THE STATUS OF MALARIA PARASITEMIA AND ASSESSMENT OF THE USE OF LONG LASTING INSECTICIDE TREATED BED NET AMONG UMUDIKE COMMUNITY OF UMUAHIA, ABIA STATE, NIGERIA

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ABSTRACT

This study was carried out to determine the status of malaria parasitemia and assessment of the awareness and use of long lasting insecticide treated nets and malaria control among Umudike community of Umuahia, Abia State, Nigeria. Using thin film preparations, malaria parasites were detected and identified. Questionnaire and observation were used to retrieve information from consenting individuals. Four hundred (400) blood samples were examined and the overall prevalence of malaria was 45 %. Females were more infected (47.50 %) than males (43.43 %), but there was no significant difference (p>0.05). Individuals within the age group of 10 – 19 years were most infected (48 %) than other age groups. Species of Plasmodium observed showed that P. falcipaprum was highest 148 (82.22 %) followed by P. vivax 24(13.33 %) and P. malaria was the least 8(4.44 %). There was no case of P. ovale infection. Students had the highest infection rate (48.67 %) followed by unemployed (45.00 %), farmers (43.33 %) and civil servants (40.00 %) that had the least. Majority of the respondents (79.45 %) associated malaria with mosquito bites and despite the high level (88.89 %) of awareness on the benefits of LLINs only few have (48.33 %) and sleep (20 %) under the net respectively. Reasons for not having and using LLINs include scarcity (45.21 %) and high cost (16.44 %) of the nets in area, despite the fact that the nets were meant to be distributed free of change. Malaria is acknowledged to be endemic and prevalence high in the study areas and despite the high awareness of LLINs also possession of the LLINs does not translate into usages, there is therefore urgent need for public health education by Government and relevant agencies on various preventive strategies especially free distribution and proper usage of LLINs, improved environmental sanitation and on proper treatment procedures of malaria in Umudike and its environs.

Keywords: Malaria, Awareness, Benefits, Long lasting insecticide treated net (LLIN)

INTRODUCTION

Malaria is still a common and one of the oldest life threatening vector borne disease of public health importance. It is transmitted to human through the bite of infected female *Anopheles* mosquitoes. Malaria persists as a major health issue especially among those living in the poorest parts of the world. World Health Organization (WHO, 2010) identified malaria as one of the living causes of death in developing countries and that each year an estimated 300 – 500 million cases occur resulting in over 200 million deaths most of whom were children. The prevalence of malaria is high, endemic and remains public health problem and the major cause of hospital attendance among all age groups in Nigeria and also the leading cause of

morbidity and mortality in the country (Aribodor *et al*., 2003; Anumudu *et al*., 2006). Common symptoms of malaria are high fever, headache, sense headache, sense chills or rigor, profuse sweating, general body pains etc. In some patients malaria could be accompanied by symptoms such as vomiting, cough and diarrhea (WHO, 2010).

Communities with high incidence of malaria have many clinically ill-members resulting in absenteeism from work and school. It also possess serious risk to pregnant women and infants, a common cause of abortion (miscarriage) and anemia in pregnant mothers while infant suffer under weight at birth (WHO, 2003; Okeke *et al*., 2016a). Malaria infection is largely distributed throughout warmer regions of the world especially in the tropics where vectors of malaria are found in large quantity. Farming activities take place mostly during the raining season and that period of the year favours the breeding of mosquitoes and makes the effect more noticeable in the rural areas due to proximity of their houses to farmland (WHO, 2003; Amadi and Nwankwo, 2012).

The socio-economic importance of malaria includes cost of health care, working days lost due to sickness, abstinence from school, brain damage due to cerebral malaria and eventual death that result due to malaria. The Federal Government apparently aware that Nigeria is in an endemic area of malaria infection has taken several steps to eradicate the vector and the disease. The campaign against malaria in Nigeria is still ongoing. Millions of long lasting insecticide treated nets (LLITNs) have been distributed to households to sustain the campaign against this disease. The African nations generally are putting in billions of dollars yearly towards the control of malaria (D'Alessandro 2001). In Nigeria, lots of studies have been reported on the awareness, use and efficacy of LLITNs in the control of malaria (Adeyemi *et al*., 2007; Echelu *et al*., 2010; Oche *et al*., 2010; Olajide *et al*., 2011; Okeke *et al*., 2016b). Inspite of all these efforts, the incidence of the life threatening disease is to a large extent not under control especially at the rural communities of the nation and this should be of great concern to everybody. It is therefore pertinent to ascertain the prevalence of malaria, level of awareness, accessibility and the effectiveness of the use of LLITNs and the use of other intermittent preventive measures in the control and prevention of malaria infection in the rural government area of Abia State, Nigeria.

MATERIALS AND METHODS

Study Areas: The study was carried out in Umudike community (Figure 1) in Ikwuano Local Government Area of Abia State, Nigeria and it is located between 5°27' and 5°33' North of latitude and 7°21' – 7°27' East.

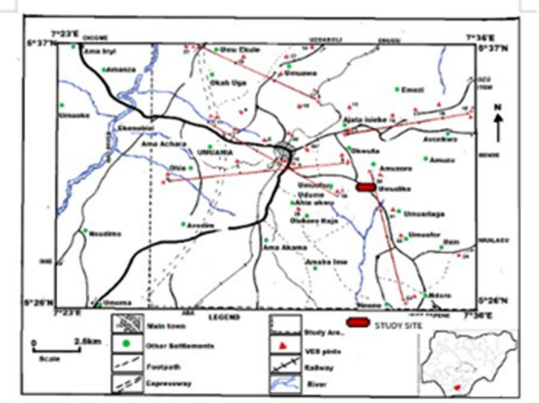

Figure 1: Map of Abia State showing the study site in Ikwano Local Government Area

The study area is within the tropical rain forest of Eastern State of Nigeria. Rainfall is distributed over a period of 8 months (March – November) with bimodal peak in June/July and September. There is also a short break around the middle of August.

Study Design: The parasitological survey was preceded by a pre-survey contact during which permission was obtained from the community head and advocacy contacts were made to inform the participants of the need of for the study. Questionnaires were administered so as to collect data which include age, sex, occupation, marital status, causes, symptoms and preventive measures against malaria and also knowledge and perception on the use of long lasting insecticide treated nets. These were done with the help of a local interpreter.

Sample Collection: Patients' thumbs were sterilized and pricked using a lancet and this was done under strict guidance and supervision of a trained laboratory technician. Blood was then squeezed from the thumbs onto the slide. Free flowing blood was allowed to enter a capillary tube. The end of the tube was sealed to avoid accumulation of air. A thin smear of each blood sample was made and stained with Leishman stain and examined under the microscope for the presence of various stages of the *Plasmodium*. Examination was first under ×40 and then ×100 objectives (Cheesbrough, 2006).

Statistical Analysis: Data was analyzed using chi-square at 5 % level of significance. Simple percentage was also adopted.

RESULTS

Out of 400 blood samples examined for prevalence of malaria, 180(45.00 %) were infected with malaria parasites. Out of the 240 males examined 104(43.43 %) were infected, while out of the 160 females examined, 76(47.50 %) were infected (Table 1).

Table 1: Sex related prevalence of malaria parasitemia among residence of Umudike community of Umuahia, Abia State, Nigeria

Sex	Number examined	Number infected
Male	240	104 (43.33)
Female	160	76(47.50)
Total	400	180(45.00)

Number in parenthesis = percentage infection

There were no statistical significant differences ($p>0.05$) in the infection rates between males and females and among all age groups. Although, individuals between the ages of 0 – 19 had the highest infection rate (48.00 %). This age group is the most vulnerable group to malaria infection and all subjects were equally exposed to the malarial pathogen.

Other age related prevalence in order of intensity were 20 – 29 years (46.00 %), 30 – 39 years (45.00 %), 50 years and above (44.00 %) and 40 – 49 years 41.67 %) (Table 2).

Table 2: Age related prevalence of malaria parasitemia among residence of Umudike community of Umuahia, Abia State, Nigeria

Age group (years)	Number examined	Number infected
10-19	100	48(48.00)
20-29	50	23(46.00)
30-39	100	45(45.00)
40-49	96	40(41.67)
50+	54	24(44.00)
Total	400	180(45.00)

Number in parenthesis = percentage infection

The highest *Plasmodium* species encountered was *P. falciparium* 148(82.22 %), followed by *P. vivax* 24(13.33 %) and the least was *P. malaria* 8(4.44 %), *P. ovale* was not encountered (Table 3).

Table 3: Prevalence of *Plasmodium* species among residence of Umudike community of Umuahia, Abia State, Nigeria

***Plasmodium* species**	**Number infected**
P. falciparum	148(82.22)
P. vivax	24(13.33)
P. malariae	8(4.44)
Total	180(100.00)

Number in parenthesis = percentage infection

The rate of infection among the species differed significantly ($p<0.05$). Students had the highest infection rate (46.20 %), followed by the unemployed (45.00 %), farmer (44.20 %) and civil servants (30.00 %) had the least (Table 4). Most respondent, 143(79.45 %) agreed that malaria was as a result of mosquito bite, while few 20(11.11 %) attributed malaria to the intake of much oil. Other respondent on the causes of malaria in order of emphasis were due to exposure to much sunlight 7(3.89 %) and caused by witchcraft 4(2.22 %), still yet 6(3.33 %) had no idea on the causes of malaria. Symptoms of malaria include headache (31.67 %), body pain (27.22 %), intermittent fever (22.78 %) and shivering (18.33%) (Table 5), while most of the respondent agreed that malaria can be prevented through the use of

Table 4: Occupation related prevalence of malaria among residence of Umudike community of Umuahia, Abia State, Nigeria

Occupation	Number examined	Number infected
Student	150	73(48.67)
Civil servant	20	8(40.00)
Traders	42	18(42.89)
Farmers	120	52(43.33)
Unemployed	68	31(45.59)
Total	400	180(45.00)

Number in parenthesis = percentage infection

mosquito coil and spray and use of door/window nets and long lasting insecticide treated nets, few believed that malaria can be prevent through avoiding much oil (12.22 %), environmental sanitation (8.34 %) and avoiding much sunlight (3.89 %) (Table 5).

Table 5: Respondents' knowledge about malaria among residence of Umudike community of Umuahia, Abia State, Nigeria

Variables	Number
Causes of Malaria	
Mosquito bite	143(79.45)
Much oil	20(11.11)
Exposure to much sunlight	7(3.89)
Witchcraft	4(2.22)
No idea	6(3.33)
Total	180(100.00)
Symptoms of Malaria	
Body pain	49(27.22)
Intermittent fever	41(22.78)
Shivering	33(18.33)
Headache	57(31.67)
Total	180(100.00)
Prevention of Malaria	
Use of mosquito coil/spray	82(45.56)
Avoiding much oil	22(12.21)
Environmental sanitation	15(8.34)
Avoiding much sunlight	7(3.89)
Use of door/window nets (LLINs)	54(30.00)
Total	180(100.00)

Number in parenthesis = percentage responds

On their perception and awareness of LLINs revealed that out of the 160(47.06 %) respondents that were aware of LLINs, 87(425.59 %) claimed to have or own one and 73(21.47 %) do not own or have LLIN and 20(5.88 %) were not aware of the existence of LLINs (Table 6). This can be attributed to the method of acquiring LLINs as most of them 51(34.93 %) bought theirs from either the chemist shop, market or health centers, while others 82(56.16 %) got theirs free from government and 13(8.91 %) got theirs from relatives and friends. Reasons for not having LLINs included mainly non availability 33(45.21 %) of the nets either through the government or in the market. Also lack of awareness 15(20.55 %). Equally important was complaints by the respondent that the nets is very expensive 12(16.44 %), others still said that the net cause heat 3(4.11 %), while a few believed that the net cannot prevent malaria 10(13.30 %). This result showed that there was no statistical significant relationship ($p>0.05$) between ownership and usage. While 47(54.02 %) respondents use their nets occasionally when it becomes unbearable and impossible to sleep due to mosquito activity and boozing noise. 20(22.99 %) used their nets every day and 20(22.99 %) do not use them at all due to carefree attitude. Reasons given by those that do not want to use LLINs included among others that the net cannot prevent malaria 8(40.00 %), causes excessive heat 6(30.00 %), difficult to set up 3(15.00%) and contains poisonous chemical 3(15.00 %). Those that refused to use the net said it occupies spaces 7(35.00 %), can collapse and cause suffocation 4(20.00 %), children may get entangled in it 6(30.00 %) and that it causes body irritation 5(15.00 %). All the respondents that make use of the LLINs agreed that it prevents mosquito bite (29.85 %) and keep them warm during cool seasons (58.20 %) Their sources of information about LLINs came mainly from staff of community health centers and hospitals 94(58.75 %), TV and radio programmes 39(24.38 %) and relations, friends and neigbhours 27(16.88 %) (Table 6).

The demographic data of the respondents indicated that 60(33.33 %) had primary education, 50(27.77 %) had secondary education, while 70(38.88 %) had tertiary education. Their vocation varied from farmers 110(61.11 %), students 35(19.44 %), petty traders 26(14.44 %) and public servants 9(5.00 %). The studied further indicated the respondents were married persons 145(80.50 %) and singles 35(19.50 %) (Table 7).

Table 6: Respondents' perception of LLINs among residence of Umudike community of Umuahia, Abia State, Nigeria

Variables	Number
Awareness of use of LLINs	
Aware of LLINs	160(47.06)
Not aware of LLINs	20(5.88)
Own/Have LLINs	87(25.59)
Don't own/Have LLINs	73(21.47)
Sources of acquiring LLINs	
Free from government	82(56.16)
Purchased from chemist/market/Health centers	51(34.93)
Got from friend/relation/neighbor	13(8.91)
Frequency of use of LLINs (Periods)	
Everyday	20(22.99)
Occasionally	47(54.02)
Not at all	20(22.99)
Reasons for not having LLINs	
Non availability	33(45.21)
Lack of awareness	15(20.55)
Very expensive	12(16.44)
May cause heat	3(4.11)
Cannot prevent malaria	10(13.30)
Reasons for not using LLINs	
Don't prevent malaria	8(40.00)
Causes excessive heat	6(30.00)
Difficult to set up	3(15.00)
Fear of chemical poison	3(15.00)
Negative aspects of LLINs	
Space consumption	7(35.00)
Collapse and suffocation	4(20.00)
Children may get entangled by it	6(30.00)
Body irritation	3(15.00)
Positive aspect of LLINs	
Mosquito bite prevention	20(29.85)
Keeping warm during cool seasons	39(58.20)
All of the above	8(11.94)
Sources of information about LLINs	
TV/Radio programme	39(24.38)
Community health centers/Hospitals	94(58.75)
Relations/Friends/Neigbhours	27(16.88)

Number in parenthesis = percentage responds

Table 7: Demographics of individual based on questionnaire administered to residence of Umudike community of Umuahia, Abia State, Nigeria

Characteristics	Number
Educational Attainment	
Primary	60(33.33)
Secondary	50(27.77)
Tertiary	70(38.88)
Total	180(100.00)
Vocation	
Petty trader	26(14.44)
Farmers	110(61.11)
Public servants	9(5.00)
Students	35(19.44)
Total	180(100.00)
Marital status	
Single	35(19.4)
Married	145(80.5)
Total	180(100.00)

Number in parenthesis = percentage responds

DISCUSSION

Malaria is acknowledge to be by far the most important parasitic disease causing suffering and loss of lives in tropical countries (WHO, 1998) and also endemic in Nigeria throughout the year (WHO, 2002; 2003). The high prevalence found in this study was not uncommon for tropical endemic area, though higher than those documented from studies elsewhere in endemic zones.

The possible reason for the high prevalence rate could be attributed to the poor sanitary condition of the area, poor sewage disposal methods, lots of vegetable surrounding the area created breeding sites for malaria parasite vector anophelene mosquitoes. More importantly noncompliance to the preventive measures such as usage of LLINs among others. More females were infected than the males. This is because female are generally known to be more susceptible to infection due to the level of immunity, social and economic challenges for women such as pregnancy (Guyatt and Snow 2001; WHO, 2002). Prevalence in relation to age indicated low prevalence with increased age with those within the age group of 10 – 19 years mostly infected. They are most susceptible to malaria infection due to their low levels of immunity (WHO, 2002). *Plasmodium falciparum*, *P. vivax* and *P. malariae* were the malarial pathogens observed in the area, with *P. falciparum* being the most dominant. This findings agreed with Coker *et al.* (2001) and Amadi and Nwankwo (2012) in their studies that reported *P. falciparium* as the most wide spread malarial pathogens in tropical Africa. Students had the highest rate of infection followed by the unemployed, then farmers and civil servants had the least. This was perhaps because students were the most vulnerable group due to their age and daily activities which exposed

them to incessant bites by malaria vector. This study and other studies have shown improved awareness, knowledge and importance of LLINs among different communities (D'Alessandro *et al*., 1996; Adeyemi *et al*., 2007; Echelu *et al*., 2010; Oche *et al*., 2010; Olajide *et al*., 2011; Okeke *et al*., 2016b) and that majority of the respondents associated malaria with mosquito bites. However, despite the high level of awareness on the benefit of LLINs, very few sleep under the nets. Reasons given were similar to those in other studies (D'Alessandro, 2001; Anosike *et al*., 2004; Adeyemi *et al*., 2007; Oche *et al*., 2010). The reasons included scarcity and high cost of nets, difficulty in setting up, excessive heat and fear of chemical poisoning. These nets are meant to be distributed free of charge but are being sold in the open market by unpatriotic Nigerians which resulted in very high cost and the few that are available not getting to the targeted population. Government as a matter of urgency should monitor the distribution of these LLINs by involving religious organizations and good spirited NGOs. Olajide *et al.* (2011) had earlier reported the high cost and unaffordability of targeted population to purchase the LLINs, and employed government to ensure availability and affordable in order to reduce the burden of malaria among targeted communities.

The significance of malaria as a health problem is increasing in many parts of the tropical Africa and the outbreak are generally associated with deteriorating socio-economic conditions. The fact that a large number of the population in the studied area is affected calls for stronger commitment by various authorities to ensure the promotion of better environmental conditions, awareness through public health education instituted by the Government. Health care centers should be created more in rural areas where the conditions are very bad in order to provide good and affordable drugs to the masses to reduce the incidence. Awareness programmes should be in place by relevant agencies to inform people the effect of malaria, improve the sanitary conditions by cleaning up drainages to allow free flow of water so as to reduce the breeding site of the vectors of malaria parasites.

Conclusion: In conclusion, the study recommends (i) encouragement of the use of combination of ILLNs, insecticide residual spraying and use of windows and door nets, (ii) public health education campaign in endemic communities be instituted emphasizing on consistent use of LLINs to reduce mosquito bite and enhance effective results, (iii) long lasting insecticides treated nets should be made affordable and to teach the most vulnerable group pregnant mothers and children, (iv) all pregnant women should be provided with LLINs on their first visit to anti-natal clinic and follow up campaign in subsequent anti-natal clinics and (v) proper environmental conditions to reduce the breeding site for mosquito vectors malaria is a highly curable and most preventable disease awareness and attitudinal change are the key to eradication of malaria.

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