

Socio-Economic Consequences of Malaria in Pregnant Women in Imo State, Nigeria

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Abstract: Human infection with malaria parasites (*Plasmodium* species) and its socioeconomic consequences were investigated in parts of Imo State Nigeria between August 2007 and September 2008 using standard parasitological and socioeconomic methods. Blood samples were collected by vein puncture from 2,871 consenting pregnant women registered for ante natal care at Federal Medical Centre, Owerri, Imo State University Teaching Hospital, Orlu and Okigwe General Hospital Okigwe as well as Imo State University Teaching Hospital Community Health Outreach Centre, Ogbaku, Mbaitoli L. G. A. The samples were analysed parasitologically for detection of malaria parasite using three different methods namely Quantitative Buffy Coat (QBC) technique, Slide smear technique and *Plasmodium falciparum* antigen. Similarly, questionnaires were administered to the same patients to elicit vital information on socio-economic consequences of malaria. The results showed that out of 2,871 persons examined, 2,323 (80.9%), 2,301 (80.1%) and 1,801 (62.7%) had malaria parasite determined by the QBC stained smear and *Plasmodium falciparum* antigens techniques respectively. The overall mean prevalence was 74.6%. The mean infection according to zones showed that Owerri had the highest prevalence (83.9%), while Orlu has the least (66.9%). Similarly, the mean infection prevalence according to trimesters was highest in women in the second trimester (81.0%), and lowest in women in the third trimester (69.5%). The age related mean infection showed highest prevalence in women in the 18-25 years and above brackets (82.9%) and lowest prevalence in those 41 years and above (64.8%). The occupational mean prevalence was slightly higher in artisans (79.0%) and civil servants (76.2%) than the other groups. Pregnant women with a combination of headache / fever had the highest mean score (94.7%) in symptom related prevalence while those that presented with general weakness (37.1%) had the lowest score. The intensity of plasmodiasis showed that 12.2% of pregnant women had heavy parasitaemia as against 28.5% and 39.4% of woman that had moderate and low parasitaemia respectively. Some complications due to plasmodiasis in pregnant women reported include miscarriage 12.2%, low birth weight 7.0% and pre term delivery 5.7%. The total loss due to malaria in pregnancy within a six month period was estimated at 5.8 million naira. The study has confirmed that the burden of malaria in pregnant women in Imo State Nigeria is high. There is need therefore to introduce appropriate intervention strategies against malaria and its vectors in order to improve the health of pregnant women and other inhabitants of the study area.

[Ohalete, C.N; Dozie, I. N. S; Nwachukwu, M. I and Obiukwu, C.E. Socio-Economic Consequences of Malaria in Pregnant Women in Imo State, Nigeria. World Rural Observations 2011;3(3):144-149]; ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). <http://www.sciencepub.net/rural>.

Key words: Socio-Economic, Consequences, Malaria, Pregnant Women, Imo State, Nigeria.

1. Introduction

Malaria is the most prevalent parasitic disease in the tropics, and thus the king of all parasites of poverty (Akogun 2008). Forbes and Jackson(1993),Ngele 2008,Obiukwu and Okwuonu (2008),Bray and Anderson (1979), exerts that in endemic malarious area particularly in tropical Africa, placental malaria is a frequent occurrence in women at parturition. These studies show that incidence of infection was highest in women with first pregnancy and their after declined progressively with increasing maternal parity. Malaria exerts a heavy toll of illness and death, especially amongst children and pregnant women. At present over one million children under 5yrs of age die annually as a result of malaria (Mashal, 1986)

Malaria is caused by the protozoan parasite belonging to the genus *plasmodium*. Four species of

plasmodium has been implicates with human malaria viz *Plasmodium ovale* and *Plasmodium malariae*. Female anopheles mosquitoes, which feed on human blood transmits *Plasmodium* parasites. The entry of these parasites into the body of the host provokes the production of phagocytic cells from the liver, spleen, and bone marrow, thus causing the organs to become enlarges. (Mashaal, 1986)

Treatment and control of malaria proves difficult with the spread of drug resistance strains of parasites and insecticides resistance strains of mosquito vectors.

2. Materials and Methods

Study Area

This study was carried out in Imo State, Nigeria. Imo state is one of the 36 states of Nigeria. It is located in the South Eastern Zone of Nigeria between the

latitudes 5° 29' N, 7° 2' E and longitude.

Imo State comprises of three geo-political zones, namely, Owerri, Orlu and Okigwe. There are good network of roads linking the zones as well as urban and rural centers. The citizens are greatly diversified professionals including traders, farmers, artisans, public/civil servants, politicians, students; etc. The standard of living is average while the literacy level is high with a remarkably high level of youth unemployment.

The level of environmental sanitation has been remarkably high over the years until the long period of military intervention in national politics and governance. The urban centers in particular Owerri, the capital city was characterized by unsightly refuse dumps, over filled and blocked gutters and drainages and consequently denied Owerri the beauty and glory of being the cleanest city in the Federation. Stagnant water bodies, over grown bushes and fields even around homes and offices were easily noticeable in both urban and rural communities in the state. These changes in the environment increased vector breeding sites and consequently increased transmission of the malaria parasites in the area.

Instrument for Data Collection

The instrument for socio-economic data collection in this study was a structures questionnaire administers on all respondents who were also part of clinical study. Blood samples were for ante natal care (ANC) at the Federal Medical Centre Owerri, Okigwe General Hospital and Imo State University Teaching Hospital Orlu. A total of 3000 pregnant women aged 18-40 years who registered for ante-natal care at various selected health institution in the three zones of Imo State were randomly selected for the study.

Administration of Questionnaires

A structured questionnaire comprising of two sections (a) socio demographic information and (b) socio economic information, was administered all the participant. This was to elicit necessary information to correlate the clinical and laboratory findings.

Parasitological Studies

Blood sample by vein-puncture was collected from each study participant by laboratory scientist at each selected health institution and analyzed within 2-4 hours of collection.

Analysis of Blood Sample

The blood sample were examined for malaria parasites using Quantitative Buffy Coat (QBC) technique, stained slide smear techniques and plasmodium falciparum (pF) antigen technique according to the methods described in (Chessbrough

1998 and Njoku, Obiajuru, Nwokoro and Ojiegbu 2000).

3. Results and discussion

The result of the prevalence of malaria plasmodiasis amongst pregnant women in Imo State showed that out of 3,000 pregnant women, 2,871 (95.7%) completed their questionnaire and donated blood samples for laboratory investigation while 129 (4.3%) did not complete the questionnaire properly or did not donate blood samples for laboratory investigation.

Out of the 2,871 persons examined using Quantitative Buffy Coat (QBC) method, 2,323 (80.9%) had malaria parasite in their blood samples. Similarly, the direct Stained Smear Technique showed that 2,301 (80.1%) persons had malaria parasites while the plasmodium falciparum (pF) antigen test showed that 1,801 (62.2%) persons had malaria parasites.

Age-Related Prevalence of Malaria Parasite

The age-related prevalence showed that pregnant women within the age of 18-25 years of age had the highest of 86.1% of malaria infection, followed by those within the age range of 36-40 yrs (82.8%) and 26-30 yrs (82.3%) respectively. (Table 1).

Table 1: Age – Related Prevalence of Malaria in Imo State

AGE (Years)	NUMBER EXAMINED	NUMBER INFECTED (%)
		QBC
18 – 25	503	433 (86.1)
26 – 30	887	730 (82.3)
31 – 35	859	657 (76.5)
36 – 40	476	394 (82.8)
41 - Above	146	109 (74.7)
Total	2,871	2,323 (80.9)

Key: QBC = Quantitative Buffy Coat

Trimester-Related Prevalence of Plasmodiasis

Trimester-related prevalence of plasmodiasis amongst women showed that the highest prevalence of plasmodiasis (84.7%) occurred amongst pregnant women in their second trimester estimated by the QBC method while 77.5% and 79.5% of women in the first and third trimester respectively were infected with malaria parasites. (Table 2)

Table 2: Trimester – Related Prevalence of Malaria in Imo State

TRIMESTER	NUMBER EXAMINED	NUMBER INFECTED (%)
		QBC
FIRST	769	596 (77.5)
SECOND	1,073	909 (84.7)
THIRD	1,029	818 (79.5)
Total	2,871	2,323 (80.9)

Key: QBC = Quantitative Buffy Coat

Occupational-Related Prevalence of Plasmodiasis

The occupational-related prevalence of plasmodiasis amongst the pregnant women showed that 85.7% of Artisans/professionals, 81.4% of Traders, 78.9% of housewives and 77.8% of civil servants had plasmodiasis respectively using the QBC method (Table 3).

Table 4 Summaries the symptom-related prevalence of malaria amongst pregnant women in Imo State. The results showed that 43.9% of pregnant women in Imo State. The results showed that 443.9% of pregnant women having general body weakness

52.3% of apparently health asymptomatic pregnant women, 88.5% had fever, 94% had headache while 96.8% of pregnant women with both fever and headache were infected with malaria parasite as shown by the QBC test.

Table 4: Symptom – Related Prevalence of Malaria in Pregnant Women in Imo State

SYMPTOMS	NUMBER EXAMINED	NUMBER INFECTED (%)
		QBC
HEADACHE	711	668 (94.0)
FEVER	680	602 (88.5)
HEADACHE/FEVER	506	490 (96.8)
GENERAL WEAKNESS	230	101 (43.9)
NO SYMPTOM	744	389 (52.3)
TOTAL	2,871	2,323 (80.9)

Table 3. Occupational – Related Prevalence of Malaria in Pregnant Women in Imo State

OCCUPATION	NUMBER EXAMINED	NUMBER INFECTED (%)	
		QBC	Mean (%) Infection
HOUSE WIVES	836	660 (78.9)	599 (71.65)
CIVIL SERVANTS	526	409 (77.8)	401 (76.24)
TRADERS	902	734 (81.4)	663 (70.18)
ARTSANS / PROFESSIONALS	607	520 (85.7)	479 (79.02)
TOTAL	2,871	2,323 (80.9)	2,141 (74.6)

Key: QBC = Quantitative Buffy Coat

Socio-Economic Consequences of Malaria on Pregnant Women

Of the 2871 pregnant women examined in the study 723 (25.2%) missed some religious programmes due to malaria while 894 (31.1%) failed to carry out some domestic responsibilities due to malaria episode.

Fig. 2 shows the economic consequences of malaria in pregnant women in Imo State in the past 6months. Of 930 pregnant women who have been hospitalized, 41 (4.4%) spent approximately ₦1,000.00 for treatment, 83 (8.8%) spent about ₦2,000.00 while 217(23.1%) spent about ₦3,000.00, 443

(47.2%) spent about ₦4,000.00 and 155 (16.5%) spent about ₦5,000.00. All together, the women spent about ₦3,364,000.00 (₦3.36million) for treatment of malaria within a period of 6months. Similarly,179 (19.1%) lost revenue worth about ₦1,000.00 due to malaria, 299 (31.8%) lost revenue of about ₦2,000.00, 387 (41.2%) lost revenue of about ₦3,000.00, 63 (6.7%) lost revenue of about ₦4,000.00 while 11 (1.2%) lost revenue of about ₦5,000.00 due to malaria. In all, the women lost a total revenue of about ₦2, 447, 5000. 00 (₦2.44million) due to malaria during pregnancy.

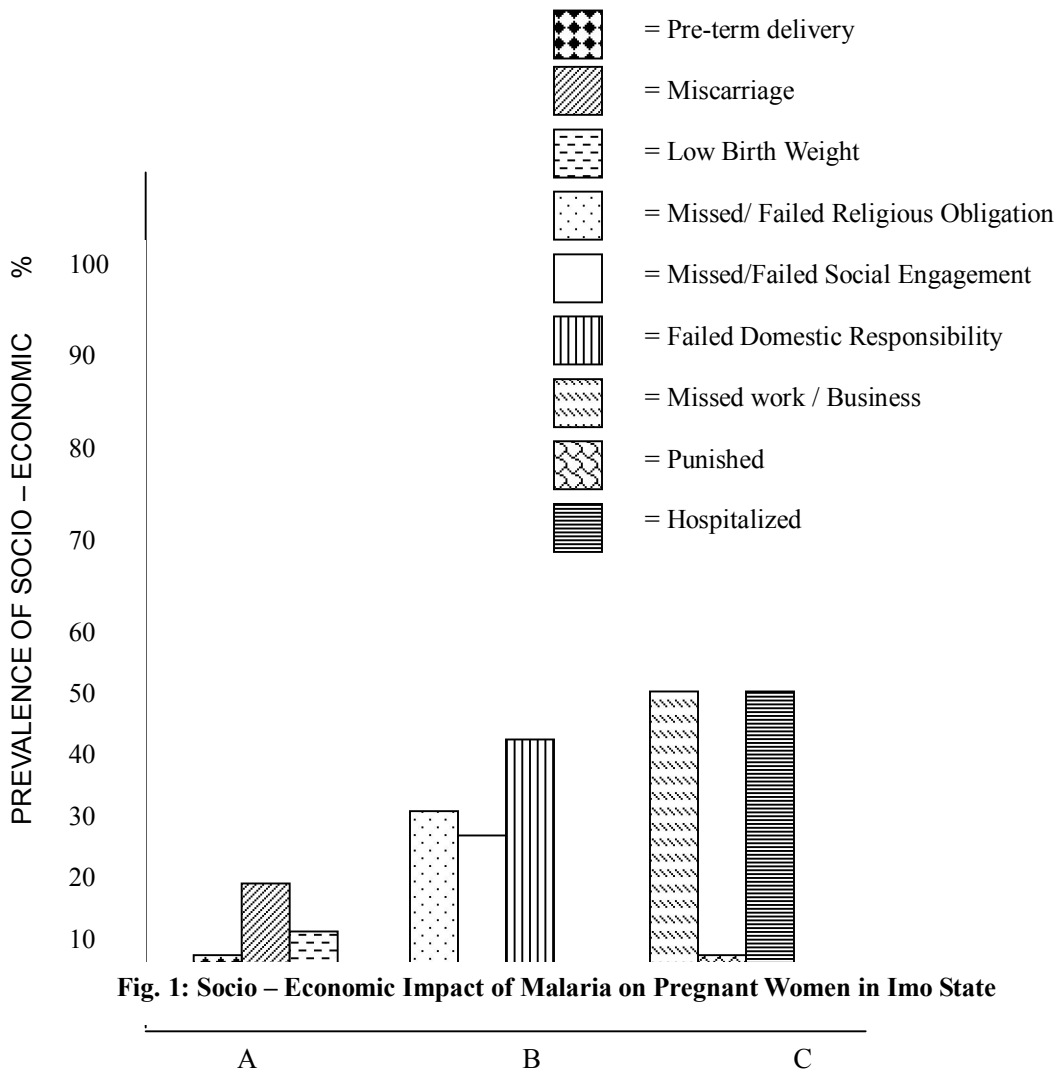


Fig. 1: Socio – Economic Impact of Malaria on Pregnant Women in Imo State

4 Discussion

The high prevalence of malaria by QBC method (80.9%) observed amongst pregnant women in this study agrees with similar report by Ngele,(2008) which obtained a 72% prevalence amongst pregnant women attending ante-natal care at secondary health facility in Ebonyi State Nigeria. Both studies emphasized the public health importance of malaria in the tropics and show that malaria is a major public health problem amongst pregnant women in Nigeria.

The age-related prevalence showed a decrease in infection with increase in age from 86.1% in women in the age group 18-25years to 74.7 in those in the 40-above years age bracket for QBC method. Statistically, this difference is not significant. This observation agrees with the findings of previous workers (Bruce-Chwatt,1980; Mashaal,1986; Usip and Opara,20008) who stated that age and sex have no bearing on the incidence of malaria.

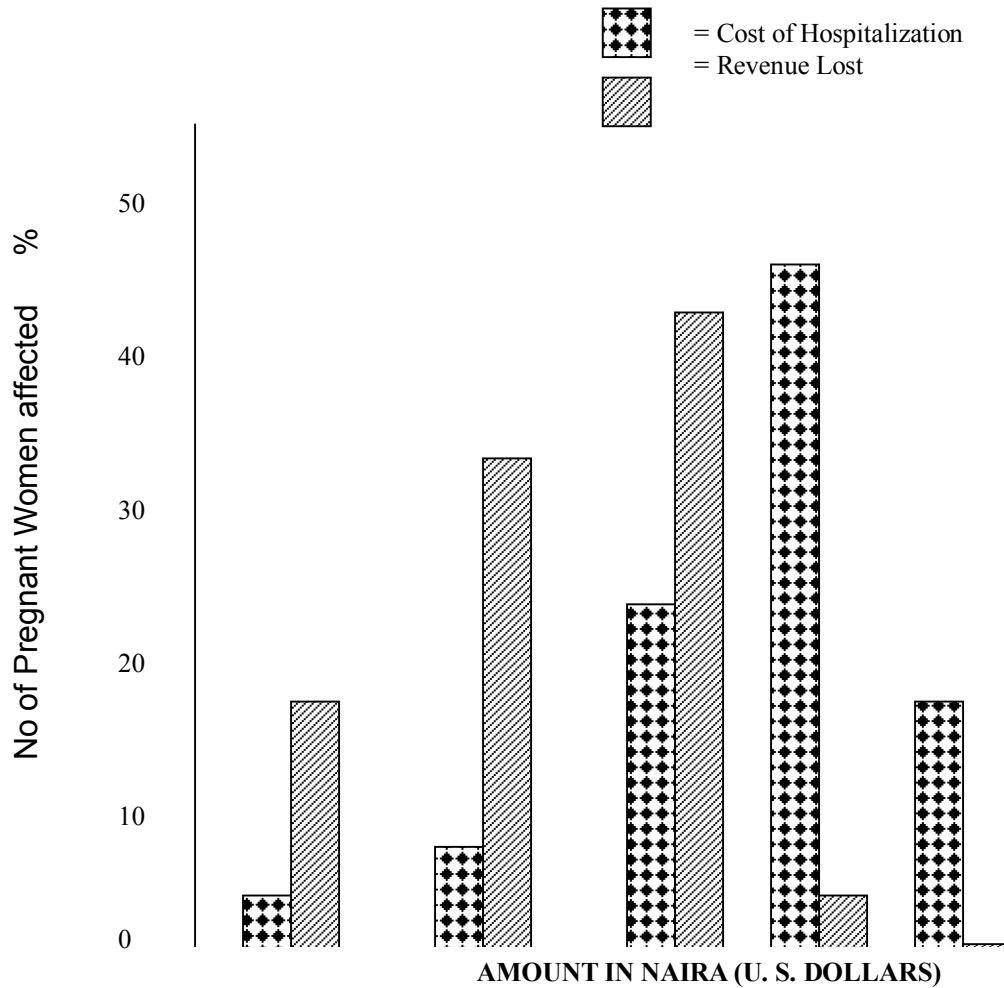


Fig. 2: Economic Impact of Malaria on Pregnant Women in Imo State

Malaria infection was highest (84.7%) amongst pregnant women in the second trimester of pregnancy, followed by those in the third and first trimesters (79.5%) and (77.5%) respectively. This finding corroborates the report of Mashaal,(1986) who observed that during the second half of pregnancy (2nd to 3rd trimesters), there is multifactorial transient immunosuppression. The presence of high adrenal steroid level, placental chorionin gonadotrophin, alpha fetoproteins and the depression of the immunosuppression mechanism of a pregnant female. Therefore malaria relapses of infection due to *Plasmodium vivax*, *P.malariae*, *P.ovale* or recrudescences of *P.falciparum* are frequently seen at a higher rate in pregnant women than in non pregnant

women.

There was significant difference (<0.05) in the prevalence of malaria between the different occupational groups surveyed. This finding agrees with similar reports (Usip and Opara, 2004), who reported highest prevalence of infection amongst peasant farmers. This may be related to exposure to arthropod vectors, which transmit malaria parasites. Civil servants stay mostly in offices often provided with electric fan which keep away mosquito vectors. Traders and artisans spend most of their time in open places such as shops, open shade etc which exposes them to vector bites and transmission of malaria parasite than occupational groups.

The analysis of the system-related prevalence of

malaria in pregnant women agrees with previous reports of (mashaal, 1986; Forbes and William,1981),which states that features of an acute malarial attack may include fever, rigors, sweating, headache, gastrointestinal upset & respiratory symptoms. In severe *falciparum* malaria, there may be collapse, convulsions and coma (cerebral malaria). Chukwuocha *et al.*, (2008) reported that fever, vomiting and headache were the most common clinical symptoms observed in 32.9% of their study participants.

Some complications due to plasmodiasis in pregnant women reported include miscarriage 12.2%, low birth weight 7.0% and pregnancy within a six month period was estimated at 5.8million naira.

4 Conclusion

This study has shown that the burden of malaria in pregnant women in Imo State Nigeria is high. There is need therefore to introduce appropriate intervention strategies against malaria and its vectors in order to enhance the health of pregnant women and other inhabitants of the study area.

4 Recommendation

For effective management of malaria in pregnant women in Imo State, the following recommendations are made:

- 1) Pregnant women in the State should be given free malaria treatment in all government hospitals until delivery so that those who could not go to hospital due to treatment costs will avail themselves of such opportunities receive quality medical attention.
- 2) There should be policy directive on the use of alternative method of diagnosis of malaria in pregnant women especially in areas where the pregnant women especially in areas where the traditional slide technique may have limitations

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6/5/2011

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