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Impact of Treated nets in the control of Malaria in Avutu and Umuariam Communities in Obowo Local Government Area of Imo State, Nigeria

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Abstract

To assess the impact of treated net in the control of malaria, a community based cross sectional study was conducted in two communities (Avutu and Umuariam) in Obowo Local Government Area Imo State Nigeria between January and September 2017. Rapid Diagnostic Test (RDT) was used to determine malaria status complemented with structured questionnaire and focal group discussion. Findings from this study showed that malaria is still a public health problem in the area with a prevalence of 22.6% among 83.0% net owners. Non ITN users had significantly higher prevalence than users (85.2% versus 14.7%). Males and females who don't use use ITN 47.95 versus 38.2% had significantly higher prevalence than users (10.2% versus 4.4%) (P<0.05). Among age group, 41-50 years, non-users (17.6% versus 16.1%) had higher prevalence of malaria then ITN users (4.4% and 10.4%). Though not statistically significant (P>0.05). Among occupations, Farmers/Traders had higher malaria prevalence, Ownership and usage of ITN (85.2%, 39.7% and 5.8%) though no significant difference (P>0.05). More than 50% of the participants agreed that ITNs prevents mosquito, reduce malaria, prevent other diseases and other insects. Efforts should be made by relevant stake holders to increase ownership and usage of ITNs in order to reduce Malaria through radio jingles, social marketing, health education in clinics and hospitals.

Keywords: Insecticide treated Nets, malaria parasitemia, Impact

Introduction

Malaria which cause more than 300 million clinical cases each year of illnesses in human is a recognized public health problem globally (WHO, 1990). It accounts for about 300 million clinical cases yearly in health facilities worldwide (WHO, 2005). Malaria is known to be both a disease of poverty and a cause of poverty. Poor families living in malaria endemic areas are said to spend close to 25% or more of their annual income on prevention and treatment (WHO, 2005). Malaria has also been estimated to account for up to 40% of public health expenditures and a decrease of the gross domestic products of many African countries by as much as 1.3% annually ((WHO, 2000). In Nigeria, it is responsible for a huge economic loss of about 132 billion naira (US $ 880 million) annually from cost of treatment, loss of man-hours, school absenteeism and other indirect costs (FMH, 2005). Insecticide-treated bed nets (ITNs) have emerged as a potent and effective weapon in the armory of vector control options for the prevention of morbidity and mortality caused by the bite of mosquito (Lengeler, 2004). The use of

insecticide treated nets (ITNs) is one of the global strategies in decreasing the burden of malaria (WHO, 2005). The reduce clinical malaria by over 50% and all-cause mortality in children aged 0–59 months by 15–30% when the overall population coverage is >70%, thus, underscoring the benefits of mass effect of net ownership and usage (Eisele *et al*., 2003; Choi *et al*., 1995). Bachou *et al*., (2006) have shown that ITNs are twice as effective as mosquito net and offer greater than 70% protection. The insecticides also repel mosquitoes, reducing the number that enter the house and attempt to feed on people inside. Besides providing personal protection to the users against mosquito bites, ITNs also produce 'mass effect', if comprehensive coverage by ITNs of the community is ensured by killing many malaria vectors, substantially reducing their longevity and entomological inoculation rate. Roll Back Malaria has adapted Insecticide Treated Bednets use as a major tool for the achievement of its malaria control objective. Several studies have demonstrated that use of Insecticide treated nets (ITNs) is effective and cost friendly in reducing malaria related morbidity and mortality (Nevill *et al.*, 1996; D'Alessandro *et al.*, 1995; Alonso *et al.*, 1993). A remarkable decrease in vector numbers in intervention communities supplied with ITNs and positive effects have been reported for untreated houses close to intervention area in western Kenya (Gimnig *et al.*, 2003). While studies elsewhere have assessed impact of ITN on malaria control data on impact of ITN on malaria is lacking in parts of Imo rural communities including Obowo and Umuariam/Avutu communities. Hence, the focus of this study. The information generated will assist planners to explore ways to tackle the Impact of treated nets in the control of malaria.

Materials and methods

Study area:

This study was carried out in two communities (Avutu and Umuariam) in Obowo Local Government Area of Imo State, South East Nigeria. The geographical coordinates of the area are Latitude $5^0 10^1$N-$5^0 5^1$N and Longitude $6^0 35^1$ E-$7^0 28^1$ E. It has an area of 198 km^2 and the vegetation characteristics are tropical rain forest. It experiences a moderate rainfall, with an annual rainfall of 1500mm and average minimum temperature of 20˚C. It has two distinct seasons; wet and dry season. The major occupation of the people is farming which is done at subsistence level. Also, they produce good quantity of vegetable, palm oil, kernel, broom (local ones) and baskets. Some of the people also embraced small scale trading and fishing. Their houses are made of brick walls with corrugated metal sheets roofs, few live in mud houses with thatched roofs. Source of water in these areas include village stream, boreholes and roof catch water which are stored in buckets, cans etc. Refuse and materials like discarded plastic cans are heaped around houses, schools, roads, and market square. These causes flood during rainfalls and contribute to the breeding of mosquitoes leading to high malaria transmission rate and prevalence (WHO, 2005). Non-governmental Organizations in 2015 shared Long Lasting Insecticide treated Nets (LLIN) to these communities and almost 70% of the people benefited.

Ethical considerations:

Ethical clearance and permission were obtained from the Post Graduate Research Board of Zoology Department of Imo State University, Owerri, Nigeria. Consent was sought and obtained from the village heads and Churches used. Informed consent was also obtained from the participants.

Study population:

The study populations were people residing in Avutu and Umuariam Communities who have lived there for at least 6 months and aged 20 years old and above. The study population was 300 participants, (119 males and 181 females) / church worshippers and community members who volunteered participation. From the following churches (Seat of Wisdom Catholic Church Umuokoro (61), All Saints Catholic Church Avutu (53) and St. Pauls Anglican Church Avutu (66) and Town Halls (Umuogele Community Town Hall (49) and (Umuokoro Town Hall (71)).

Data Collection:

Data collection involved both blood collection and questionnaire administration. A total of three hundred participants blood were collected and processed using venipuncture methods (Ukaga and Nwoke, 2007). Blood collection and processing was done after church services while in Town halls it was done after village meeting. Malaria test kit used for the research was obtained from Johnny Supermarket/Pharmacy store located at Ikenegbu in Owerri. Following manufacture instruction, CareStart^{TM} Malaria Pf (HRP2) Ag RDT test strip was used to assess malaria status of the participants. Questionnaires were given to only those whose blood was taken for malaria test and filled with the aid of research assistant. The questionnaires administration was complemented with Focal Group Discussion (FGD) held to explain more facts and to strengthen the response of the questionnaire.

Data Analysis:

The data were analyzed statistically using Chi-Square and ANOVA. P-values greater than or equal top≥0.05 were taken not to be significant.

Results

The result on Relationship between malaria prevalence, ITNs ownership and ITN usage shows that of (22.6%) positive participants from 300 examined, (83.0%) own ITN and greater proportion don't use ITN (85.2%). Participants from U.T.H who own majority of the ITN (20.3%) had the highest malaria prevalence (33.8%s). Overal, non ITN users had significantly higher infection than user (p>0.05) (Table 1). Relationship between Malaria prevalence and ITN Ownership by Sex and Age shows that among sexes, (29.0%) males who own ITN (57.3%) had malaria while for females (54.0%) who own ITN (42.6%) were positive. Similarly, non ITN users (47.0% versus 38.0%) had higher prevalence than users (10.2% versus 4.4%). The result also shows that both male and female within the age group 41-50 years (22.0%) and (17.6%) had the highest prevalence of malaria and ITN ownership of (8.0%) and (18.3%). However, females and males of the age group 20-30 years (5.8%) and (8.8%) had the least prevalence of malaria and least ITN ownership (9.0%) and (4.3%) with (1.4%) users and (4.4%) non-users. Statistical Analysis showed that there was no significant difference between Age, ITN Ownership and ITN usage in the study area (P<0.05) (Table 2). Occupational Related Prevalence of Malaria and ITN Ownership shows that Traders/Farmers who don't use ITN (38.2%) but own ITN (26.0%) had the highest prevalence of malaria (39.7%) followed by Other occupations (Capenters, palmwine tapers, laborers, contractors etc) (17.0%) who don't use ITN (20.5%) but own ITN with (27.9%) malaria prevalence while students (18.0%) who own ITN with (13.2%) had the least malaria prevalence with (1.4%) users and (14.7%) non users. Statistical analysis showed that there was no significant difference between Occupation and ITN Ownership in the study area (P<0.05) (Table 3). Respondents Perception on the Impact of Treated Net (Table 4) shows that more than 50% of the respondents agreed that treated net prevents mosquito bite, reduce mosquito density, reduce malaria, prevent malaria, prevent other diseases, reduce other insects (such as bedbugs, cockroaches, houseflies), kill other insects while other respondents disagreed. Two hundred and thirteen representing (71.0%) disagreed that Treated net protect against animals (Such as rats, snakes) while (29.0%) agreed.

Discussion

The use of insecticide-treated bed nets (ITNs) has been established from different studies to be an effective and cheap way of preventing malaria and mosquito borne disease (Lengeler, 2004; Minja *et al*., 2001). This study which assessed the Impact of treated net in the control of malaria in Obowo showed that Malaria is still a public health problem with a prevalence rate of 22.6% among 83.0% net owneras. Practical evidence abounds on the efficacy of insecticide treated nets against mosquitoes. Apart from forming such a physical barrier, treated nets also repel mosquitoes near the house and thus reduce biting nuisance from the insects. Use of ITN have been found to lower indoor resting densities of fed *A. gambiae sl* and *A. funestus* by 58.5% and 94.5% in intervention areas in western Kenya. Richards et al. (1994) observed that the treated nets produced both repelling and killing effects on *Anopheles albimanus* and *A. vestitipennis* which were the malaria vectors in the Northern Guatemala. Wide use of ITN in a community should reduce vector density, decrease vector-human contact, lower malaria transmission and decrease morbidity and mortality (Sexton, 1994; WHO, 1995; Brieger et al., 1996b; Hawley et al., 2003). Several pilot studies have attested to its efficacy in controlling both the vector and diseases. The success of ITNs in reducing mortality and morbidity from malaria has been well documented (Alonso *et al., 1993;* D'Alessandro *et al., 1995).* Studies have found ITNs useful in controlling vector-borne infections, sandflies and cutaneous leishmaniasis (Schreck *et al.,* 1982) cullicoides (Schreck and Kline, 1993), Bedbug (Maxwell *et al.,* 1999) and chagas disease (Kroeger *et al.,* 2003). It was soon observed that insecticide treated bednets provided adequate protection against malaria, Filariasis and Leshmaniasis (Lengeler & Snow 1996). The insecticide treated bed nets (ITN) have been shown to reduce the number of malaria episodes by as much as 50% and childhood mortality by 20%. Evidence from studies in Burkina Faso showed that use of deltametrin-impregnated nets resulted in an 82% reduction in malaria transmission owing to lowered sporozoite rate and a drop-in population of vector mosquitoes (Sexton, 1994). Ownership of ITN generally does not necessarily translate to usage. In the present study, three quarters of those who owned nets used them. Related studies by Awosan *et al* (2013) and Ugwu *et al* (2013) among pregnant women in Sokoto and Enugu, Nigeria had (27.6% and 39.1%) respectively which is lower than (18.2%) recorded in the present study. A study done in Cote d'Ivoire reported that though a third of the households possessed nets (34.2%), only

3.2% reported actual use (Koudou *et al*., 2010). Another study in Kenya reported ownership of 71% and usage of 56.3% (Atieli *et al*., 2011). Findings from our study showed that males had more infection than females (57.3% versus 42.6%) and ownership of ITNs (54.0% and 29.0) with users (10.2% vesus 4.4%) and Non-users (47.0% vesus 38.2%) respectively. This disagrees with previous reports (Akogun, 1991; Amaechi, 2009). Males and Female in this study area hadly engage in the same activities and besides they had different behavioural practices that expose them to the bite of the vectors. It was observed and confirmed too that only men often come out at evening in the playground to relax. Also, the men engage in night security (vigitantee). While women stay indoors, men are exposed to activities involving exposure risk such as nocturnal outdoor meeting and storytelling. Gender and age-related prevalence showed that people of the Age and Gender 41-50 years of age had the highest prevalence of malaria (39.6%), ownership of ITNs (26.3%) Users (5.8%) and Non-Users (33.7%). In terms of occupation farmers/Traders had the highest prevalence of malaria (39.7%) also malaia parasitemia was also higher in uses and non-users among fames and traders (5.8% versus 38.2%). Also, our study revealed that they were highest owners of net (26.0%). This could probably be due to exposure to malaria parasite in the environmental conditions and unhygienic lifestyle. Unlike civil servants and students who perhaps have known what malaria all is about, other occupations which include capenters, bricklayers, shoemakers, tailors, unemployed etc recorded malaria prevalence of 27.9%. Farmers and traders are also exposed to malaria due to their environment. This study further showed that (50%) of the participants were of the view that treated net prevents mosquito bite, reduce mosquito bites, reduce malaria, prevent malaria, prevent other diseases, reduce other insects (such as bedbugs, cockroaches, houseflies), kill other insects and others protect against animals (Such as rats, snakes) while other participants disagreed. Conclusively, this study has shown that treated nets have impact on both the vector and disease. There is a great need to educate inhabitants of the study area towards right perception of the causes, mode of transmission and proper vector preventive measures through ITNs.

Table 1: Relationship between malaria prevalence, ITNs ownership and ITN usage

Variables	**No Examined**	**No Infected (%)**	**ITN Ownership (%)**		**ITN usage (%)**	
			Yes	**No**	**Users**	**Non-users**
S.W.C.C. U	61	7(10.2)	56(18.6)	4(1.3)	0(0.00)	7(1.2)
A.S.C.C. A	53	16(23.5)	37(12.3)	11(3.6)	2(2.9)	14(20.5)
S.P.A.C. A	66	13(19.1)	51(17.0)	9(3.0)	2(2.9)	11(16.1)
U.C.T.H	49	9(13.2)	44(14.6)	12(4.0)	1(1.4)	8(11.7)
U.T.H	71	23(33.8)	61(20.3)	15(5.0)	5(7.3)	18(12.0)
TOTAL	**300**	**68**(22.6)	**249**(83.0)	**51**(17.0)	**10(14.7)**	**58**(85.2)

Key:

S.W.C.C. U	Seat of Wisdom Catholic Church Umuokoro
A.S.C.C. A	All Saints Anglica Church Avutu
S.P.A.C. A	St. Peters Anglican Church Avutu
U.C.T.H	Umuogele CommunityTown Hall
U.T.H	Umuokoro Town Hall

Table 2: Relationship between Malaria prevalence and ITN Ownership in relation to Sex and Age

Variables	No Examined		No Infected (%)	ITN Ownership (%)		ITNs usage (%)	
				Yes	No	Users	Non-Users
Sex/Gender							
Male	119		39(57.3)	87(29.0)	32(10.6)	7(10.2)	32(47.0)
Female	181		29(42.6)	162(54.0)	19(6.3)	3(4.4)	26(38.2)
Age group (years)							
20-30	M F	16 27	6(8.8) 4(5.8)	13(4.3) 27(9.0)	3(1.0) 0(0.0)	0(0.0) 1(1.4)	6(8.8) 3(4.4)
31-40	M F	28 41	8(11.7) 5(7.3)	22(7.2) 36(12.0)	6(2.0) 5(1.6)	2(2.9) 0(0.0)	6(8.8) 5(7.3)
41-50	M F	38 61	15(22.0) 12(17.6)	24(8.0) 55(18.3)	14(4.6) 6(2.0)	3(4.4) 1(1.4)	12(17.6) 11(16.1)
51+	M F	37 52	10(14.7) 8(8.8)	28(9.3) 44(14.6)	9(3.0) 8(2.6)	2(2.9) 1(1.4)	8(1.7) 7(10.2)
Total	**300**		**68(22.6)**	**249(83.0)**	**51(17.0)**	**10**(14.7)	**58**(85.2)

Table 3: Occupational Related Prevalence of Malaria, ITN Ownership and ITN Usage

Occupation	No Examined	No Infected	Ownership (%)		ITNs usage (%)	
			Yes	No	Users	Non-Users
Farmers/Traders	99	27(39.7)	78(26.0)	21(7.0)	4(5.8)	26(38.2)
Students	61	9(13.2)	54(18.)	7(2.3)	1(1.4)	10(14.7)
Civil servants/ Health workers	76	13(19.1)	65(21.6)	11(3.6)	2(2.9)	8(11.7)
Others	64	19(27.9)	51(17.0)	13(4.3)	3(4.4)	14(20.5)
TOTAL	**300**	**68(22.6)**	**249(83.0)**	**51(17.0)**	**10**(14.7)	**58**(85.2)

Table 4: Respondents Perception on the Impact of Treated Net

Impacts	Agree/ Disagree	No of respondents	Percentage (%)
Treated bed nets prevent mosquito bites	Agree Disagree	241 59	80.3 19.6
Treated bed nets reduce mosquito population	Agree Disagree	229 71	76.3 23.6
Treated bed nets kill mosquitoes	Agree Disagree	267 33	89.0 11.0
Treated bed nets reduce malaria	Agree Disagree	209 91	69.6 30.3
Treated bed nets prevent malaria	Agree Disagree	183 117	61.0 39.0
Treated bed nets prevent other diseases	Agree Disagree	193 107	64.3 35.6
Treated bed nets reduce other insects (such as bedbugs, cockroaches, houseflies)	Agree Disagree	169 131	56.3 43.6
Treated bed nets kill other insects	Agree Disagree	174 126	58.0 42.0
Treated bed nets protect against animals (Such as rats, snakes)	Agree Disagree	87 213	29.0 71.0

References

1) Akogun, OB (1991). Filariasis in Gongola state, Nigeria: climical and parasitological studies in Mutum biyu District, *Journal of Hygiene, Epidemiology, Microbiology and Immunology* 4: 383-393
2) Alonso PL, Lindsay SW, Armstrong JRM, Keita K, Gomez P, Shenton FC, Hill AG, David PH, Fegan G, Cham K, Greenwood BM. (1993). A malaria control trial using insecticide treated bed nets and targeted chemoprophylaxis in a rural area of The Gambia, West Africa: 6. The impact of the interventions on mortality and morbidity from malaria. *Transaction Royal Society of Tropical Medicine and Hygiene* 87:37-44.
3) Amaechi, AA. (2009). Studies on Insecticide – impregnated bed nets for control of mosquito-vector of human lymphatic filariasis in parts of Ebonyi State, Nigeria. PhD thesis, Imo State University, Owerri, Nigeria.
4) Atieli HE, Zhou G, Afrane Y, Lee M, Mwanzo I, Githeko AK (2011): Insecticide treated net (ITN) ownership, usage and malaria transmission in the highlands of western Kenya. *Parasit Vectors*, 4: 113.
5) Awosan KJ, Ibrahim MTO, Alayande MO, Isah BA, Yunusa L, Mahmud MB (2013). Prevalence and barrier to the use of insecticide treated nets among pregnant women attending antenatal clinic at Specialist Hospital Sokoto, Nigeria. *Academic Journals*, 5(10):416-420.
6) Bachou H, Tylleskär T, Kaddu-Mulindwa DH, Tumwine JK (2006). "Bacteraemia among severely malnourished children infected and uninfected with the human immunodeficiency virus-1 in Kampala, Uganda". *BMC Infect. Dis*. 6: 160.
7) Choi, H.W., Breman, J.G., Teutsch, S.U., Liu, S., Hightower, A.W. and Sexton, J.D. (1995). The effectiveness of insecticide-impregnated bed nets in reducing cases of malaria infection: A meta-analysis of published results. *America Journal of Tropical Medicine and Hyg*iene 52(5):377-382.
8) D'Alessandro, U., Olayele, B. O.P., McGuire, W., Bennett, S., Langerock, P., Aikins, M.K., Thomson, M., Cham, M.K., Cham, B.A. and Greenwood, B.M. (1995). Mortality and morbidity from malaria in Gambian children after introduction of an impregnated bed net programme. *Lancet*, 345:479-482.
9) Eisele TP, Lindblade KA, Wannemuehler KA, Gimnig JE, Odhiambo F, Hawley WA, (2003): Effect of sustained insecticide- treated bednet use on all-cause child mortality in an area of intense perennial transmission in western Kenya. *America Journal of Tropical Medicine and Hyg*iene *73:* 149–56.
10) FMH (2005): *Anti-malaria treatment policy*. Abuja: Federal Ministry of Health 2005; p. 4–36.
11) Gimmig, J.E., Vulule, J.M., Lo, T.Q., Kaman, L., Kolczak, M.S., Philips-Howard, P.A., Mathenge, E.M., Terkuile, F.O., Nahlen, B.L., Hightower, A.W. and Hawley, W.A. (2003). Impact of permethrin-treated bed nets on entomologic indices in an area of intense year-round malaria transmission. *America Journal of Tropical Medicine and Hyg*iene 68(4):16-22.
12) Koudou BG, Ghattas H, Esse C, Nsanzabana C, Rohner F, Utzinger J (2010): The use of insecticide treated nets for reducing malaria morbidity among children aged 6-59 months in an area of high malaria transmission in central Cote d'Ivoire. *Parasit Vectors* 3: 91
13) Lengeler, C (2004): Insecticide treated bed nets and curtains for preventing malaria. Cochrane Database system Revised CD000363. Cross reference public medicine /NCB/. Google scholar.
14) Minja, H., Schellenberg, J.A., Mukasa, O., Wathan, R., Abdulla, S., Mponda, H., Tanner, M., Lengeler, C. and Obrist, B. (2001). Introducing insecticide-treated nets in the kilombero valley, Tanzania: The relevance of local knowledge and practice for an information education and communication (IEC) campaign. *Tropical Medicine and International Health* 6(8):614-623.
15) Nevill CG, Some ES, Mung'ala VO, Mutemi W, New L, Marsh K, Lengeler C, Snow RW. (1996). Insecticide-treated bednets reduce mortality and severe morbidity from malaria among children on the Kenyan coast. *Tropical Medicine and International Health 1:* 139–146.
16) Nwoke, B.E.B. (2004): *Our Environment and Emerging and Re-emerging Parasitic and Infectious Diseases.* Supreme Publisher, Owerri, Nigeria.
17) Ugwu EO, Ezechukwu PC, Obi SN, Ugwu AO, Okeke TC (2013). Utilization of insecticide treated nets among pregnant women in Enugu, South eastern Nigeria. *Nigeria Journal of Clinical Practical* 16: 292-296.
18) Ukaga C.N and Nwoke B.E.B (2007): *Practical Medical Parasitology for Biological Science and Medical Students*. Megasoft publishers. Pp 47-48

19) WHO (1990) World report on tropical disease, WHO feature, March, No. 139, Geneva, Switzerland?
20) WHO (2000) The Abuja declaration and the plan of action: an extract from the African summit on Roll Back Malaria, Abuja? Geneva: World Health Organization 2000.
21) WHO (2005): Targeted subsidy strategies for national scaling up of insecticide treated netting programmes, principles and approaches, *Geneva*: Global malaria programme