

## Zonal Prevalence of Malaria Fever among Pregnant Women in Nigeria: A Retrospective Study

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**Abstract:** Nigeria as a developing nation is in a predicament on the issue of malaria fever and pregnancy connectivity. Pregnancy is a necessity but the country is sandwiched within the mosquito active belt/region of the world, the result of this connection is frequent occurrence of malaria during pregnancy! A dire situation that often results into maternal fatalities. Malaria remains a major public health problem in Nigeria where it is endemic; this paper thus focuses on determining the level of prevalence of malaria fever burden among pregnant women in all the geopolitical regions of the country. The study made use of official data on reported cases of malaria in pregnancy and associated maternal deaths from all the states of the nation grouped subsequently into contiguous geopolitical regions over a specified time frame. It was found that maternal malaria is endemic in all the regions of the country although it is most prevalent in the North-West region although associated mortalities are found more prevalent in the south-south region during the period under study. Therefore there is the urgent need for interventions through capacity building and continuous commitment for implementation of programmes geared towards reduction in malaria cases such as the intermittent preventive treatment (IPT), use of insecticides treated-nets (ITN), roll back malaria (RBM) programme and the effective case management of malaria illness especially in pregnant women.

**Keywords:** Malaria, Pregnancy, Prevalence, Maternal, Nigeria.

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### I. Introduction

Diseases can be defined as the disorder of the body and mind or a condition in humans, plants, or animals that results in pathological symptoms and is not the direct result of physical injury. In other words, there are many common diseases affecting the people especially the pregnant women. Malaria is highly endemic in Nigeria where it accounts for 60% outpatient visits to health facilities, 30% childhood death, and 11% of maternal deaths. *The financial loss due to malaria annually is estimated to be about 132 billion naira in form of treatment cost, prevention cost, loss of man-hours etc. Malaria is caused mainly by four Plasmodium species namely Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae and Plasmodium ovale and it is the most important of all the tropical diseases in terms of its associated morbidity and mortality (Chukwuocha, et al, 2012).* Umaru, et al (1990) also emphasis that malaria is a tropical disease caused by plasmodium parasite as a result of bite of infected female anopheles mosquitoes and that Plasmodium falciparum is the most common species in virtually all parts of Nigeria.

On the global scale, an estimated 300 million cases of malaria occur each year annually worldwide accounting from 1.5 to 2.7 million deaths. Most of these deaths are due to infection with plasmodium falciparum which occur among children and pregnant women in the developing world, especially West Africa where Nigerians constitutes most of the population size. According to Lindsay, et al (1972) pregnant women are more attractive to mosquitoes and the malaria-parasite densities are also higher in them. They opined that more than 300-500 million individuals throughout the World are infected with the disease and 1.5-2.7 million people die of it yearly.

A lot of times the actual statistics is not clear in so many regions due to paucity of data and this often leads to neglect of the disease and the devastation. Hundreds of millions of people are affected and pregnant women are more susceptible together with little children. It is dangerous to both the mother and the foetus. *The pregnant women are at greater risk of malaria infection and of symptomatic malaria disease than non-pregnant adults. Pregnant women are particularly vulnerable to malaria because pregnancy reduces immunity to malaria; increases susceptibility to malaria infection, the risk of illness, severe anaemia, acute pulmonary edema, renal failure, puerperal sepsis, postpartum haemorrhage which increases the risk of death. Malaria in pregnancy results in adverse pregnancy outcomes, such as spontaneous abortion, neonatal death, and low birth weight. Chronic anemia, due to malaria may also affect a child's growth and intellectual development (Bassey et al, 2007).*

Malaria control still remains a challenge in Africa where 45 countries, including Nigeria, are endemic for malaria, and about 588 million people are at risk. The protection of pregnant women living in malaria-

endemic countries has been of particular interest to many National Malaria Control Programmes because of their reduced immunity. *Most cases of malaria in pregnancy in areas of stable malaria transmission are asymptomatic. This is attributed to anti-disease immunity acquired during previous exposures which protects against clinical malaria. Unfortunately, this subclinical infection still poses great danger to both the mother and the foetus. The principal impact of malaria infection is due to the presence of parasites in the placenta causing maternal anaemia (potentially responsible for maternal death when severe) and low birth weight (LBW) (Hemingway and Bates, 2003) .*

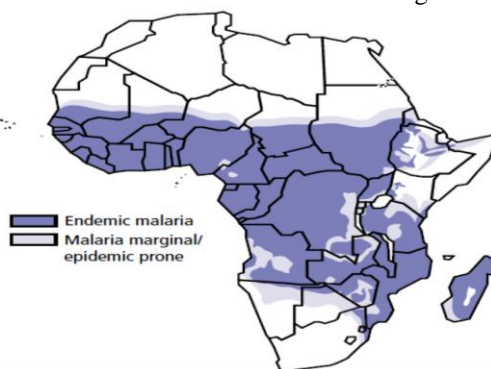
The recent World Malaria Report, which indicated that Nigeria accounts for a quarter of all malaria cases in the 45 malaria-endemic countries in Africa, clearly showed the challenge of malaria in Nigeria. This may be due to the large population with approximately 140 million people living in areas of high malaria transmission. Thus, pregnant women, who are known to be one of the groups at high risk of the effects of malaria infection, need special protective measures to ensure their survival and improve birth outcome.

Each year, 25-30 million women become pregnant in malaria endemic area of Africa, and similar numbers are exposed to malaria in Asia, Oceania, and South America. According to Nigeria’s Federal Ministry of Health (2005), malaria is associated with 11.0% of all maternal deaths and 70.5% of morbidity in pregnancy. It accounts for up to 15% maternal anaemia, 5%-14% of low birth weight (LBW), and 30% of “preventable LBW; 300 million cases (90%) occur in Africa.

It is reported that one person in Africa dies of malaria every 10 seconds, and pregnant women and children under five are most of risk. It equally indicated that other burdens associated with malaria during pregnancy include but not restricted to spontaneous abortion and miscarriage, still birth, socio-economic status of the family is affected in terms of using scarce resources on preventable conditions.

Malaria is an important cause of severe anaemia in pregnant African women, and by this mechanism malaria causes an estimated 10 000 maternal deaths each year. All these statistics points to the fact that concerted and continuous efforts is essential to curb the fatalities due malaria in endemic countries such as Nigeria.

Figure 1: Distribution of Endemic Malaria region in Africa



Source: MARA/ARMA collaboration (Mapping Malaria Risk in Africa), July 2002. [www.mara.org.za](http://www.mara.org.za).

## II. Methodology

This study shall focus on examination of the distribution of malaria burden among pregnant women in Nigeria. States of Nigeria is grouped according to the six geopolitical zone namely; **north-east, north-west, north-central, south-east, south-west and south-south** as tabulated below.

North Central	North East	North West	South East	South South	South West
FCT Abuja	Adamawa	Jigawa	Abia	Akwa Ibom	Ekiti
Benue	Bauchi	Kaduna	Anambra	Bayelsa	Lagos
Kogi	Gombe	Kano	Ebonyi	Cross River	Ogun
Kwara	Taraba	Katsina	Enugu	Delta	Ondo
Nasarawa	Yobe	Sokoto	Imo	Edo	Osun
Niger	Borno	Zamfara		Rivers	Oyo
Plateau		Kebbi			

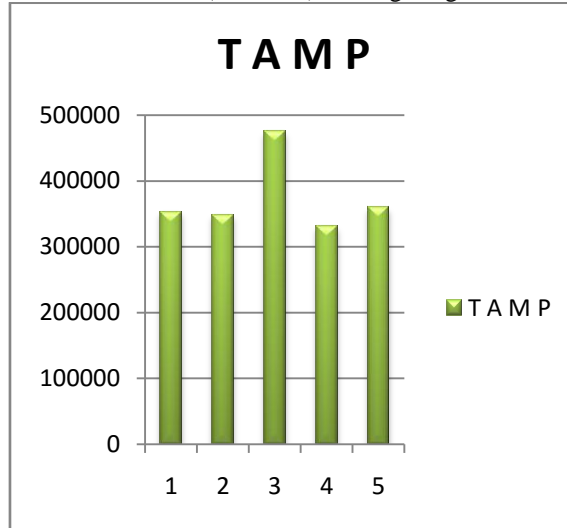
Data on reported cases of malaria occurrence among pregnant women is collected on each state and then aggregated into geopolitical zones. The primary objective of this approach is to evaluate the

zonal prevalence distribution of malaria among pregnant women in the six geopolitical zones of Nigeria as shown in table and ascertain the degree of nationwide prevalence over period under study.

**III. The Summary Results**

**Descriptive Statistics:** Descriptive or deductive statistics such as sample means, median, mode, range and standard deviation are also employed in the analyses for lucidity on prevalence pattern.

Figure 1: Total Annual Malaria Prevalence (T A M P) Among Pregnant Women In Nigeria (2007-2011)



Notes: 1=2007, 2=2008, 3=2009, 4=2010, 5=2011

Pie Chart Showing Cases of Malaria in Pregnant Women in the Six Geographical Zones in Nigeria (2007-2011).

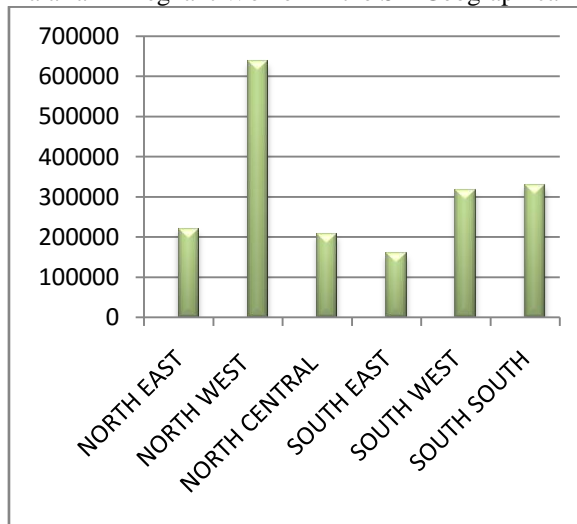
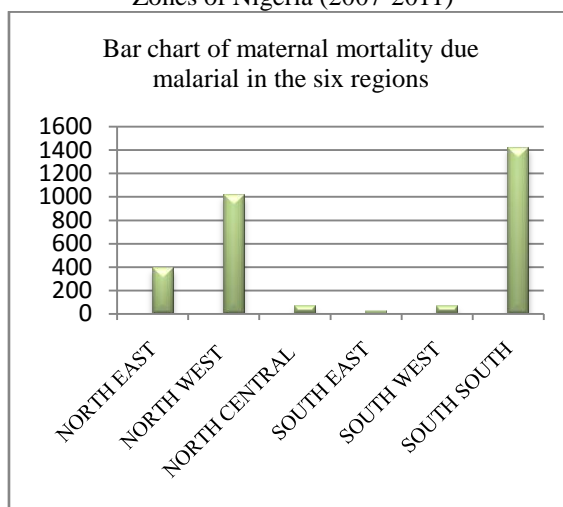


Table 2: Descriptive Analysis on Regional Reported Cases.

REGIONS	MEAN	STD DEV
NORTH EAST	43622.2	9139.574
NORTH WEST	127200	39540.91
NORTH CENTRAL	41451.8	3349.752
SOUTH EAST	31936	9606.029
SOUTH WEST	63438	20567.59
SOUTH SOUTH	65594.6	19753.23
NIGERIA	373242.6	52005.27

Table 3: The Summary of the Maternal Deaths Due To Malaria among Pregnant Women in Six Geopolitical Zones of Nigeria (2007-2011)



**Case Fatality Ratio (CFR) Analysis**

$$CFR = \frac{\text{Total Number of Deaths due in disease (Malaria)}}{\text{Total Number of Cases due to the disease (Malaria)}} \times 50000$$

Table 4: (CFR)Analyses Results

STATES	YEARS					TOTAL
	2007	2008	2009	2010	2011	
NORTH EAST	9	4	2	4	12	31
NORTH WEST	1569	24	12	27	4	1636
NORTH CENTRAL	2	2	6	12	27	49
SOUTH EAST	59	4	4	5	9	81
SOUTH WEST	88	131	116	44	61	440
SOUTH SOUTH	58	125	66	60	93	402
TOTAL	1785	290	206	152	206	2639

$\chi^2$  Test Statistics for annual prevalence and annual deaths

- $H_{01}$ : The annual prevalence of malaria among pregnant women in geopolitical zones is dependent of the years.
- $H_{02}$ : The annual deaths due prevalence of malaria disease among pregnant women in geopolitical zone are dependent of the years.
- $H_{A1}$  &  $H_{A2}$ : Otherwise independent

$$\chi^2 = \frac{\sum(Q_i - E_{ij})^2}{E_j}, \quad \text{Level of Significance: } \alpha = 0.05,$$

Critical region:  $(\chi^2)_{tab} = \chi^2_{\alpha, (r-1)(c-1)}$ , therefore  $(\chi^2)_{tab} = \chi^2_{20, 0.5} = 31.41$

$$\chi^2_{cal} = 116009.2 \quad (1), \quad \chi^2_{cal} = 1939.318 \quad (2),$$

Decision: Since  $\chi^2_{cal} > \chi^2_{\alpha}$  hence,  $H_{01}$  &  $H_{02}$  are rejected. .

**IV. Interpretation Of Results And Discussion**

The study of charts on annual malaria prevalence among pregnant women shows that total annual prevalence is almost an equal level of annual distribution except in year 2009 when there was dominance in the number of women affected by the malaria disease. This implies that the annual prevalence is hardly influenced by factors of control measures.

Examination of regional chart distribution however shows that while south (west and south) regions are almost equal on level of prevalence. The north (central and east) regions are also having almost equal level of prevalence although their level is slightly lower than those of the south (west and south) regions. The North West region however expresses a significantly higher prevalence than all other regions. This points to the fact climatic factors influence determines the rate of prevalence.

This implies that all regions in contiguous climatic zones and similar cultural practices experiences similar prevalence levels. The exceptional level perceived in the North West region may be attributable to data fluke or improper malaria control systems in the region.

Table 2 also corroborated all the facts above with the mean and standard deviations which show largely that the figures are closely knit and it is not influenced by extreme values.

The maternal deaths due malaria as shown in table three reveal that despite high prevalence in the regional prevalence distribution maternal deaths is quite minimal in all regions (even the north west shows low death figure level when compared with its high prevalence values) except the South South region which exhibits a very high total deaths in the year 2007 figure. This may be due to breakdown of control measures or the peculiar seasonal climactic attributes peculiar to that year. All this is also depicted in the accompanying bar chart.

The case fatality ratio results in table 4 shows that despite that annual death fatalities is minimal in all regions except in the north west, south west and South South regions have high fatalities with the north west having the highest fatalities on incidence of death from malaria infection of pregnant women in Nigeria.

In the  $\chi^2$  test of independence of ( $H_{01}$  &  $H_{02}$ ) analysis on the prevalence and reported deaths due to malaria among pregnant women in Nigeria (2007-2011) in six geopolitical zones,  $H_{01}$  &  $H_{02}$  are rejected concluded that the prevalence and the occurrence of the disease (malaria) among pregnant women in geopolitical zone are independent of the years.

This independence implies that there is no association between malaria prevalence and years, deaths due prevalence of malaria and years variables.

All these analytical results above nets on two basic conclusions:

(a) There is still a considerable high level of annual prevalence of malaria disease among pregnant women in all the six geopolitical regions of Nigeria irrespective of periods considered.

(b) Annual maternal mortality due to malaria infection in pregnancy still occurs on relative high levels in all the six geopolitical regions of Nigeria irrespective of periods considered.

Though Nigeria lies in endemic belt of malaria in Africa which seemingly imply that non-infection of women during pregnancy is almost impossible, the high rates of infection and maternal deaths associated with such infections is however unacceptable and undesirable as these could be mitigated through proactive preventive measures and well-coordinated actions.

## V. Conclusion

In the year 2000, countries across sub-Saharan Africa signed the Abuja Declaration pledging to fight MiP; specifically, committing to give pregnant women access to Intermittent preventive treatment during pregnancy (IPTp-SP) and Insecticide treated nets (ITNs) as well as effective case management. By 2007, all 39 African countries with stable malaria transmission had adopted the World Health Organization (WHO) three-pronged approach: IPTp-SP during the 2nd and 3rd trimester, sleeping under an ITN and prompt case management among pregnant women with symptoms of malaria. Malaria in pregnancy is a maternal and newborn health issue, impacting both the mother and her newborn (WHO, 2012).

With continuous high annual prevalence in all regions of Nigeria, deaths and complications due to malaria disease infections is inevitable. It is therefore expedient to focus more on preventive strategies than curative ones.

Synopsis of recent trends of management of malaria in pregnancy in Nigeria shows the engagement of the following measures / approaches:

- (1) Insecticide treated nets (ITNs)
- (2) Indoor Residual Spraying (IRS)
- (3) Health education, Knowledge, attitudes and practices (KAP)
- (4) Intermittent preventive treatment of malaria in pregnancy (IPT) (administration of two doses of sulfadoxine-pyrimethamine (SP/Fansidar) during the antenatal care visits)
- (5) Use of Artemisinin (ACT) medication derivatives (water soluble form (Artesunate) and Fat soluble form (Artemether).

Nigeria Malaria Indicators	DHS 2008	MIS 2010	DHS preliminary 2013
All-cause under-five mortality rate	157/1,000	–	128/1,000
Proportion of households with at least one ITN	8%	42%	50%
Proportion of children under five years old who slept under an ITN the previous night	6%	29%	17%
Proportion of pregnant women who slept under an ITN the previous night	4%	34%	17%
Proportion of women who received two or more doses of IPTp during their last pregnancy in the last two years	5%	13%	15%

Source : MIS Malaria Indicator Survey as culled from PMI(2014)



Among these measures, the Nigeria Malaria Indicator Survey (2010), Bassey, et al (2007), Nigerian Demographic and Health Survey (2011), Thomas, et al (2012) and Okwa (2013) and others asserts that the above measures 4 and 5 which are basically curative have gained more wider popularity, use and acceptability among the populace than the preventive measures 1, 2 and 3 over time.

Researchers however highlight problems and setbacks associated with some of these control measures. These according to Chukwuocha (2012) include:

- *Drug resistance: antimalarial drug resistance is recognized as one of the causes of treatment failure. Chloroquine (CQ) and Sulphadoxine-pyrimethamine (SP) have grown resistance to the parasite and are therefore no longer considered as a first line therapeutic agent. Those of the ACTs have not been confirmed.*
- *Drug dosage and compliance: Most cases reported as antimalarial resistance in Nigeria are related to problems associated with incorrect drug dosage and compliance. A good number of malaria treatments occur at home. The majority rural dwellers lack basic education required to read and stick to instructions stipulated, thereby encouraging the irrational use of antimalarial.*
- *Dearth of quality control of drugs: There is widespread increase in the sale of adulterated drugs across the country. Since nearly all malaria treatment occurs at home, people rely mainly on drugs sold over the counter. Quality assurances of these drugs are questionable and thus contribute to treatment failure encountered in malaria.*
- *Inadequate malaria epidemiological data: Epidemiological data concerning malaria morbidity and mortality in Nigeria is inadequate. Most studies were confined to pregnant mothers and children under the age of five and mostly hospital based records. Again much is not known about malaria mortality and morbidity in rural settings.*
- *Dearth of effective rural drug distribution mechanism: Most of the rural areas do not have access to good health care systems. Usually there are no accessible roads to the health centres, which in turn are poorly equipped and have inadequate drugs for malaria treatment.*
- *Widespread presumptive treatment: Among the many clinical signs and symptoms associated with malaria, the most prominent is fever, which is often accompanied by chills, perspiration, anorexia, headaches, vomiting and malaise. Residents of endemic areas are often familiar with this combination of symptoms, and frequently self-diagnose malaria based on symptoms alone. They stop treatment as soon as the fever subsides without completing the dosage. This in particular constitutes a threat to mitigating malaria.*
- *Incorrect diagnosis/inadequate diagnostic equipment: High-quality parasite-based diagnosis has remained unavailable to most patients in Nigeria. Maintenance of quality, effective microscopy service requires an organized health system infrastructure, including the provision of high quality supplies and reagents, the presence of satisfactory microscopes, maintenance and technical competence, an adequate workplace environment and the ability to prepare usable blood films. Field microscopy, where established, often falls short of these requirements.*

Analysis of these shortcomings reveals that they mainly emanates from the curative measures. It is therefore pertinent for the health sector in Nigeria, all malaria control agencies and international partners to place more emphasis on the preventive control measures than curative approaches in the country. As the general saying goes: **Prevention is better than cure** and **a stitch on time saves nine**.

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