Tropical Journal of Applied Natural Science

Vol. 3 Issue 1 (2025)

ISSN: 2449-2043

https://tjansonline.org/view-paper.php?id=72;

Volume/Issue: Volume 3, Issue 1 **Published:** July 19, 2025

EPIDEMIOLOGY OF MALARIA AND ITS CONTROL AMONG PREGNANT WOMEN IN AGUATA LOCAL GOVERNMENT AREA, ANAMBRA STATE, NIGERIA

Chinemelu, U. C.[1], Anyaegbunam, L. C [2]. and Ezeokoli, A. W. [1]

1. Department of Science Laboratory Technology, Federal Polytechnic, Oko, Anambra State

2. Department of Biological Sciences ,Chukwuemeka Odumegwu Ojukwu University Uli, Anambra State.

amychinex4luv2004@gmail.com; 08067864668

ABSTRACT

Malaria in pregnancy is a significant public health concern in hyper-endemic areas like Nigeria. This study investigated the epidemiology of malaria and its control among 376 pregnant women in Aguata Local Government Area, Anambra State, between June and October 2023. Blood samples were collected and examined for malaria infection using Giemsa stained thick and thin blood films. The study found a malaria prevalence of 62.23% (234/376) among the pregnant women. The prevalence varied significantly across communities, with Ezinifite having the highest prevalence (80.00%) and Ekwulobia having the lowest (50.69%). Young maternal age, gravidity, and non-utilization of malaria preventive measures were identified as risk factors. Women under 21 years had the highest prevalence (75.00%), while those over 35 years had the lowest (45.71%). The use of malaria preventive tools like intermittent preventive treatment (IPT) and long-lasting insecticide-treated nets (LLINs) reduced malaria transmission by 86% among users. However, many women did not use these tools or practice proper environmental sanitation. The study highlights the need for aggressive integrated malaria control measures to reduce the burden of malaria among pregnant women and their developing fetuses. Targeted interventions are essential to address the high burden of malaria in this population.

Keywords; Malaria, Pregnant women, Aguata, Anambra State.

INTRODUCTION

Malaria is a disease caused by haemc protozoan parasites of the genus *Plasmodiu* There are many species of *Plasmodium,* bu five of these species are known to caus malaria disease in man. These ar *Plasmodium falciparum, P. ovale, I malariae, P. vivax*, and *P. knowlesi.* Th most common and vicious of these species i *P. falciparum* (Sherman, 1998). Malaria i transmitted to humans by an infected femal Anopheles mosquito, during blood meal on susceptible host.

Malaria is one of the killer disease worldwide. According to the World Healt Organization (WHO), report in 2016, aroun 216 million new cases of malaria occu globally.

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

According to the Federal Ministry of Healt (FMH) report, approximately 97% c Nigerians live in malaria risk areas. Nigeria suffers the world's 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 of age, pregnant women are the highest risk group for malaria infection and to develop a severe form of the disease that result in mortality. Pregnancy associated malaria (PAM) or placental malaria is a major health challenge that is life threatening to both the mother and the developing foetus. Malaria infection in pregnancy is a major cause of maternal death, maternal anemia, and postpartum hemorrhage, pulmonary edema and puerpal sepsis. Furthermore, malaria during pregnancy causes negative impact on pregnancy such as spontaneous abortion, preterm delivery, growth restriction/ low birth weight, still birth, congenital infection and neonatal mortality. (Maternal health taskforce, 2018).

There are several thousand cases of malaria-related deaths in pregnancy per year, which are usually due to severe maternal anemia. (Steketee *et al*., 2001). Each 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 th disease. Pregnant women living in areas c malaria transmission have little or n immunity to malaria and are mor susceptible than non-pregnant women wit malaria. In unstable malaria transmissio areas, the death of a pregnant mother may b due to complications of severe malari (hypoglycemia, cerebral malaria an pulmonary edema) or indirectly from malari related severe anemia (Marchesin an Crawley, 2001).

This study is aimed at evaluating th epidemiology of malaria and its contr among pregnant women in Aguata Loc Government Area of Anambra State Nigeria

MATERIAL AND METHOD

Study Area: The study was carried out i six (6) randomly selected communitie Three suburban (Ekwuluobia, Umuchu an Uga) and three rural communitie (Nkpologwu,Eziniifite and Umuona) i Aguata Local Government Area of Anambr State, Nigeria. Aguata Local Governmer Area is one of the oldest and largest Loc Government Area in the State. It is locate at latitude $5^{0}55.\ 2^{1}N$ to $6^{0}4.8^{1}N$ an longitude $6^{0}5.9^{1}E$ to $7^{0}9.6^{1}E$. The Loc government headquarters is located Aguata and is composed of fourteen (14 autonomous communities; Ekwuluobi Isuofia, Agulu, Ezechukwu, Amesi, Achin Akpo, Ezenifite, Igboukwu, Ikenga, Akpologwu, Oraeri, Uga, Umuchu And Umona.

The Local Government Area landmass covers an area of 19,966. $25km^{2}$. 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.

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

Fig. 1: Map of Anambra State Indicating Aguata Local Government Area

Sources: Akanwa, A. O. and Ezeoledo, I. C. (2018)

This research was a quantitative cross sectional study of pregnant women wh attended antenatal clinic in six hospital randomly selected from six differer communities. (St. Patrick's Hospita Ekwulobia, Visitation Hospital Umuchu Divine Grace Hospital Uga, Stanle Hospital Nkpologwu, Eziniifite Primar Health Center and Umuona Health Center).

Sample Size

A sample size of 376 consenting pregnar women were recruited using Yamane (1996 formula (Appendix 1). The population of th study area based on the 2015 Nigeri national population figure was estimated t 31st December, 2022. Only the femal population was under consideration an within the female population, su population of women of reproductive ag [15-49 years] which makes up 49% of th total female population were involvec Within the subpopulation, only 5% of th women of reproductive age was considere pregnant.

Ethical Approval

Ethical approval was obtained from th health unit, Aguata Local Government Area Anambra State. A pre-survey visit was mad to the local government to obtain permissio from the local government authority. Th authorization letter was forwarded to th 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 & seventy (376) consented pregnant women who came for antenatal clinic during the research period (Junes-October 2023) were involved in the study.

Collection of Blood Sample

With the assistance of a medical lab scientis and other health professionals, bloo samples were collected employing th venipuncture technique. The puncture sit was cleaned with cotton wool, deepened i methylated spirit and the blood specime was obtained using 2ml syringes. Eac blood specimen collected was transferre into a sterile EDTA container. Each sampl was labeled correctly with patient's data t avoid mix up.

Determination of *Plasmodium* Infection.

The presence of malaria parasite wa determined microscopically using ligh microscopy using thick and thin blood films Both thick and thin blood films were staine using 10% v/v Giemsa stain. Thick bloo films were used to detect the presence o malaria parasite, while the thin blood film were examined for the identification o *Plasmodium* species present.

Preparation of Thick Film

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

The slides were placed on a horizonta position and the smear allowed to air dr thoroughly. When dried, the slides wer stained with 10% v|v Giemsa stain for 1 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 mls 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.

Evaluation of risk factors and utilization of malaria preventive control measures among pregnant women

Detailed questionnaires were distributed to the pregnant women involving the risk factors such as non- wearing of protective

clothing, poor environmental condition: e.t.c. The knowledge and use of preventiv measures such as the use of long lastin insecticide treated nets (LLINs) an intermittent preventive treatment (IPT). Thi was used to analyze the risk factors and th number of pregnant women who use malaria preventive measures and also acces its efficacy in the control of malaria amon the users.

Analysis of Data

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

RESULTS

The overall prevalence of infection amon pregnant women in Aguata Loca Government Area to be 62.23% ($\frac{234}{376}$). *P falciparum* was the only malaria parasit specie identified. The prevalence of malari was highest among pregnant women in th age $\leq$ 20 (75%) and least among wome above 35 years (45.71%). The prevalenc was highest among women in their secon trimester (67.52%). The primigraud wome had the highest malaria prevalence than the multigravids (68.99%).

Table 4.1 shows the overall prevalence of Plasmodium falciparum infection among pregnant women in Aguata Local Government Area to be 62.23% (234/376).

Table 4.2 shows the relationship between age and malaria prevalence among pregnant women in Aguata Local Government Area. The prevalence of malaria infection was highest among pregnant women in the age $\leq$ 20 (75%), followed by 65.8%, 63.3%, 57.0% and 45.71 for age groups 21-25, 31-35, 26-30 and >35 years respectively ($p<0.299$) (see appendix IV).

Table 4.3 shows the relationship between malaria with gravidity and trimester among pregnant women in the study area. Malaria prevalence among pregnant women in the study area followed the trend 2nd trimester (67.52%) >1st trimester (58.20%) >3rd trimester (55.65%) ($p<0.05$). primigravid women had higher malaria prevalence (68.99%) than the multigravida (51.70% ($p<0.05$).

Table 4.1: 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**

Table 4.2: Prevalence of malaria parasite among pregnant women by age and the relationship between malaria with age in the study area.

Age	No. Examined	No. infected	% Prevalence
≤ 20	48	36	75.00%
21-25	126	83	65.87%
26-30	107	61	57.01%
31-35	60	38	63.33%
>35	35	16	45.71%
Total	376	234	62.23

Table 4.3: The relationship between malaria with gravidity and trimester.

Parameters	No. Examined	No. of infected	% Prevalence
Gravidity			
Primi	229	158	68.99
Multi	147	76	51.70
Total	376	234	58.20
Trimester			
Ist	67	39	58.20
2nd	194	131	67.52
3rd	115	64	55.65
Total	376	234	62.23

Table 4.4: Risk factors and the utilization of malaria preventive and control measures among pregnant women in the study area.

Malaria risk factors a preventive measures	Number of Persons Examined	No. infected	% Prevalence
IPT	26	0	0.00
LLINs	105	28	26.66
Both LLINs & IPT	10	0	0.00
Not Wearing protective clothing	97	85	87.63
Not covering of windows & doo with nets	100	85	85.00
Presence of stagnant water in a around the environment	38	36	94.74
Total	376	234	62.23

DISCUSSION

The epidemiological study of malaria and it control among pregnant women in Aguat Local Government Area was carried ou between June - October, 2023 in si different communities. Three sub urba (Ekwulobia, Umuchu and Uga) and thre rural communities. (Nkpologwu, Ezinifit and Umuona). Three hundred and seventy six (376) consented pregnant women wer sampled and examined for malaria parasite From the study, the number of pregnar women that tested positive to malaria usin Giemsa stained thick films were 234 whil 142 tested negative. The overall prevalenc of *Plasmodium* infection among pregnar women in Aguata Local Government Area Anambra State was 62.23%. A prevalenc of 62.23% represents an increase fror 43.50% obtained from the previous work c Nwangu and his colleagues in 2020 in th same area between October – March, 202(A comparatively higher prevalence obtaine in this study may be as a result of the perio of the research (June - October). June October is the period of rainy season, whe *Anopheles* mosquito breeding habitat abound and their population increase: Malaria transmission is affected by seaso as malaria vector population increases in th 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. 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.

In this study, pregnant women of all ages were at equal risk of malaria parasite although the highest prevalence of malaria (75% and 65.8% respectively) occurred

among the age groups ≤ 20 and 21-25 whil lowest prevalence (45.71%) was recorde among the age group >35 years. This agree with findings of Espinoza *et al.,* (2005) an Nwangwu *et al.,* (2020) who reported tha the highest malaria prevalence was seen i pregnant women not older than 25years an that younger women are more susceptible t malaria infection. The observed hig prevalence among these age group (≤ 20 an 21 -25 years) may be because most wome in the age group were primigravidae and th existence of low natural immunity t infectious disease including malaria at tha age. There was significant difference in th prevalence of malaria in relation to ag ($p<0.05$).

In this study, pregnant women in the second trimester recorded significantly th highest prevalence of malaria infectio (67.52%). This finding is consistent with th report of Nwangwu *et al*., (2020) tha indicated that malaria susceptibility is mor marked in the second trimester than othe trimesters (first and third). This findin disagrees with the work of Accrombessi e *al.,* (2018) that stated that women in the first trimester are more susceptible t malaria infection as a result of pre-existin malaria infection before conception.

It was observed in this study that malari prevalence was higher in primigravida (68.99%) than in multigravidae (51.70%). This agrees with the studies of Mockenhaupt *et al*., (2000) and Espinoza *et al*., (2005) in which the highest prevalence was found among pregnant women in the primiparae than in multiparae.

Also, Wirth and Alonso, 2017 stated that first-time mothers are vulnerable to parasitemia and chronic infections by *P. falciparum* because they lack immunity against CSA – binding parasites and that as purity increases, the predisposition to malaria infection decreases.

From the study, women who did not use malaria preventive measures such as wearing protective clothing , those who do not have window and door nets and those who live in dirty environments where there stagnant water around their environments, were at risks of malaria infection. The overall usage rate of control measures among pregnant women in Aguata Local Government Area was 37.5%. This utilization of control measures brought about 86% reduction of malaria transmission among the pregnant women that utilized control measures. This is to emphasize the efficacy of the use of LL1Ns and 1PT to the control of malaria in pregnancy. This agrees with the work of Larsen, 2012, which stated that a study conducted in Raieda, Western Kenya in

2020 on a large community of LL1Ns an 1PT users among pregnant women. Th study revealed that the pregnant wome who utilized malaria control / preventiv measures had low malaria prevalence.

Contribution to knowledge

This study identified the high prevalence c malaria among pregnant women in Aguat Local Government Area. By conducting a epidemiological investigation, the hig burden of malaria in the population wa determined, which is essential for plannin and implementing targeted interventior This study also highlighted factors tha contributed to the high prevalence c malaria in the region, such as poor access t healthcare services, lack of knowledge o malaria preventive and control measures.

Furthermore, the study provided valuabl insights to the current practices an challenges related to the control of malari among pregnant women in Aguata Loca Government Area. By assessing th knowledge, attitudes and practices c pregnant women towards malaria preventio and control measures, gaps in existin interventions were identified and also way of improving the delivery of malari preventive species to the vulnerabl population.

Conclusion

Malaria remains a significant public health concern among pregnant women in Aguata Local Government Area of Anambra State. 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.

ACKNOWLEDGEMENTS

My profound gratitude goes to Almighty God for His grace

My unreserved gratitude goes to my children Master Kamsi Anyaorah and Miss Ifechukwu, thank you for making this academic journey an easy one for me. Thank you for your prayers and support.

My special thanks goes to Dr A. O. Ekesiob who taught me basically what I needed t know about this research. Thank you sir fc taking out time to mentor me. I will forev be grateful.

Special thanks goes to the management c Visitation Hospital Umuchu. To m amazing friend Scientist Ikechukwu, thi research wouldn't have being a succes without your support. Thank you for you efforts to make sure that this research was success.

REFERENCES

Accrombessi, M., Fievet, N., Yoo, E Cottrell, G., Agbota, G. an Massougbodji, (2018 *Prevalence and associated ris factors of malaria in the firs trimester of pregnancy*. A preconceptional cohort study i Benin. *Journal of Infectiou Diseases*. **217**(8):1309-1317.

Espinoza, E. C., Hildago, L. M. an Chedraul, P. A. (2005). Th effect of malaria infection o malaria-foetal outcome i Ecuador. *Journal of Malaria Foetal and Neonatal Medicine* **18**(16):101-105

Marchesini, P. and Crawley, J. (2004 *Reducing burden of malaria i pregnancy*. MERA IV *Supporting Agency Malari*a, WHO.

Mockenhaupt, F.P., Thompson, W.N. and Rong, B.E. (2000). *A*naemia in pregnant Ghana women. Importance of malaria, iron deficiency and haeomoglobinopathies. *Journal of Royal Society of Tropical Medicine and Hygiene,* **94**(12):477-483.

Nwangwu, R. L., Eguche, C. M., Mbanugo, J. I., and Onwu zulike, V. I. (2020). Prevalence of plasmodium falciparum infection among pregnant women visiting community hospitals in Aguata Local Government Area, Anambra State Nigeria: *Journal of Biomedical statistics and informatics*, **4**(5):76-80

Sherman, I.W. (1998). *A brief history of malaria and discovery of the parasites lifestyle*. In. I.W. Sherman (ed). Malaria: parasite biology, pathogenesis and protection, ASM Press, Washington D.C. 200: Pp. 159-172.

Steketee, R.W., Nahlen, B.L. and Menendez, C.E. (2001). *The burden of malaria in pregnancy in malaria endemic areas. American Journal of Tropical Medicine and Hygiene*, **64** (2): 28-35.

WHO, (2006). *The role of laborator diagnosis to support malari disease management*. Focus i the use of rapid diagnostic test in area of high transmission. A report of a WHO technica consultation. Genev Switzerland.

WHO, (2006). World Health Organizatio guidelines for the treatment c malaria. 2006. World malari report, Geneva, Switzerland.

WHO, (2009). *The African malaria report 2009*. World Health Organization, 20 avenue Appia 1211, Geneva, Switzerland. www.who.com.accessed 02/06/2023.

WHO, (2014). *World malaria report 2014.* World Health Organization, 20 avenue Appiah, Geneva, Switzerland. www.who.com.Accesses 05/06/2023.