the

developing foetus. Malaria infection in pregnancy can lead to maternal death, maternal anemia, and postpartum hemorrhage, pulmonary edema and puerpal sepsis (AUTHOR?). Furthermore, malaria in pregnancy poses a severe threat to the developing foetus which can lead to spontaneous abortion, preterm delivery, growth restriction/ low birth weight, still birth, congenital infection and neonatal mortality (Maternal Health Taskforce, 2018).

There are thousands of malaria-related deaths in pregnancy yearly, as a result of severe maternal anemia. (Steketee *et al.*, 2001 OLD). Every year, malaria in pregnancy is responsible for 20% of still births and 11% of all new born deaths in Africa (WHO, 2018). Pregnant women remain highly susceptible to malaria because pregnancy minimizes immunity to the disease. Pregnant women living in areas of malaria transmission have little or no immunity to malaria and are more susceptible than non-pregnant women with malaria (AUTHOR?). In unstable malaria transmission areas, the death of a pregnant mother may be due to complications of severe malaria (hypoglycemia, cerebral malaria and pulmonary edema) or indirectly from malaria related severe anemia (Marchesin and Crawley, 2001 OLD).STATE THE AIM OF THE STUDY HERE!!!!

MATERIALS AND METHODS

Study area.

The study was carried out in six (6) randomly selected communities. Three suburban communities (Ekwuluobia, Umuchu and Uga) and three rural communities (Nkpologwu, Eziniifite and Umuona) in Aguata Local Government Area of Anambra State, Nigeria. Aguata Local Government Area is one of the oldest and largest Local Government Area in the State. It is located at latitude $5^{\circ}55.2'N$ to $6^{\circ}4.8'N$ and longitude $6^{\circ}5.9'E$ to $7^{\circ}9.6'E$ (AUTHOR?). The Local government headquarters is located at Aguata and is composed of fourteen (14) autonomous communities; Ekwuluobia, Isuofia, Agulu,

Ezechukwu, Amesi, Achina, Akpo, Ezenifite, Igboukwu, Ikenga, Nkpologwu, Oraeri, Uga, Umuchu And Umuona.

The Local Government Area landmass covers an area of 19,966. 25km² (AUTHOR?). The estimated population of the area is 527,200 with female having 258,328 and males having 268,872 according to National Population Commission Data for 2015. The study area is marked by two seasons, the rainy season, which starts from March to October, with an annual rainfall of about 180mm to 270mm, while dry season covers the period of November to April with high temperature (AUTHOR?).

The inhabitants of the area are predominantly farmers, traders, civil servant, students, merchants who are typically Igbos, only few inhabitants are from other tribes.

Study Design

This research was a quantitative cross-sectional study of pregnant women who attended antenatal clinic in six hospitals randomly selected from six different communities(St. Patrick's Hospital Ekwulobia, Visitation Hospital Umuchu, Divine Grace Hospital Uga, Stanley Hospital Nkpologwu, Eziniifite Primary Health Center and Umuona Health Center).

Sample Size

A sample size of 376 consenting pregnant women were recruited using Yamane (1996) formula (Appendix 1). The population of the study area based on the 2015 Nigeria national population figure was estimated to 31st December, 2022. Only the female population was under consideration and within the female population, sub population of women of reproductive age [15-49 years] which makes up 49% of the total female population were involved. Within the subpopulation, only 5% of the women of reproductive age was considered pregnant.

Ethical Approval

Ethical approval was obtained from the health unit, Aguata Local Government Area, Anambra State. A pre-survey visit was made to the local government to obtain permission from the local government authority. The authorization letter was forwarded to the management, health workers in charge of antenatal women and laboratory scientists in the hospitals and they were informed on the nature and objective of the study. The informed consent of the pregnant women were sought and obtained before the commencement of the study.

Study Population and Sampling Method

The study consisted of all the pregnant women who attended antenatal clinic in the 3 sub-urban communities (Ekwulobia, Umuchu and Uga) and three rural communities (Nkpologwu, Ezinifite and Umuonna) during the study period. These communities were selected out of the fourteen (14) communities in Aguata Local Government Area by random sampling. In each of the randomly selected communities, at least one hospital was selected by judgmental (purposively sampling) method which involves researcher's informed judgment about the sampling unit base on his knowledge and experience about the population as well as the purpose of the study (Anyanwu, 2000). Three hundred and seventy (376) consented pregnant women who came for antenatal clinic during the research period (June-October 2023) were involved in the study.

Collection of Blood Sample

With the assistance of a medical lab scientist and other health professionals, blood samples were collected employing the venipuncture technique. The puncture site was cleaned with cotton wool, deepened in methylated spirit and the blood specimen was obtained using 2ml syringes. Each blood specimen collected was transferred into a sterile EDTA container. Each sample was labeled correctly with patient's data to avoid mix up.

Determination of *Plasmodium* Infection.

The presence of malaria parasite was determined microscopically under light microscopy using thick and thin blood films. Both thick and thin blood films were stained using 10% v/v Giemsa stain. Thick blood films were used to detect the presence of malaria parasite, while the thin blood films were examined for the identification of *Plasmodium* species present.

Preparation of Thick Film

Using a Pasteur pipette, one drop of blood was placed at the center of a labeled, grease free, dry and clean glass slides. The drop of blood was emulsified to make a smear of about 15mm.

The slides were placed on a horizontal position and the smear allowed to air dry thoroughly. When dried, the slides were stained with 10% v/v Giemsa stain for 10 minutes and were gently washed in a clean water. The slides were kept vertically in a draining rack and allowed to dry. When completely dried, a drop of immersion oil was applied on the smear and was examined under the microscope using 100x objective and the results recorded.

Preparation of Thin Film

Two milliliters of venous blood was placed at the center of a labelled, grease free, dry and clean slides. With an applicator stick or spreader, the smear was spread across the slides. The slides were placed on horizontal position and the smear allowed to dry thoroughly. When dried, the thin films were fixed for 2minutes with a drop of absolute methanol and allowed to dry. The thin films were stained with Giemsa stain and were left to dry for 10minutes. The slides were washed off with water and were allowed to dry. When dried, a drop of immersion oil was applied to the smears and it were examined under microscope, using 100x objective to identify the different species of malaria parasites and the results recorded.

Analysis of Data

The data obtained were analyzed using statistical package for social sciences (SPSS) version 20 (2020). The statistical significance of variables was estimated using Pearson's chi square to establish possible relation of prevalence with parity, age, trimester and IPT and LLIN usage. P-value less than 0.05, ($p < 0.05$) was considered significant.

RESULTS

The overall prevalence of infection among pregnant women in Aguata Local Government Area was 62.23% ($\frac{234}{376}$). *P. falciparum* was the only malaria parasite specie identified. The prevalence of malaria was highest among pregnant women in the age ≤ 20 (75%) and least among women above 35 years (45.71%). The prevalence was highest among women in their second trimester (67.52%). The primigravid women had the highest malaria prevalence than the multigravids (68.99%). Table 1 shows the overall prevalence of *Plasmodium falciparum* infection among pregnant women in Aguata Local Government Area to be 62.23% (234/376). The prevalence of malaria in pregnant women by community was 50.67% (38/75), 56.00% (42/75), 52.63% (40/76), 76.67% (46/70), 80.00% (40/50) and 70.00% (28/40) for sun-urban communities (Ekwulobia, Umuchu, Uga) and rural communities (Nkpologwu, Ezinifite and Umuona) respectively ($P < 0.05$).

Table 1: Prevalence of Malaria among pregnant women according to communities in Aguata LGA (N = 376).

Community	Number Examined	Number Infected%	% Prevalence
Sub-urban			
Ekwulobia	75	38	50.67
Umuchu	75	42	56.00
Uga	76	40	52.63
Rural			
Nkpologwu	60	46	76.67
Ezinifite	50	40	80.00

Umuona	40	28	70.00
TOTAL	376	234	62.23

DISCUSSION

The prevalence of malaria among pregnant women in Aguata Local Government Area was carried out between June - October, 2023 in six different communities. Three sub-urban (Ekwulobia, Umuchu and Uga) and three rural communities. (Nkpologwu, Ezinifite and Umuona). Three hundred and seventy-six (376) consented pregnant women were sampled and examined for malaria parasite. From the study, the number of pregnant women that tested positive to malaria using Giemsa stained thick films were 234 (%?), while 142 (%?) tested negative. The overall prevalence of *Plasmodium* infection among pregnant women in Aguata Local Government Area, Anambra State was 62.23%. A prevalence of 62.23% represents an increase from 43.50% obtained from the previous work of Nwangwu and his colleagues in 2020 in the same area between October – March, 2020. A comparatively higher prevalence obtained in this study may be as a result of the period of the research (June - October). June – October is the period of rainy season, when *Anopheles* mosquito breeding habitats abound and their population increases. Malaria transmission is affected by season as malaria vector population increases in the rainy season than in the dry season.

In addition, the high prevalence recorded may also be as a result of lack of the use of malaria preventive measures such as the use of Long Lasting Insecticide Treated Nets (LLINs) and Intermittent Preventive Treatment (IPT) by most pregnant women as witnessed during the research. Only about 39% of these women utilized malaria control measures **DID YOU STUDY THIS?, SHOW RESULT TABLE)**

From the result, the sub-urban communities in Aguata Local Government Area (Ekwulobia, Umuchu and Uga) had the lowest malaria prevalence of 50.67%, 56.00% and 52.63% respectively, while, the

rural communities (Nkpologwu, Ezinifite and Umuona) recorded the highest malaria prevalence of 76.00, 80.00% and 70.00% respectively. The difference in the prevalence of malaria among the pregnant women based on community was statistically significant ($p < 0.05$). A factor which may have contributed to high prevalence in some areas is the behavioral attitudes of the inhabitants such as the utilization of malaria control tools, poor sanitation measures etc. Also, the environmental conditions of the various communities may have contributed unequally to mosquito breeding habitats and unequal exposure to their bites.

RECOMMENDATIONS

CONCLUSION

Malaria remains a significant public health concern among pregnant women in Aguata Local Government Area of Anambra State. **(SUMMARIZE RESULTS HERE)** To effectively control malaria in this population, a comprehensive approach that includes improving access to healthcare services, providing pregnant women with insecticide treated bed nets and implementing intermittent preventive treatment for malaria in pregnancy (IPTP) is essential. By addressing the epidemiology of malaria among pregnant women and implementing evidence-based control measures, we can reduce the burden of malaria in this vulnerable population and improve maternal and child health outcomes. Collaborative efforts between government agencies, healthcare providers and community stakeholders are crucial in the fight against malaria among pregnant women in this region.

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RECOMMENDED CORRECTIONS

- 1. Reduce Abstract rto 250 words.**
- 2. Reduce keywords to 5 words.**
- 3. End your Introduction by stating the aim of the study.**
- 4. Discuss your Results fully with current related research findings.**
- 5. List Recommendations of your study.**
- 6. Some of your citations are old and obsolete. Use current editions of the texts.**
- 7. WHO 2015 listed in References not found in text. Reconcile.**
- 8. FMH(NO DATE), WHO 2015, National Population Commission 2015, Yamane 1996, Anyanwu 2000 and SPSS 2020 were found in text but not listed in References. Please reconcile.**

REMARK

Paper publishable after comprehensive corrections are accomplished.