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Socio-cultural factors influencing insecticide treated bed net utilization in a malaria endemic city in north-central Nigeria

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ABSTRACT

Objective: To ascertain the socio-cultural factors influencing the rate of utilization of insecticide treated bed nets (ITNs) in a malaria endemic city of Makurdi, north central Nigeria.**Methods:** The study was cross-sectional in nature using systematic sampling method to identify households. Both quantitative and qualitative data was generated from adult women using structured and semi structured questionnaires, and focused group discussions (FGDs) to obtain information on rate and patterns of utilization of ITNs. Information such as age, educational level, marital status, awareness or otherwise of the existence of malaria, and factors influencing rate of ownership and utilization of ITNs were obtained. FGDs were used to obtain qualitative information on rate of utilization of ITNs not captured in the questionnaires. Data obtained was analysed using Epi Info 6 statistical software. **Results:** Among the respondents interviewed, 97.0% (2013/2075) were aware of existence of malaria and 87.0% of these (1751/2013) would associate it with mosquitoes. The rate of ownership of any bed net, ITNs and untreated bed nets (UTNs) was 25.1%, 17.0% and 8.3%, respectively. Utilization of ITNs among children was 30.0% (112/373) and UTNs 12.9% (48/373). Positive contributors to ITNs utilization were literacy, enhanced economy, experience of marriage, and being gainfully employed ($P < 0.05$); while negative contributors were ignorance, poverty and some cultural beliefs and values. **Conclusions:** A more synchronized advocacy should be carried out on the potential benefits of ITNs utilization and sustained. Also ITNs should be made available to the people of the community at minimal or no cost.

1. Introduction

The era in human history of existence when malaria parasites became human companions has remained a puzzle so difficult to unravel by medical historians to date^[1,2]. Contrary to the findings from tombs of ancient Egyptian monarchs dating from the pre-dynastic to Byzantine eras, the remains from the tombs of kings and princes in

ancient Babylon and Greece, and fossils from China giving archaeological clues to the evolution of several infectious diseases, that of malaria has remained a mystery^[3–5]. In Africa, African folktales, stories and wise sayings depicting malaria related ailments spanning several generations lead credence to the fact that the disease might have been on the continent as far back as, probably the origin of Africans themselves^[6–8].

In spite of the long history of malaria's association with man, there are still mixed and diverse views and perceptions about the disease world over^[9–11]. Those views, especially in sub-Saharan Africa, often times are at variance with the established scientific facts about the

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disease with often flawed approach towards its control^[12]. In Zanzibar, several cultural myths and perceptions about causation and transmission of malaria were observed^[13]. Final decisions concerning treatment of malaria were usually reserved for the family members (especially grand parents), and by husbands mother-in-laws (where they existed) with often disastrous consequences^[13]. From Turkey, 33% of those interviewed believed malaria can be acquired from dirty water, or by changing place of residence^[14]; and in Tanzania, about 85% of the 1 530 caretakers interviewed could not link malaria with convulsions, fever, and vomiting^[15]. Also malaria infections were attributed to doing strenuous work by 73% of respondents in Abeokuta while only 11.7% of them attributed it to mosquito bites while mosquito bed nets were not generally regarded as important tools in its control^[16].

In Nigeria as is the case in the rest of sub-Saharan Africa, insecticide treated bed nets (ITNs), one of the four cardinal components of the roll back malaria programme (RBM) has been central in the advocacy of both government and non-governmental organizations (NGOs) towards effective control of the disease on the continent^[17–19]. Besides provision of effective drugs for the treatment of malaria infections, over all success of its control on the continent relies heavily on the rate of acceptability and utilization of ITNs which have been found to be highly result oriented in the malaria war world over^[20–22]. The recently conducted city-wide malaria prevalence in Makurdi which was put at 32.3% among the under fives still puts the entire city as endemic for this disease^[23]. There is therefore the need to assess rate of acceptability and utilization of the ITNs by inhabitants of the city as well as factors influencing their decisions. This forms the basis for the present study as the rate of ownership and utilization of ITNs has been shown to an important index in measuring the success of the RBM programme among communities in sub-Saharan Africa^[22].

2. Materials and methods

2.1. Procedure

The study was carried out between October and December 2009. Six major parts of the city comprising high level, low level, Wurukum, North bank, Wadata and GRA were selected to cut across, ethnic, socioeconomic, and religious backgrounds of the inhabitants. Interviewers were trained on the art of questionnaire administration and subsequently recruited for the study. Households were selected using systematic sampling methods in which one after another household in each direction faced by the interviewers was recruited into the study. Women aged 18 years and above or of any age with a biological child in each household were individually interviewed to assess their knowledge and perceptions about ownership and utilization of ITNs; where more than one adult female was encountered in a household. The one with an under five child or one in a better position to volunteer the required information was given priority, or selection was based on general consensus. Semi structured questionnaires with both closed and open

ended questions were either self or interviewer administered to the respondents to obtain the information.

Information such as age, educational level, occupation, marital status, ownership/use of ITNs and factors influencing their ownership and utilization were obtained. Focused group discussions and in depth discussions on myths and cultural practices surrounding ownership or otherwise of ITNs were also carried out where it was possible to assemble more than 10 adults in any location of the city. This qualitative data was used to strengthen the quantitative data obtained from the questionnaires.

Principal Component Analysis (PCA) was used to develop wealth indices for the households based on ownership of durable assets including radio, television, telephone, refrigerator, bicycle, motorcycle/scooter and car/truck. Ownership was coded as 0 or 1 and missing cases were excluded. The households were then divided into socio-economic quartiles based on their scores. Cronbach's alpha was then calculated to test consistency-reliability^[24].

2.2. Analysis of results

Data obtained was analysed using Epi Info 6 statistical software; Pearson's Chi squared test or Mantel-Haenszel were used to determine association with a *P* value of <0.05 accepted as significant. Fisher's exact test was calculated for borderline significance and for cells with counts less than five. Logistic regression models were used to determine the predictors of appreciable knowledge about malaria among the study population.

3. Results

The age range of the 2 075 women studied in Makurdi was 18 to 83 years with the mean ages 37 years and mode 32 years. 97.0% (*n*=2 013) of the respondents were aware of the existence of malaria while 87% (*n*=1 751) were able to associate it with mosquitoes. Those familiar with ITNs were 72.5% (1 504/2 075) while 571 (27.5%) had no knowledge about the existence of the tool with no significant age difference (*P*>0.05). Table 1 showed the age distribution pattern of adult females in relation to their awareness about ITNs or otherwise.

The rate of ownership of ITNs among the households was 17.0% (*n*=349); 8.3% (*n*=172) had untreated bed nets (UTNs) while 75.0% (*n*=1 554) of the households had no bed net. Ownership of bed net of any type was put at 25.1% (521/2 075). There was correlation between familiarity with the tool and rate of ownership of any bed net (*RR*=2.42, 95% *CI*=3.14–4.22).

The rate of utilization of ITNs among households who owned it was 78.2% (273/349) without significant difference (*P*>0.05); and that of UTNs was 51.7% (89/172) which was statistically significant ($\chi^2=8.38$, *OR*=1.89, *RR*=1.31)(*P*< 0.05).

A review of the number of bed nets per household showed that 79.4% (53/349) had one ITN per household and 70.6% (368/521) had any one bed net per household; 15.2% (53/349) had two ITNs and 14.8% (77/521) two any bed net per household; and households with three and above bed nets

Table 1Age distribution pattern of adult females in relation to their awareness about ITNs or otherwise in Makurdi, Nigeria ($n=2\ 075$)[$n, (\%)$].

Age interval (years)	Aware	Unaware	Total
<20	154 (87.0)	23 (13.0)	177
20–29	586 (92.4)	48 (7.6)	634
30–39	372 (95.1)	19 (4.9)	391
40–49	206 (92.4)	17 (7.6)	223
50–59	255 (91.4)	24 (8.6)	279
60–69	119 (92.2)	10 (7.8)	129
70–79	202 (98.5)	3 (1.5)	205
>80	36 (97.2)	1 (2.7)	37

χ^2 (Mantel–Haenszel)= 0.28, $OR= 1.11$, $RR= 1.05$, $P>0.05$;NB: Age Range= 18– 83 years, Mean= 37 Years, Mode= 32 years.

were: 5.4% (19/349) and 14.6% (76/521) for ITNs and any bed net respectively. There was a significant difference between the number of ITNs and UTNs among households who had three and above. The number of children in a household did not actually determine the number of bed nets as compared to the correlation between level of family income and number of bed nets available ($\chi^2=4.53$, $OR=3.0$, $RR=1.1$) ($P<0.05$).

Analysis of marital status of the respondents in relation to ownership of any bed net revealed that; 35.6% (420/1 179), 34.6% (73/211), and 4.0% (28/685) of those married, separated/divorced/widowed/divorced, and singles respectively possessed bed nets of any type with a direct correlation with an experience of marriage ($\chi^2=20.89$, $OR=0.11$, $RR=0.77$) ($P<0.01$). The preference for ITNs as compared to UTNs was significantly higher (83.5%, 304/364) among the married compared to the other groups ($P<0.01$).

Among the households with under five children, regular utilization of ITNs for the children was 30.0% (112/373), 12.9% (48/373) UTNs and overall any bed net usage was 42.9% (160/373). There was no significant gender preference in bed net utilization for the children ($P>0.05$).

Based on educational levels of the respondents, 8.8% (73/833), 20.2% (105/519), 70.6% (156/455), and 69.8% (187/265) of those respectively with nil, primary, secondary and tertiary education had bed nets of any type with educational level influencing rate of ownership of any type of bed net ($\chi^2=33.57$, $OR=7.0$, $RR=1.55$) ($P<0.01$). Over 74.9% (140/187) of the nets owned by respondents with tertiary education were ITNs compared to UTNs as owned by the other groups ($P<0.05$).

Among the professions of the respondents, 69.1% (143/207) civil servants, 71.5% (88/123) teachers/lecturers and 81.3% (39/48) of the health workers possessed bed nets of any type. Also 21.5% (46/214), 13.6% (58/425), 25.4% (62/244), and 10.3% (81/788) respectively of the petty traders, artisans, farmers and applicants had a bed net of any type. All the bed nets owned by health workers were ITNs compared to the other professions ($P<0.001$).

Using the wealth index generated, net ownership was commoner among those in the upper three quartiles compared to the poorest in the first quartile with a

significant RR of 1.4. However, ownership of more than one bed net was commoner among those in second and third quartile, those in the highest quartile usually had one net. Preference for ITNs was more pronounced among those in the 3rd and 4th quartile compared to the first two ($RR=1.3$, $CI= 1.3–2.1$).

Among the various reasons advanced by the respondents for non utilization of mosquito nets were lack of funds to procure (32.4%, $n=672$), the meant for only children (11.9%, $n=247$), for cold nights but not day (7.4%, $n=153$), for fear of death (8.1%, $n=168$) and no idea about how to use it (8.6%, $n=179$), and where to procure (9.7%, $n=201$). Other reasons were no idea about where to buy it (9.7%, $n=201$), too much heat (4.0%, $n=84$), the meant to cover the dead (5.1%, $n=106$), for boarding students (3.0%, $n=63$), for hospital use only (3.4%, $n=71$), for thr educated and the rich (4.5%, $n=94$), and for Nil (2.3%, $n=47$).

4. Discussion

Among the 2 075 women studied in Makurdi, 97.0 % of them were aware of the existence of malaria and 72.5% were familiar with the existence of ITNs. Those who owned ITNs were 17.0%, UTNs 8.0% and ownership of any bed net was 25.1%. The number of any bed net per household was: one, 70.6%; two, 14.8%, and three and above, 14.6% with a significantly higher number of UTNs among households with three or more bed nets ($P<0.05$). Among households with children aged under five, 42.9% of them slept under any bed net, 30.0% and 12.9% under ITNs and UTNs, respectively.

30.0% utilization of ITNs among children in the present study is a far cry from the African target of at least 60% in 2005 and 80% by 2010. This finding points clearly to the fact that the target is not likely to be achieved[25,26]. It is, however, a call for a renewed commitment by the policy managers towards malaria control without which the possibility for attainment of the millennium development goals (MDGs) equally hangs in the balance. The near absence of the equally second important component of RBM which is early

treatment with artemisinin combined therapy using home based management (HBM) programme, as observed from focused group discussions (FGDs) generally points to the fact that there is need to intensify on the RBM initiative in the community.

Factors which positively influenced the rate of utilization of ITNs were a higher level of education ($P < 0.05$), enhanced economy ($RR = 1.4$) and certain professions such as being a health worker, civil servant or teacher/lecturer. On the other hand, negative factors that influenced ITNs utilization were: lack of funds, ignorance, various cultural beliefs such as fear of death, net meant for cold nights, and is meant for health institutions. Government should consider the possibility of creating a social insurance scheme that could take care of the large number of unemployed people in order to boost their economic status and also improve on their attitude towards healthcare^[27].

Furthermore, when developing interventions for populations with traditional beliefs and culturally defined behaviours, programme planners should reinforce positive beliefs and behaviours and identify culturally appropriate means to modify harmful beliefs and behaviours so as to include them in health education messages^[28–30]. For example, health education would feature both prominent and ordinary people in the society who have lived up to ripe old age with acclaimed history of regular utilization of ITNs so as to wipe out fear among the people. Fiscal provisions should also be included in the overall costs so as to ensure a correct implementation of the programme.

The factors influencing the utilization of ITNs from the present study appear generally similar to that from other parts of Africa^[31]. In Bukina Faso, mosquitoes were not regarded as the only causes of malaria, hence ITNs were only viewed to have limited use^[32]; and in Gabon, strong and persistent fevers were believed to be supernatural and not associated with mosquitoes^[33]; while in Ghana, malaria was strongly associated with overcrowding^[34]. Also in Sierra Leone, over 50% of the people interviewed did not believe that malaria could be prevented by any means^[35]. There appears an apparent disconnect between the well intentioned zeal of the global community to help Africa drive away malaria out of her domain and Africa's peculiar challenges, socio-cultural stand and identity^[36–38]. The large number of destitutes, orphans with teenage family heads and widows occasioned by the onslaught of AIDS has further contributed to distorting the social structure^[39–41]. The huge donations from foreign agencies to fight malaria therefore may not produce meaningful results until individual fundamental social peculiarities of the continent's groups of people are painstakingly taken into consideration^[17,18,42–44].

In conclusion, the present study has shown that utilization of ITNs almost 10 years ago is still low in Makurdi city and the city is not likely to attain the 2010 Africa target for RBM which is just a few months ahead. Illiteracy, poverty and cultural beliefs were found to be the major factors responsible for it. Policy managers should look critically into these factors and re-launch the community into the present Africa's road map for the control of malaria.

Conflict of interest statement

We declare that we have no conflict of interest.

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