*American Journal of Epidemiology and Infectious Disease, 2016, Vol. 4, No. 3, 42-46*
Available online at http://pubs.sciepub.com/ajeid/4/3/1

DOI:10.12691/ajeid-4-3-1

# Insecticide-treated Bed Net (ITN): Ownership and Usage in the Control of Malaria in Abia State, Nigeria

**Ezeigbo O. R.*, Ejike E. N., Nwachukwu I.**

Department of Biology/Microbiology, Abia State Polytechnic, Aba
*Corresponding author: obyezeigbotxt1@yahoo.com

**Abstract** Malaria and its control remain major global public health and development challenge. To date, there is no effective vaccine or drug for the mass chemoprophylaxis against malaria, thus proper know-how and use of preventive measures is crucial. The recommended preventive interventions are the use of ITNs, and indoor residual house spraying and other preventive interventions where appropriate and effective. However, lack of sustainable distribution and issues relating to ownership and usage, have limited the effective use of ITN as a control measure. This study evaluated the distribution, ownership and usage of ITNs in the control of malaria in five (5) Local Government Areas of Abia State between January and April, 2016. A cross-sectional study was conducted using a pre-tested structural questionnaire administered through house-to-house interview. Out of 2000 respondents, 1538(77.0%) affirmed they are aware of ITNs. Out of this number (1538) who claimed awareness of ITNs, only 593(38.6%) actually owned ITNs. Reasons for non-ownership include "not readily available" (19.9%), "already have door/window netting" (18.8%) and "fear of side-effect" (6.9%). Sources through which ITNs were acquired include Health Center (37.8%), followed by Health campaign (27.0%). Rate of compliance to the use of ITNs showed that only 287(47.0%) out of 593 that owned the net, claimed they actually use the net every night. A major reason for non-compliance was that the net is too hot to sleep under (44.7%). On ways to improve compliance to ITNs use, "ensure availability" was highly recommended (82.0%).There is a need therefore to create more awareness of the anti-malarial significance of ITNs, and to ensure that these nets are readily available to as many as need them.

***Keywords:*** *insecticide-treated bed nets, malaria control, distribution, ownership, usage*

**Cite This Article:** Ezeigbo O. R., Ejike E. N., and Nwachukwu I., "Insecticide-treated Bed Net (ITN): Ownership and Usage in the Control of Malaria in Abia State, Nigeria." *American Journal of Epidemiology and Infectious Disease*, vol. 4, no. 3 (2016): 42-46. doi: 10.12691/ajeid-4-3-1.

## 1. Introduction

Malaria remains a major global public health and development challenge. It caused 216 million cases and 655,000 deaths worldwide in 2010, of which 81% of the cases and 915 of the deaths were from sub-Saharan Africa [21]. Malaria is Africa's leading cause of under-five mortality, and constitutes 10% of the continent's overall disease burden. It accounts for 40% of public health expenditure, 30 to 50% of in-patient admissions, and up to 50% of out-patient visits in areas with high malaria transmission, like Nigeria [24]. The World Health Organization (WHO) estimated that the number of cases of malaria rose from 233 million in 2000 to 244 million in 2005, but decreased to 225 million in 2009 [22]. The number of deaths due to malaria is estimated to have decreased from 985,000 in 2000 to 781,000 in 2009 [22].

Nigeria is one of the hardest hit of the countries in malaria-endemic countries of sub-Saharan Africa, where the disease accounts for 11% of maternal mortality and 12 to 30% of mortality among the under-five; but its severity and complicated effects are most common among infants and pregnant women [10,14]. It is estimated that 50% of the people have at least one episode of malaria each year [11,23]. With a total population of 120 million, this translates to 60 million people suffering from attacks of malaria yearly. It is estimated that children under the age of five, have 2 to 4 attacks every year [23]. This makes malaria the most important cause of death and disability in children under the age of five in the country [12].

Malaria control remains a challenge in Nigeria. The resent World Malaria Report which indicated that Nigeria accounts for a quarter of all cases in 45 malaria-endemic in Africa clearly shows the challenge of malaria in Nigeria. This may be due to her large population, with approximately 140 million people living in areas of high malaria transmission. While there are reports of up to 50% reduction in malaria episodes and deaths in some African countries from 2000 to 2006 [24], reports from Nigeria has not shown any significant reduction, especially with regards to malaria in children and pregnant women [2]. Malaria- related mortality, morbidity and economic loss could be averted if available effective preventive and treatment interventions were made universally accessible to those in need [7]. To date, there is no effective vaccine or drug for the mass chemoprophylaxis against malaria, thus proper know-how and use of preventive measures is crucial [5]. The recommended preventive interventions are

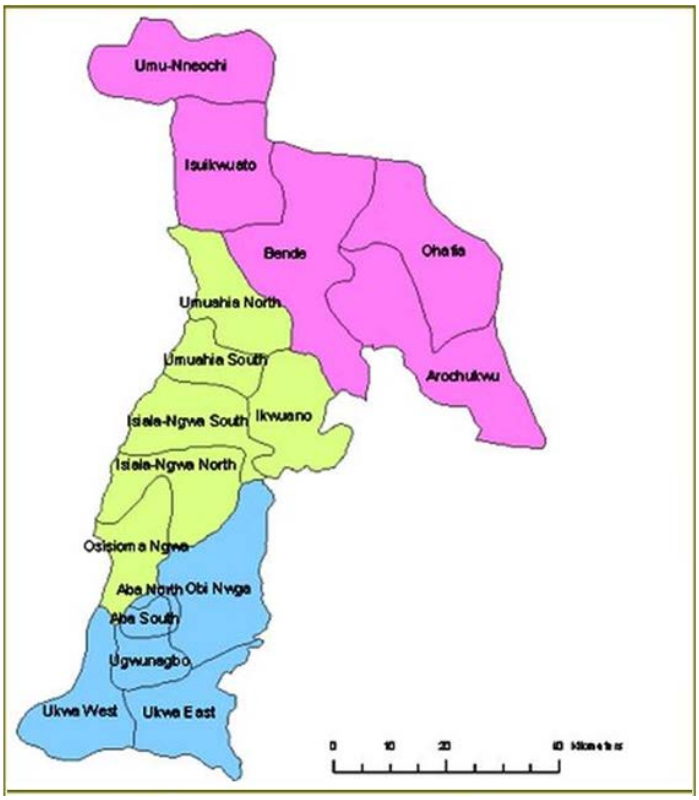
the use of ITNs, and indoor residual house spraying and other preventive interventions where appropriate and effective [1]. The coverage and proper utilization of these malaria preventive measures, like the ITNs in the country is also limited, due to lack of sustainable distribution and issues relating to replacement of nets, seasonality of malaria and poor knowledge of the communities with regards to the link between mosquito and malaria [16]. It is worth mentioning that even when knowledge is a predictor of ITN use; it may not assure protection from malaria unless there is proper use and strong adherence [6]. However, Edelu et al [8] in a study carried out in Enugu, Nigeria, observed that non-use of ITNs is not indicative of the difficulty with sourcing for ITNs and therefore recommended that community involvement in distribution and monitoring is important, as most people might not go to health centers to source for ITNs. Singh et al [19] also observed that the main determinant of ITN ownership was community involvement. Roll back malaria (RBM) is a people-oriented programme that emphasized community participation. The RBM strategy seeks to establish a social movement in which local communities, public and private sectors, all tiers of government and non-governmental agencies come together in a partnership and network to implement malaria control activities [3]. The WHO and RBM partnership now recommended that distribution of long-lasting insecticide-treated nets (LLINs) be free or heavily subsidized to achieve greater equity of coverage and that a variety of distribution system be used to achieve universal access, including targeted campaigns to deliver nets to most at-risk populations [13]. Despite this recommendation, WHO identified supply as a primary barrier to achieving optimum coverage, with the latest World Malaria Report suggesting that in the general population, there is a high correlation between ownership and use of ITNs [17]. Enhancement of health education and community mobilization efforts should be employed to increase the possession and proper utilization of ITNs. This study evaluated ownership and usage of ITN in the control of malaria in Abia State, Nigeria.

## 2. Materials and Methods

**Study Area:** Abia state is located in the south eastern part of Nigeria. The state was created out of Imo State in August 27, 1991. The State lies between latitude $4^{o}\ 45^{1}$ and $6^{o}\ 15^{1}$ North and longitude $6^{o}\ 30^{1}$ and $8^{o}\ 9^{1}$ East. It is bordered on the North and Northeast by Ebonyi and Enugu states respectively and on the east by Cross River and Akwa Ibom States. Its Southern border is shared with River State while its western border is shared with Imo and Anambra. The people of the state are very dynamic and are predominantly farmers, artisans and civil servants. Other ethnic groups also reside with the dominant Igbo speaking people.

The Abia State being a rainy zone is prone to malaria because of flooding during the rainy seasons with poor drainage system, resulting in the formation of temporary water bodies that promote the breeding of mosquitoes, the vector for malaria parasites.

**Research Ethics:** Ethical review and clearance of the research protocol, research instruments and consent procedures were obtained from the Ethical Review Committee of the Department of Biology/Microbiology, Abia State Polytechnic, Aba. Permission was sought from each Local Government chairmen and the community leaders in each of the five Local Government Areas. Meetings were held in all the sampled LGAs to explain the research objectives and procedures, and the right of individuals to participate or not were emphasized.




Map Showing The LGAs of Abia State (Source: http://www.nigerianmuse.com)

**Study Design and Data Collection:** The study was designed to evaluate the knowledge, distribution and usage of insecticide-treated bed nets (ITNs) for the control of malaria in Abia State. The study was conducted in five LGAs of Abia State: Arochukwu LGA, Bende LGA, Isiala-Ngwa North LGA, Osisioma-Ngwa LGA and Ikwuano LGA between January and April, 2016. These areas were selected based on their dense population, the drainage system, educational levels and occupation of the people. A cross-sectional approach was adopted through collecting qualitative and quantitative data using pre-tested structural questionnaire from households in each of the five Local Government Areas. The information which included such variables like distribution, ownership and usage of ITNs, was presented in English language or interpreted in the local dialect for better understanding to the respondents. Given the magnitude and sensitive nature of the work, as well as the need to generate adequate data, the field assistants were used and trained on the importance of making relevant field observations, data collection and keeping accurate records. To realize the above, they were reminded of the importance of their role in the whole research objectives and the procedure of achieving the goals.

**Statistical Analysis:** Bar Chart was used to allow for quick appreciation of the suggestions to improve the rate of compliance to the use of ITNs.

## 3. Results

The Knowledge of the insecticide-treated bed nets is shown in Table 1. Out of 2000 individuals sampled from the five Local Government Areas of Abia State, 1538(76.9%) have a good knowledge of ITNs while 462(23.1%) claimed they have no knowledge of ITNs.

**Table 1. Knowledge of the Insecticide-treated bed nets in the LGAs of Abia State**

| Awareness of ITNs | Ikwuano | Isiala Ngwa North | Bende | Arochukwu | Osisioma | Total (%) |
|---|---|---|---|---|---|---|
| Yes | 203 | 354 | 217 | 383 | 381 | 1538 (77.0) |
| No | 197 | 46 | 183 | 17 | 19 | 462 |
| Total | 400 | 400 | 400 | 400 | 400 | 2000 |

The source of information on ITNs is shown in Table 2. Out of 1538 respondents who claimed awareness of ITNs, 40.2% claimed they got information from local Health center, 26.9% from LGA/Health campaign, 24.2% from Media and 8.8% from relatives/friends.

**Table 2. Sources of Information (awareness) on ITNs in each LGA**

| Source of information | Ikwuano | Isiala Ngwa North | Bende | Arochukwu | Osisioma | Total (%) |
|---|---|---|---|---|---|---|
| Relations/friends | 7 | 40 | 9 | 80 | - | 136(8.8) |
| Health center | 65 | 41 | 83 | 202 | 226 | 618(40.2) |
| Media | 85 | 203 | 26 | 58 | - | 372(24.2) |
| Health campaign | 46 | 70 | 99 | 43 | 155 | 413(26.9) |
| Total | 203 | 354 | 217 | 383 | 381 | 1538(77.0) |

The result in Table 3 showed that out of 1538 respondents that claimed awareness of ITNs, only 593(38.6%) actually claimed they have at least one insecticide treated bed net while 945(61.4%) claimed they had none.

**Table 3. Ownership of ITNs in the LGAs**

| Ownership of ITNs | Ikwuano (%) | Isiala Ngwa North (%) | Bende (%) | Arochukwu (%) | Osisioma(%) | Total (%) |
|---|---|---|---|---|---|---|
| Yes | 52(25.6) | 225(63.6) | 70(32.3) | 127(33.2) | 119(31.2) | 593(38.6) |
| No | 151(74.4) | 129(36.4) | 147(67.7) | 256(66.8) | 262(68.8) | 945(61.4) |
| Total | 203 | 354 | 217 | 383 | 381 | 1538 |

Several reasons were given for non-ownership of ITNs (Table 4). Out of 945 interviewed who claimed non-ownership of ITNs, 188(19.9%) claimed the nets are not readily available while 178(18.8%) claimed they already have door/window netting. One hundred and forty five (15.3%) respondents claimed that ITNs are expensive; only 65(6.9%) claimed fear of the side-effects of the treated bed nets.

**Table 4. Reasons for Non-ownership of ITNs in the LGAs**

| Reasons for non-ownership | Ikwuano | Isiala-Ngwa North | Bende | Arochukwu | Osisioma | Total (%) |
|---|---|---|---|---|---|---|
| Not readily available | 33 | 18 | 36 | 63 | 38 | 188(19.9) |
| Don't know the benefits | 30 | 11 | 29 | 23 | 46 | 139(14.7) |
| The design of my bed does not fit | 10 | 24 | 30 | 20 | 28 | 112(11.9) |
| It is expensive | 19 | 20 | 14 | 59 | 33 | 145(15.3) |
| I can treat malaria with insecticide | 26 | 6 | 8 | 33 | 45 | 118(12.5) |
| I already have door/window netting | 18 | 37 | 21 | 45 | 57 | 178(18.8) |
| Fear of side-effect | 15 | 13 | 9 | 13 | 15 | 65(6.9) |

Table 5 shows sources of the ITNs by the respondents. Out of 593 who claimed ownership of ITNs, 224 (37.8%) claimed they got their nets from their local Health Centers, 160(27.0%) got during the health campaign, 121(20.4%) got from LGA while 63(10.6%) bought from the market.

**Table 5. Sources of Acquisition of ITNs in the LGAs**

| Source of ITNs | Ikwuano | Isiala-Ngwa North | Bende | Arochukwu | Osisisoma | Total (%) |
|---|---|---|---|---|---|---|
| Health Center | 11 | 82 | 22 | 86 | 23 | 224(37.8) |
| Market | 6 | 18 | 7 | 15 | 17 | 63(10.6) |
| Friends/Relations | 5 | 10 | 2 | 8 | - | 25(4.2) |
| Heath Campaign | 22 | 54 | 25 | - | 59 | 160(27.0) |
| LGA | 8 | 61 | 14 | 18 | 20 | 121(20.4) |
| Total | 52 | 225 | 70 | 127 | 119 | 593 |

On the rate of compliance to the use of ITNs (Table 6), out of 593 respondents that own ITNs, an appreciable number of 282(47.6%) claimed they use the net every day, 162 (27.3%) claimed they often use the net (about 5 times a week) while 69 (11.6%) claimed they have the nets but have never used them.

**Table 6. Compliance to the Use of ITNs in the LGAs**

| Compliance rate | Ikwuano | Isiala-Ngwa North | Bende | Arochukwu | Osisioma | Total (%) |
|---|---|---|---|---|---|---|
| All nights | 21 | 117 | 16 | 56 | 72 | 282(47.6) |
| More than 5 times a week | 5 | 55 | 27 | 50 | 25 | 162(27.3) |
| Not more than 2-3 times a week | 16 | 38 | 10 | 8 | 8 | 80(13.5) |
| Non-compliance | 10 | 15 | 17 | 13 | 14 | 69(11.6) |
| Total | 52 | 225 | 70 | 127 | 119 | 593 |

The reasons for non-compliance on the use of ITNs are shown in Table 7 as follows: the net is too hot to sleep under (44.7%), it does not allow circulation of air (17.0%), It irritates the skin and nose (15.0%) while 3.0% had no reasons for non-use.

**Table 7. Reasons for Non-compliance to ITNs in the LGAs**

| Reasons for non-compliance | Number of respondents | Percentage (%) |
|---|---|---|
| It is too hot to sleep under the net | 265 | 44.7 |
| It irritates | 89 | 15.0 |
| It does not allow air circulation | 101 | 17.0 |
| Problem with space | 68 | 11.5 |
| Problem with hanging | 52 | 8.8 |
| No reason | 18 | 3.0 |

Suggestion on the ways to improve ownership and usage of ITNs in order of priority are shown in Figure 1. They are “ensure availability” (82.0%); “more awareness through churches” (80.1%); “ITNs should be available for door/windows” (73.3%); “involve community members in distribution (53.0%) while “educate the community members on the benefits” had 38.4%.

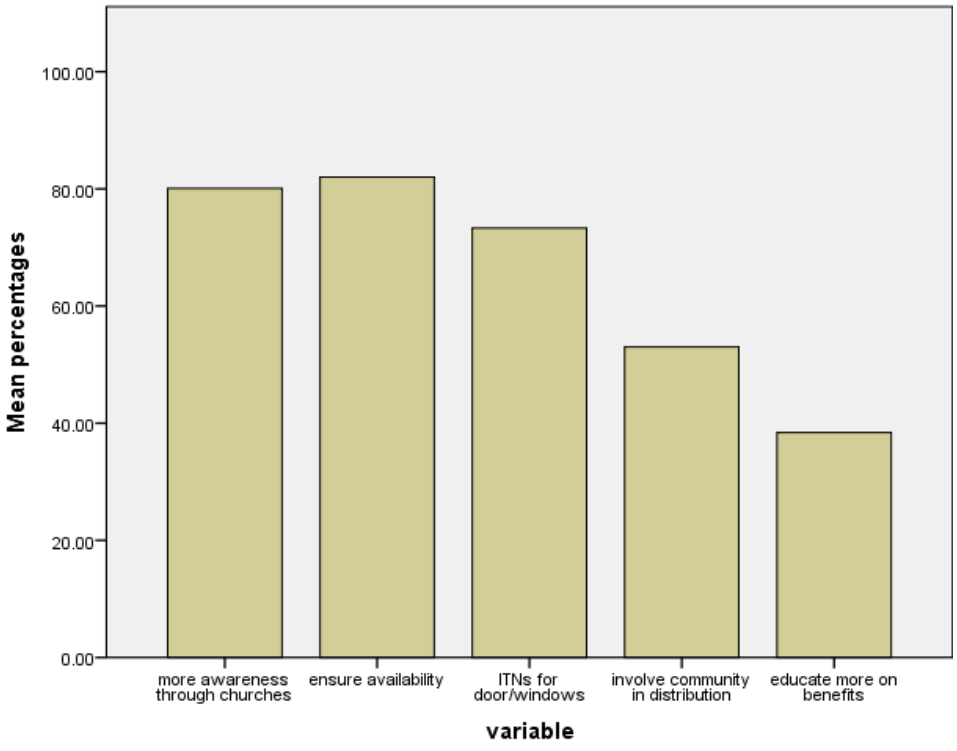



**Figure 1.** Ways to Improve Compliance to the use of ITNs in Abia State

## 4. 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 [15,17]. An insecticide-treated net is a mosquito net that repels, disables and/or kills mosquitoes coming in contact with the insecticide on the netting material. However, the use of ITNs for prevention of malaria has been associated with a lot of difficulties ranging from lack of awareness and knowledge of its role in preventing malaria, to its accessibility, availability and affordability [18,25]. This study evaluated the distribution, ownership and usage of ITNs in the control of malaria in five (5) Local Government Areas of Abia State. The results revealed that majority (77.0%) of the respondents were aware of ITNs; however awareness did not have much influence on ownership since only 38.6% of those who claimed awareness actually owned at least one net. On the sources of acquisition of the nets, Health Center topped the list (37.8%), followed by Health campaign (27.0%). Reasons for non-ownership of ITNs include "net not readily available" (19.9%); "door/window netting already available" (18.8%) while 15.3% claimed they nets are not affordable.

On the rate of compliance to ITNs usage, only 47.6% actually use the net every night compared to 11.6% non-complaints who either store these nets or use them to fence their farms against pests as observed during this survey. The result obtained on usage of ITNs in this study is higher compared to 27.6% obtained by Awosan et al [4] and 39.1% by Ugwu et al [20] among pregnant women in Sokoto and Enugu, Nigeria respectively. Similarly, utilization of ITNs has also improved compared to the result obtained in a similar setting in Aba, Abia State where a compliance rate of 38.1% was obtained [9]. Reasons for non-compliance were given as "the nets are too hot to sleep under" (44.7%), followed by "it does not allow air to circulate" (17.0%). On ways to improve ownership and usage, the following were suggested: "ensure availability" (82.0%); "create awareness through churches" (80.1%); "provide treated nets for doors/windows" (73.3%) while "involve community members in distribution" had 53.0%. However, much need to be done to develop health promotion packages based on these suggested ways of improvement in order to increase access and benefits of this intervention.

## Acknowledgement

Authors wish to acknowledge TETFUND sponsorship in this research work.

## References

[1] African Union (2006). Special Summit of African Union on HIV/AIDS, Tuberculosis and Malaria (ATM) Abuja, Nigeria: 2006, May 2-4, Update on Malaria Control in Africa.

[2] Agomo CO, Oyibo WA, Anorlu RI, Agomo PU (2009). Prevalence of malaria in pregnant women in Lagos,South-West Nigeria. Korean J. Parasitol., 47(2): 179-183.

[3] Aluko JO, Oluwatosin AO (2012). Utilization of insecticide – treated nets during pregnancy among postpartum women in Ibadan, Nigeria: a cross-sectional study. BMC Pregnancy Chidbirth, 12:12.

[4] 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 ante-natal clinic at Specialist Hospital Sokoto, Nigeria. Academic Journals, 5(10):416-420.

[5] Ayalew A (2010). Knowledge and practice of malaria prevention methods among residents of Arba Minch Town and Arba Minch Zuria District, Southern Ethiopia. *Ethiop. J. Health Sci*., 20(3): 185-193.

[6] Biadgilign S, Ayalu R, Haji K. (2012). Determinants of ownership and utilization of insecticide-treated bed nets for malaria control in Eastern Ethiopia. *Journal of Tropical Medicine*, 2012,

[7] Breman JG, Alilio MS, White NJ (2007). Defining and defeating the intolerable burden of malaria III. Progress and perspectives. American Journal of Tropical Medicine and Hygiene, 77 (6) supplement 6.

[8] Edelu BO, Ikefuna AN, Emodi JI, Adimora GN (2010). Awareness and use of insecticide-treated bed nets among children attending outpatient clinic at UNTH, Enugu- the need for an effective mobilization. African Health Sciences, 10(2): 117-119.

[9] Ezeigbo OR, Osuagwu MC, Ibegbulem ZO, Agomoh NG (2015). Evaluation of the knowledge, attitude and practice of the use of insecticide treated nets (ITNs) in Aba, Nigeria. British Journal of Medicine and Medical Research, 5(1): 57-64.

[10] Federal Ministry of Health (FMOH) (2003). Burden of Malaria in Nigeria; Nigeria Demographic and Health Survey; pp 2-15.

[11] Federal Ministry of Health (2006). National Health Financing Policy. Federal Ministry of Health, Abuja.

[12] Ganiyu AS, Rabiu OJ (2009). Awareness and use of insecticide-treated nets among women attending ante-natal clinic in a Northern State of Nigeria. *Journal of Pakistan Medical Association*, pages with reference to book, from 4 to 0.

[13] Jima D, Getachew A, Bilak H, Steketee RW, Emerson PM, Graves PM, Gebre T, Reithinger R, Hwang J(2010). Malaria indicator survey 2007, Ethiopia: coverage and use of major malaria prevention and control interventions. Malaria Journal, 12:58.

[14] Jimoh A, Sofola O, Petu A, Okorosobo T (2007). Quantifying the economic burden of malaria in Nigeria using the willingness to pay approach. Cost effectiveness Resour Allocation, 5(6), 1428-1754.

[15] Lengeler C (2000). Insecticide-treated bednets and curtains for preventing malaria. Cochrane Database Syst Rev 2000: CD000363. PubMed.

[16] MOH (2006). Proceedings of the National Workshops on the Review of the first five year (2001-2005) and Preparation of the second five year(2006- 2010) National strategic plan for malaria prevention and control in Ethiopia, Federal Demogratic Republic of Ethiopia Ministry of Health, Addis Ababa, Ethiopia.

[17] Musa OI, Salaudeen GA, Jimoh RO (2009). Awareness and use of insecticide-treated nets among women attending ante-natal clinic in a northern state of Nigeria. J. Pak. Med. Assoc., 59 (6): 354-358.

[18] Opiyo P, Mukabana WR, Kiche I, Mathenge E, Killeen GF, Fillinger U (2007). An exploratory study of community factors relevant for participatory malaria control on Rusinga Island, Western Kenya. Malaria Journal, vol. 6, Article 48.

[19] Singh M, Brown G, Rogerson SJ (2013). Ownership and use of insecticide-treated bed nets during pregnancy insub-Saharan Africa: A review. Malaria Journal, 12: 268.

[20] Ugwu EO, Ezechukwu PC, Obi SN, Ugwu AO, Okeke TC (2013). Utilization of insecticide treated nets among pregnant women in Enugu, South eastern Nigeria. Nig. J. Clin. Pract., 16: 292-296.

[21] WHO (2011). World malaria report. Geneva: World Health Organization 2011.

[22] WHO (2010). World Malaria Report 2010, World Health Organization, Geneva, Switzerland.

[23] WHO / UNICEF (2003). The Africa Malaria Report for year 2003, pp 9-29.

[24] WHO (2008). World Malaria Report 2008. World Health Organization, Geneva, Switzerland, pp 99-101.

[25] Wiseman V, Scott A, McElroy B, Conteh L, Stevens, W (2007). Determinants of bed net use in The Gambia: Implication for malaria control. American Journal of Tropical Medicine and Hygiene, 76(5): 830-836.