The Impact Of Insecticide Treated Net On The Prevalence Of Malaria In Some Communities Of The Fct, Abuja.

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Abstract: An assessment of the impact of insecticide treated net on the prevalence of malaria in Yangoji and Gwagwalada areas of the Federal Capital Territory, Abuja, was conducted from June 2015 to January 2016 among patients presented with fibril illness, in the University of Abuja Teaching Hospital in Gwagwalada and the Primary Health Care Centre in Yangoji, Kwali Area Council. A total of 500 individuals resident in Gwagwalada and Yangoji were administered with a structured questionnaire and examined respectively for the presence of malaria parasiteamia microscopically. In Yangoji and Gwagwalada, of the 250 subjects examined respectively, the study reveals that 73.20% and 78.54% of respondent possesses insecticide treated net. The prevalence of malaria among individuals that possesses ITNs was 47.54% at Yangoji and 38.78% at Gwagwalada. There was a statistical difference in the prevalence of malaria between individuals possessing ITNs and those not possessing it, (P-value > 0.05). Prevalence of malaria among males and females that possesses ITNs in Yangoji and Gwagwalada was 56.52%, 41.22% and 40.485, 37.50%, conversely prevalence of malaria among males and females not possessing net in Yangoji and Gwagwalada were 66.66% and 85.71%, 83.33% and 70.83%. The study revealed that Malaria parasitaemia was less prevalent among subjects possessing ITNs.
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1. Introduction

Malaria due to *Plasmodium falciparum* remains one of the most important causes of morbidity and early mortality in endemic region of sub-Saharan Africa (WHO, 2013) current malaria control strategies involve early diagnoses and treatment of infected individuals and the reduction of human-mosquito contact rate through vector control efforts (Mushinzimana *et al*., 2006) malaria related mortality, morbidity and economic loss could therefore be averted if the available effective preventive and treatment interventions are made accessible to those in need (Breman *et al.,* 2007) nevertheless, inadequate access to information healthcare and anti-malaria resources results in the inability to properly implement malaria intervention (Welch and Fuster 2012). Furthermore, disparities exist in access between rural areas found to have less access to malaria control interventions (Barat *et al.,* 2004).

Insecticide treated nets (ITNs) and indoor residual spraying have been demonstrated to reduce malaria (Draper, *et al.,* 1960) and to date are the mainstay for controlling malaria vectors and associated malaria transmission (Kazembe *et al.,* 2007) nevertheless, long lasting insecticide treated bed nets are the major and most promising components of the selective vector control strategies (Lengeler, 2004). In fact, a massive scale-up in malaria control programme between 2008 and 2010 resulted in the provision of ITNs to protect more than 57 million people at risk and the concomitant reduction in mortality from 985,000 in 2000 to 781,000 in 2009 (Mabaso *et al.,* 2004).

Therefore, the Government of Nigeria embarked on a scale-up of ITNs coverage in 2011 in line with the role-back malaria recommendation of universal coverage. However, bed nets as a tool for malaria control can present challenges, such as coverage, proper use and replacement of old and torn net (Pluess *et al*., 2010) Recent data (Worrall *et al.,* 2005) suggest that net possession and use remain low in some parts of Nigeria with only 36% ITN ownership and 21% of children between 5 years reportedly sleeping under an ITN.

The coverage and proper utilization of the malaria preventive measures in the country may be limited by the lack of sustainable distribution and issues related to replacement of nets, severity of malaria and poor knowledge of the community about the link between mosquitoes and malaria (WHO, 2005). The possible shift in local malaria epidemiology also necessitate the evaluation of the proper use and effectiveness in ensuring their long-term benefit (WHO, 2010) in addition establishing determinants of infection and evaluating the effectiveness of vector control interventions can identify possible ways to improve malaria control (Kilian *et al.,*2010).

The World Health Organization (Rehman *et al.,* 2011) therefore recommends periodic surveys to access whether population at risk receives sufficient insecticide treated nets and that these nets are properly used. While challenges to increasing ITNs ownership may diminish as a result of the expansion of large-scale distribution efforts. ITN impact on transmission will be minimized if they are not properly and consistently used especially among population vulnerable to increased malaria morbidity and mortality, such as children and pregnant women (Biadgilign *et al.,* 2012) in addition considerable disparity has been observed between ITN possession and use (Bortel *et al.,* 1996). Although, ITNs have been shown to reduce morbidity and mortality in numerous controlled trials (Atkinson *et al.,* 2009) the preventive effect of the tool in malaria parasitaemia warrants further investigation. ITNs have been shown to reduce asexual parasitaemia prevalence in children under 5 years old (Deribew *et al.*, 2010) as well as increase protection for community members not sleeping under any bed nets at all and decrease malaria prevalence in surrounding areas following community-wide use (West *et al.,* 2012).

Nigeria has the largest population at risk of malaria in Africa with stable transmission throughout the country. Malaria is among the top three causes of death in the country (National Malaria Control Plan of Action 1996-2001) culminating into a social and economic problem some prophylactic and treatment measure has proved ineffective especially with the incidence of malaria resistance to most anti-malaria drugs (WHO, 2000) preventing vector-host contact has been identified as the most effective measures in halting this trend.

This investigation covers the urban area of Gwagwalada Area Council and Yangoji a rural area in Kwali Area Council of the FCT, focusing on the prevalence of malaria in both sexes and among various age groups in conjunction with the possession of ITNs. It's imperative to evaluate the possession of insecticide treated net (ITNs) in relation to the prevalence of malaria in the FCT in order to ascertain the current status of net possession and its effectiveness in preventing malaria. This will involve evaluating the possession of insecticide treated net in rural and urban settlers in the FCT, and assessing the prevalence of malaria in relation to possession of ITNs.

2. Material and Methods

Study Area

The research was carried out in Gwagwalada town of Gwagwalada Area Council and Yangoji in Kwali Area Council, which are among of the six Local Government Area Councils of the FCT. Gwagwalada and Kwali lie between longitude 8^0 and 8^056^1 east and latitude 7^0 58^1 and 7^0 05^1 North. Gwagwalada is the name of the main town in the Local Government Area, it has a population of 157,700as at the 2006 census and has grown to over 1,000000, with an area of 1069.589km. Kwali has an area of 1206km, with a population of 85,837 as at 2006 census and has grown to over 1,000000. Gwagwalada and Kwali share similar socio-cultural life which includes farming, hunting and trading. (Awowole, 2007).

Sample and Study Population

The samples consist of 500 subjects of adult and children both male and female from Yangoji and Gwagwalada respectively. A well designed questionnaire was used to access information from the participants on the possession of ITN.

Collections of Blood Samples

Venous blood was collected into sample bottle containing potassium EDTA anticoagulant. Using a 5ml syringe and needle the vein was punctured and about 4ml of blood drawn into a labeled EDTA anticoagulant bottle and mixed gently

Preparation of Blood Films

Both thick and thin films are made from each patients sample immediately at the point of collection on same slide as described by Chesbrough (2005).

Procedure for Preparation of Thick and Thin Blood Films

A small drop of blood (2µl) was placed at the center of a clean, grease free microscope slide, for thin film and a larger one(6µl) about 15mm to the right for thick film. Immediately the thin film was spread using a smooth edged glass spreader. Without delay the larger drop of blood was spread to make a thick smear covering an area of about 15mm. The films were allowed to air dry in a horizontal position on a flat surface.

The thin film was fixed with absolute methanol for 2 minutes to ensure that the smear does not wash away and to fix the cells well and the thick film was heated fixed in a hot air oven at 40°C for 20 minutes.

Staining of Films using Giemsa Stain

10% (1:10) dilution of the Giemsa stain was made in buffered water (pH 7.1-7.2) immediately before staining and the films are to be stained using the following procedure as stated by WHO (2010).

The slide was placed on a staining rack and flooded with 10% Geimsa stain and stained for 10minutes.

The slides was washed gently with clean water, the back wiped and air dried.

Experimental Design

The study involves observational data from large cross sectional survey to assess net possession and investigate the protective effect of ITNs on malaria transmission in Gwagwalada and Yangoji.

Statistical Analysis

All data obtained were analyzed using the student t-test and chi-square at 0.05 level of probability.

3. Results

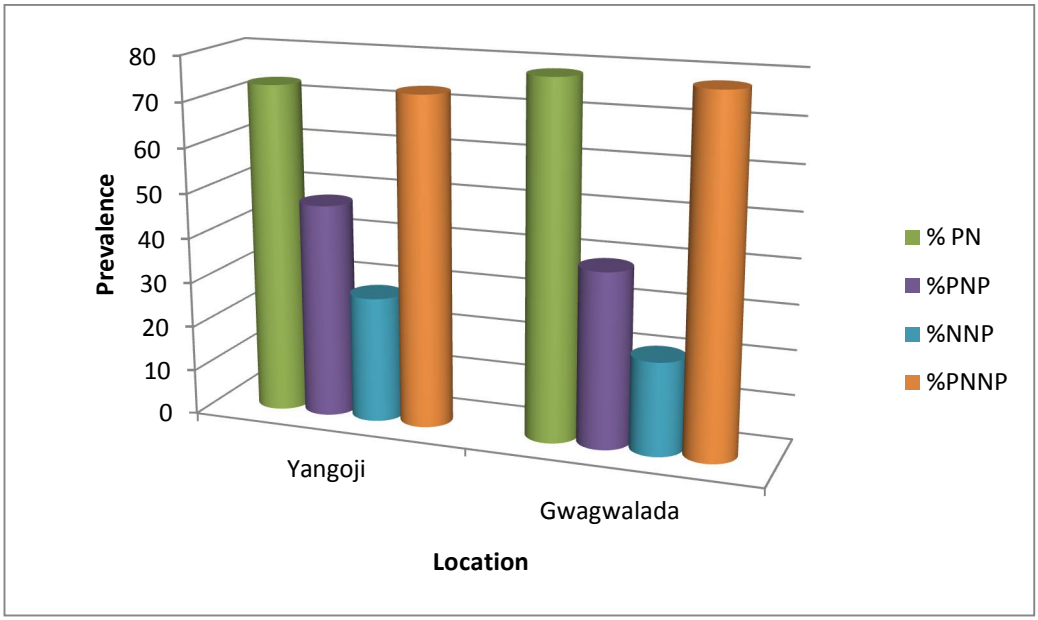

Figure 1: The overall prevalence of malaria based on possession of net in Yangoji and Gwagwalada.
PN = proportion possessing ITNs
PNP = prevalence among ITNs possessors
PNPN = proportion not possessing ITNs
PNNP = prevalence among non ITNs possessors.

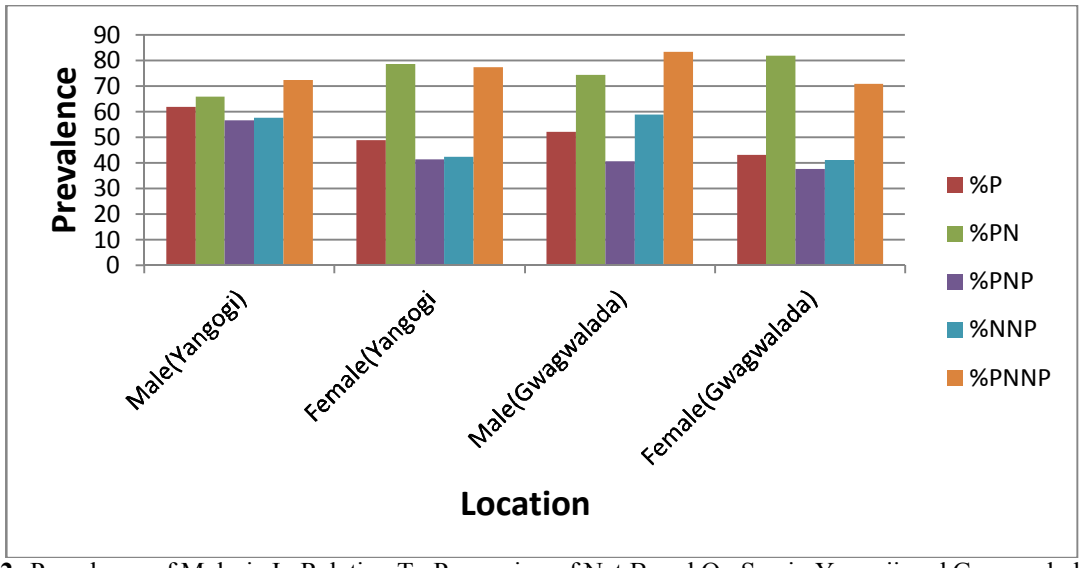

Figure 2: Prevalence of Malaria In Relation To Possession of Net Based On Sex in Yangoji and Gwagwalada
P = overall prevalence
PN = proportion possessing ITNs
PNP = prevalence among ITNs possessors
PNPN = proportion not possessing ITNs
PNNP = prevalence among non ITNs possessors

Figure 1shows the proportion of individuals possessing ITNs were 73.20% and 78.40% in Yangoji and Gwagwalada respectively, while the prevalence of malaria among these proportions were 47.54% and 38.78% in Yangoji and Gwagwalada respectively, the prevalence of parasiteamia among individuals not possessing insecticides treated nets in both communities were 73.13% and 77.77% respectively. Statistical analysis, using T-test reveals that there exist a significant difference in the prevalence of malaria between those possessing nets and those not possessing it in both communities.

Figure 2 explains the prevalence of malaria in relation to possession of nets based on sex in Yangoji and Gwagwalada. Prevalence of malaria in males and females in Yangoji were 61.90% and 48.96%, and in Gwagwalada, 52.21%, and 43.07% respectively. Proportions of males and females in possession of insecticides treated nets in Yangoji and Gwagwalada were 65.71%, 78.62% and 74.33, 81.75% respectively. Thus, prevalence of malaria among these proportions possessing insecticides treated nets among male and females in Yangoji and Gwagwalada respectively was 56.52%, 41.22% and 40.48%, 37.50%. Conversely, prevalence of malaria among male and females not possessing nets in Yangoji were 72.22%, and 77.41%, while Gwagwalada had 83.33% and 70.83%. Statistical analysis, using t-test shows that there was a significant difference in the prevalence of malaria between males and females and between males and females possessing nets in Yangoji. However there was no significant difference in the prevalence of malaria between males and females and between males and females possessing nets in Gwagwalada.

4. Discussion

The study on the assessment of the impact of insecticide treated nets on the prevalence of malaria in Yangoji and Gwagwalada communities was conducted from June 2014 to January 2016 in the Federal Capital Territory of Abuja, utilizing the centralized medical institutions in the various localities, the University of Abuja Teaching Hospital in Gwagwalada and the Primary Health Care Center in Yangoji, Kwali Area Council, FCT, Abuja. A total of 500 individuals resident in Gwagwalada town and Yangoji district were examined respectively for the presence of parasiteamia using microscopy as a gold standard for smear examination. The study reveals that 73.20% and 78.40% possesses insecticide treated net in Yangoji and Gwagwalada respectively, this result supports the claims of the WHO (2013) who asserted a scale up in the distribution of insecticide treated net in recent times. Of the number examined, male and females in Yangoji 65.71%, and 78.62% possesses insecticide treated nets respectively, while in Gwagwalada 74.33% of males and 81.75% of females possesses ITNs, indicating that females utilizes ITNS more than males.

The prevalence of malaria among individuals that possess insecticide treated nets in Yangoji and Gwagwalada was47.54% and 38.78% while the prevalence among those individuals not possessing ITNS was significantly higher 73.13% and 77.77% respectively. Findings from this study revealed a higher prevalence of malaria parasiteamia among individuals not possessing insecticides treated net, similar to Noland *et al*.(2014) who reported a low prevalence rate of 36.13% and 36.60% among users of ITNs in Abia. Statistical analysis using t-test showed a significant difference in the prevalence between individuals possessing ITNs and those not possessing it.

The overall prevalence of malaria among males and females in Yangoji were 61.90% and 48.96% and in Gwagwalada, 52.21%, and 43.07% respectively, this is in line with the reports of Nmadu (2015) who reported 67.45% and 61.23% among males and females in Gwaripa, Abuja. There was a significant difference ($p<0.05$) in the prevalence of malaria among males and females in Yangoji and not significantly different in Gwagwalada ($p>0.05$). The prevalence among individuals possessing Insecticides treated nets in males and females in Yangoji and Gwagwalada respectively was 56.52%, 41.22% and 40.48%, 37.50%. Statistical analysis reveals a significant difference ($p<0.05$) in the prevalence between males and females possessing ITNsin Yangoji, and no significant difference ($p>0.05$) in the prevalence between males and females possessing nets in Gwagwalada. Okoyo *et al*.(2015)reported a prevalence rate among children using insecticide treated net of 66.90% in Busia, 51.8% in Homabay and the lowest of 29.69% in Nigori county in Kenya, the relatively high prevalence was attributed to improper handling, and human behavior which can diminish it effectiveness.

In conclusion, this study provides a baseline data, assessing the impact and thus, the effectiveness.

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