Original Article

Family Biosocial Variables Driving Adherence to the Use of Insecticide Treated Nets among Under-Five Children Managed for Malaria in a Rural Hospital in Eastern Nigeria

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ABSTRACT

BACKGROUND: As the distribution and awareness of free insecticide treated nets (ITNs) for malaria control continues to grow in Nigeria in order to meet the coverage target for the year 2010, a large gap exists between acquiring them, using them, and adhering to its use by families of under-five children. Therefore, the family biosocial variables driving its adherence need to be explored if the potential benefits of the nets are to be fully harnessed by families of under-five children in Nigeria. This study was aimed at describing family biosocial variables driving adherence to the use of insecticide treated nets among under-five children managed for malaria in a rural hospital in Eastern Nigeria.

MATERIALS AND METHODS: This was descriptive hospital-based study carried out from June 2008 to June 2010 on a cross section of 220 mothers of under-five children who were managed for confirmed malaria within the study period and met the selection criteria were interviewed using a pretested, structured researcher administered questionnaire. The questionnaire instrument elicited information on family biosocial variables. Adherence was assessed in the previous 6 months and graded using an ordinal scoring system of 1-4 points: score of 4 points indicated adherence while scores of 1-3 points meant non-adherence. Operationally, an adherent respondent was defined as one who scored 4 points. An under-five child was defined to have malaria if the mother gave complaint of fever, vomiting and other symptoms suggestive of malaria, had body temperature exceeding 37.5°C with the asexual forms *Plasmodium falciparum* detected on the peripheral blood film. Reasons for non-adherence were also sought.

RESULTS: The adherence rate was 33.2%. The family biosocial variables significantly associated with adherence were maternal age =30 years (p-value=0.03), maternal occupation (house wives) (p-value=0.03), family size less than 4(p-value=0.026) and spouse living together (p-value=0.01). Others included family belief in the benefits of ITNs (p-value=0.002) and source of ITNs (p-value=0.03). The most significant predictor of adherence was living together of spouse (p-value=0.000, OR=3.851, CI=1.76-6.01). The commonest reason for non-adherence was forgetfulness (p-value=0.003).

CONCLUSION: Despite high family belief in the benefits of ITNs, adherence to its use was low. Some family biosocial variables played significant roles in driving its adherence. Measures targeted at these variables and widespread family-oriented health promotion programmes are recommended in order to improve on adherence leading to family friendly ITNs communities.

KEY WORDS: Malaria, under-five, family biosocial variables, adherence, ITNs, rural Nigeria, hospital.

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INTRODUCTION

Malaria infection has continued to be a family and public health problem especially in Nigeria with high morbidity and mortality particularly among under-five children in endemic communities.[1,2] Malaria causes disruption of family dynamics leading to family dysfunction and staggering economic costs.[3] It accounts for seven out of ten outpatients' visits in Nigerian hospitals and is responsible for 25% infant mortality rate and 30% under-five mortality rate.[4]

Vision 2010 of the Roll Back Malaria Initiative (RBMI) is committed to halving world's malaria burden by 2010 and halving it again in the 2015 using ITNs among other multiple prevention strategies.[5,6] Sleeping under ITNs is a proven method of preventing malaria especially for the under-five children and World Health Organization (WHO) RBMI has called for its increased use.[7,8,9] The global prioritization of malaria control in Africa motivated the Federal Government of Nigeria after the Abuja Malaria Summit in 2000 to commit to the global effort to reduce the burden of malaria by 50% by the end of the year 2010 and ensured that 60% of at risk population such as under-five children in endemic communities use ITNs by the year 2015.[5,6] These global efforts are essential to achieving the Millennium Development Goals (MDGs) as regards malaria disease and child health.

Free distribution of ITNs is aimed at promoting its consistent use for malaria control. Although, awareness

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of ITNs is currently and relatively high and increasing in Nigeria, a large gap remains between being aware of them, acquiring them and adhering consistently to its use. Of great concern therefore is that beside high ITNs awareness and adherence rates reported in Gambia[10] and Guatemela[11], poor ITNs use and adherence rates were reported in Nigeria.[12-14] The consistent use of ITNs is an important component in the personal and family protection preventive strategies of malaria and wider use reduces episodes of malaria illness in areas of high and year round transmission.[15]

The malaria control intervention programmes such as adherence to ITNs utilization is aimed at building human and institutional resources to fight the malaria scourge. The families of the under-five children constitute important human and basic social institutional resources in which health education and promotion on adherence to ITNs use should take place. More so, families are important recipients of health information (message) and sources of motivation for the community members concerning health practice matters such as ITNs. Adherence to the use of ITNs is one of the greatest challenges of social marketing and distribution of free ITNs and has been shown to be an important factor for malaria control for the at risk group such as under-five children in malaria endemic communities.[16]

Conceptually, adherence to health promotion interventions such as the use of ITNs refers to the degree to which users conform to the prescribed instructions.[17] Clinical measures of adherence to the use of ITNs included interview method using questionnaires, self-reported adherence and observation method such as home-based unannounced observation visit. Other measures of adherence include impact on the morbidity indicators like number of febrile episodes and level of malaria parasitaemia. However, there is no gold standard for precise measurement of adherence in hospital settings.

The family has a great impact on success or failure of medical health promotion interventions such as the use of ITNs. Families that use ITNs all-times for the under-five children are at advantage of its benefit in malaria prevention. It is difficult to predict whether a particular family will be adherent as various family biosocial variables may influence adherence behaviour. The elucidation of the influence of family biosocial variables on adherence to ITNs use for under-five children needs to be explored in malaria endemic rural communities in Nigeria. Intervention for adherence to ITNs may not be possible if the influence of these variables is not studied and the description of the impact of these family variables on adherence will help to improve adherence to its use for this special group of under-five children. The effects of family biosocial variables on malaria disease and illness in under-five children as regards malaria prevention using and adhering to ITNs need to be explored in rural Nigeria. However, family biosocial variables influencing adherence to the use of ITNs for the under-five children are yet to be studied in Nigeria particularly at secondary healthcare level in a rural area of Imo state, Nigeria. More so, the target years of 2005 and 2010 of RBMI had passed and 2015 target years of Millennium Development Goals (MDGs) is approximating. It is therefore appropriate to assess the adherence to the use of ITNs in the families of under-five children now. It is against this background that the authors were motivated towards ascertaining family biosocial factors driving the adherence to the use of ITNs among the under-five children in a rural Nigeria. The authors therefore studied family biosocial variables driving adherence to the use of insecticide treated nets among under-five children managed for malaria in a rural hospital in Eastern Nigeria.

MATERIALS AND METHODS

This was a hospital-based descriptive study carried out from June 2008 to June 2011 on a cross section of 220 mothers of under-five children who were managed for confirmed malaria at St. Vincent De Paul Hospital, Amurie-Omanze, a rural Mission General Hospital in Isu Local Government Area of Imo state, Eastern Nigeria. The hospital renders twenty four hours service daily including public holidays to the community and its environs.

A minimum sample size of 217 was calculated using the formula[18] for estimating minimum sample size for descriptive studies when studying proportions with entire population size <10,000 using estimated population size of 400 under-five patients based on the previous annual under-five patients population hospital attendance. We assumed that 50% of the respondents would adhere to the use of ITNs for the under-five patients, at 95% confidence level and a 5% margin of error. However, a total of 220 respondents were used based on the time frame for the study.

After clinical evaluation of the under-five patients, those who had presumptive diagnosis of malaria had malaria diagnosis confirmed by thick blood film microscopy using standard Giemsa staining technique. The study population were recruited from among mothers whose under-five children were managed for confirmed malaria at the study centre during the study period. Only married women who owned and used ITNs and whose husbands were alive were interviewed. The under-five children who were brought to the hospital by other care givers; those used to pre-test the questionnaire in the study centre and those using untreated nets were excluded from the study. More so, under-five children who needed specialized diagnostic investigations and care were referred out and excluded from the study. The

mothers were interviewed using researcher administered pretested, structured questionnaire after obtaining a verbal informed consent on one to one basis maintaining confidentiality. In order to ensure that no mother was interviewed more than once, those interviewed were properly documented at the time of the interview and the records were subsequently cross checked prior to every interview session. Detailed enquiries were made about:

(1). Family socio-demographic variables such as parental age, occupation and educational status. Social classification of the parents was based on five point occupational classification described in a previous study.[19] However, this was reclassified into lower class (social classes V and IV), middle class (social class III) and upper class (social class I and II) to suit Nigerian environment.

(2). Family structure such as type of marital union, family size and living together of parents as related to adherence to the use of ITNs for the under-five children were also studied.

The adherence to the use of ITNs was assessed in the previous 6 months and graded using ITNs adherence scoring system of 1- 4 points developed by the authors from review of literature[1,8,10-12,14,16] as follows: all-times use=4 points, most-times use=3 points, some-times use=2 points and rarely use=1 point. Those that scored 4 points were graded as being adherent while1,2 and 3 scores were graded as non-adherent. An adherent respondent was operationally defined as one who used ITNs all-times (score of 4 points) for the under-five children. The reasons for non-adherence were also inquired from those who scored 3 points and less.

Clinical symptoms, signs and laboratory test of the patients were also recorded. An under-five child was defined to have malaria if the mother gave complaint of fever, vomiting and other symptoms suggestive of malaria, had body temperature exceeding 37.5^{o}C with the asexual forms *Plasmodium falciparum* detected on the peripheral blood film.

The questionnaire was pre-tested internally using ten mothers of under-five children in the study centre who met the selection criteria and externally at St. Damian hospital Okporo, a similar mission General Hospital in Orlu, Imo state using ten mothers of under-five children who met the selection criteria. The pre-testing of the questionnaire lasted for two days. The respondents for the pre-testing were selected haphazardly and those used from the study centre were excluded from the main study. The pretesting was done to find out how the questionnaire would interact with the respondents and ensure that there were no ambiguities. However, no change was necessary after the pre-test as the questions were interpreted with the same meaning as intended.

The authors operationally defined primary care givers as the biological mothers of the under-five children who were treated for malaria during the study. Family referred to a couple and their children.

STATISTICS

Data analysis was done using Statistical Package for Social Sciences version 13.0, Chicago. Categorical variables were described by frequencies and percentages. Bivariate analysis involving Chi-square test was used to test for the significance of associations between categorical variables. Furthermore, to identify family biosocial factors independently associated with adherence, univariate logistic regression analysis was performed at 95% confidence limit. The level of significance was set at $p<0.05$.

ETHICAL ISSUES

Ethical certificate was obtained from the Ethics Committee of the hospital. Informed verbal consent was also obtained from respondents included in the study.

RESULTS

Of the 220 mothers of under-five children who use ITNs, seventy-three (33.2%) were adherent while one hundred and forty seven (66.8%) were not adherent.

On the sources of ITNs, sixty nine (31.4%) respondents said they bought their nets through commercial and social marketing while one hundred and fifty one (68.6%) got their nets free of charge. Of the 69 respondents who bought their nets forty one (56.2%) were adherent while twenty eight (19.0%) were non-adherent. Similarly, of the 151 respondents who had free nets, thirty-two (43.8%) were adherent while one hundred and nineteen (81.0%) were not adherent. This difference was statistically significant(x^2=5.72; df=1; p-value=0.003)(Table I).

Table I. Sources of ITNs as related to adherence

Source of ITNs	Adherence	
	Yes Number(%)	No Number(%)
Bought nets from commercial and social marketing	41(56.2)	28(19.0)
Free nets	32(43.8)	119(81.0)
Total	73(100.0)	147(100.0)

X^2=5.72; df=1; p-value=0.003.

On the family belief in the benefits of ITNs, two hundred and one (91.4%) believed that ITNs were beneficial to the under-five children while nineteen (8.6%) didn't. Of the 201 that believed in the benefits of ITNs, sixty nine (94.5%) were adherent. Similarly, of the nineteen that didn't believe in the benefits of the nets, four (5.5%) were adherent. This difference was statistically significant(x^2=8.32; df=1; p-value=0.002)(Table II).

Table II. Family belief in the benefits of ITNs as related to adherence.

Family belief in the benefits of ITNs	Adherence	
	Yes Number(%)	No Number(%)
Yes	69(94.5)	132(89.8)
No	4(5.5%)	15(10.2)
Total	73(100.0)	147(100.0)

X^2=8.30; df=1; p-value=0.002

Bivariate analysis of family biosocial variables as related to adherence showed that family variables such as maternal age (older age =30 years)(p-value=0.03); maternal occupation (housewife)(p-value=0.03); family size of 1- 4(p-value=0.026) and living together of parents(p-value=0.01) were statistically significant while other family variables such as fathers age, parental education, fathers occupation, parental social class and type of marital union were not statistically significant (Table III).

However, on univariate logistic regression of these statistically significant family factors, living together of parents and maternal age remained statistically significant with living together of parents being most statistically significant predictor of adherence.A significantly higher proportion of parents living together were adherent compared to those not living together (OR=3.851, CI=1.76-6.01, p-value=0.000). The spouse living together was four times more likely to be adherent compared to those not living together. More so, family size =4 had an Odds ratio of 1.306 suggesting that family size =4 was one and half times more likely to be adherent compared to family size>4(Table IV).

Table IV: Predictors of adherence to the use of ITNs among the respondents

Family variables	-coefficient	Odds ratio	Confidence Interval(95%)	p-value
Maternal age>30 years	0.069	0.933	0.80 -2.27	0.432
Maternal occupation(H/W)	0.612	0.916	0.87 -2.45	0.350
Family size	1.487	1.306	1.06- 4.90	0.001
Parents living together	2.210	3.851	1.76 - 6.01	0.000

Reference categories: maternal age<20 years, maternal occupation(student), family size <4, and parents not living together.

The most common reason proffered by non-adherent respondents was forgetfulness (31.3%). Other reasons included task of having to mount and dismantle the net everyday(21.1%), inconvenience during sleep(17.5%), hot night temperature(heat)(15.6) and no mosquito(14.5). The difference was statistically significant(x^2=6.10; df=4 ; p-value=0.003)(Table V).

Table V: Reasons for non-adherence among the non-adherent respondents.

Reason for non-adherence	Number	Percent
Forget to put the net	131	31.3
Task of mounting and dismantling the net everyday	88	21.1
Inconvenience during sleep	73	17.5
Hot night temperature(heat)	65	15.6
No mosquito	61	14.5
Total responses	418	100.0

X²=6.10; df=4; p-value=0.003.

NB Multiple responses were recorded for some patients.

-Percentages represent the proportion of the responses obtained.

DISCUSSION

The adherence rate of 33.2% in this study was low compared to the policy target of regular and consistent use of ITNs in stable endemic malaria communities such as the study area as contained in the roll back malaria initiative of World Health Organization[5] and Federal Government of Nigeria.[4] This low adherence rate to the use of ITNs, one of the cardinal components of roll back malaria initiative has buttressed the reports that inspite of the widespread belief and documentations on the benefits of ITNs, concerns regarding adherence to its use are growing and constitute a major cause for worry in malaria control.[7,8,10-13] In this regard, satisfactory level of adherence to the use of ITNs was yet to be achieved among the respondents and the current scaling up of free distribution of ITNs has not yet yielded desired expectation on adherence. Thus, it is not enough to distribute the ITNs to meet coverage target for the year 2015. However, this low adherence rate in this study has a far reaching implication on the use of ITNs; translating awareness into practice and adherence should be the focus of health promotion activities on ITNs. This adherence rate can be improved by focusing on these family variables that favoured ITNs use. This is the only way to fully harness the benefits of ITNs as an effective tool for malaria control among the under-five children.

This study has demonstrated that the family belief in the benefits of ITNs as a personal preventive device against malaria was high. However, this belief could be undermined by the reasons for the use of ITNs. Despite the fact that majority of the respondents knew that ITNs prevent malaria through protection from mosquito bites, some respondents used ITNs to prevent the noise from mosquitoes. Similar reasons were adduced in Egbema (Rivers state)[13] and in other African countries such as Ghana[20] and Kenya[21] where the use of ITNs was driven mainly by the need to control the nuisance of mosquitoes. The high family belief in the benefits of ITNs in malaria control in this study is not surprising since the respondents received messages on ITNs from the health facilities as well as electronic media in the

Table III: Family variables as related to adherence to the use of ITNs.

Family variables	Adherence		X^2	df	P-value	Remark
	Yes(number)(%)	No(number)(%)				
Age(years)						
Mother						
< 20	9(12.3)	23(15.6)				
20 - 29	23(31.5)	96(65.3)				
≥ 30	41(56.2)	28(19.1)				
Total	**73(100.0)**	**147(100.0)**	**4.16**	**2**	**0.03**	**S**
Father						
< 25	7(9.6)	2(1.4)				
25 -39	25(34.2)	26(17.7)				
≥ 40	41(56.2)	119(80.9)				
Total	**73(100.0)**	**147(100.0)**	**2.13**	**2**	**0.210**	**NS**
Education						
Mother						
Primary & below	17(23.3)	77(52.4)				
Secondary & above	56(76.7)	70(47.6)				
Total	**73(100.0)**	**147(100.0)**	**2.10**	**1**	**0.170**	**NS**
Father						
Primary & below	29(39.7)	48(32.7)				
Secondary & above	44(60.3)	99(67.3)				
Total	**73(100.0)**	**147(100.0)**	**3.06**	**1**	**0.09**	**NS**
Occupation						
Mother						
Housewives	41(56.2)	20(13.6)				
Student/apprentice	12(16.4)	11(7.5)				
Traders	6(8.2)	68(46.3)				
Farmers	11(15.1)	40(27.2)				
Public servants	3(4.1)	8(5.4)				
Total	**73(100.0)**	**147(100.0)**	**4.09**	**4**	**0.03**	**S**
Father						
Farmers	31(42.5)	57(38.8)				
Traders	10(13.7)	41(27.9)				
Artisans	4(5.5)	28(19.0)				
Public servants	14(19,2)	9(6.1)				
Drivers	8(10.9)	11(7.5)				
Professionals	6(8.2)	1(0.7)				
Total	**73(100.0)**	**147(100.0)**	**3.02**	**5**	**0.194**	**NS**
Social class						
Mother						
Lower	59(80.8)	112(76.2)				
Middle	13(17.8)	35(23.8)				
Upper	1(1.4)	0(0.0)				
Total	**73(100.0)**	**147(100.0)**	**1.96**	**2**	**0.140**	**NS**
Father						
Lower	18(24.7)	35(23.8)				
Middle	51(69.9)	111(75.5)				
Upper	4(5.4)	1(0.7)				
Total	**73(100.0)**	**147(100.0)**	**2.16**	**2**	**0.230**	**NS**
Type of marital union						
Monogamy	71(97.3)	142(96.6)				
Polygamy	2(2.7)	5(3.4)				
Total	**73(100.0)**	**147(100.0)**	**1.04**	**1**	**0.430**	**NS**
Family size						
1 - 4	63(86.3)	49(33.3)				
≥ 5	10(13.7)	98(66.7)				
Total	**73(100.0)**	**147(100.0)**	**6.16**	**1**	**0.026**	**S**
Parents living together						
Living together	66(90.4)	46(31.3)				
Not living together	7(9.6)	101(68.7)				
Total	**73(100.0)**	**147(100.0)**	**8.02**	**1**	**0.01**	**S**

Remark: S=Significant; NS=Not significant

state. However, it is disappointing that this belief didn't translate into action on adherence despite the documented evidence of benefits of adhering to the use of ITNs as preventive device against malaria which have been proven by various researchers.[22,23]

This study has shown that the source of ITNs significantly influenced adherence to its use. Adherence to ITNs use was significantly higher among those who bought the ITNs through commercial and social marketing compared to those who obtained it free of charge through the current distribution of free ITNs by the Federal government of Nigeria under its roll back malaria initiative. This has demonstrated that the commercial and social cost of ITNs did drive its adherence and even receiving free ITNs didn't guarantee adherence. Despite escalation in the commercial and social marketing of ITNs in recent times and its current free distribution, there is an expectedly corresponding increase in adherence to its use for the most vulnerable group at risk of malaria disease. The finding in this study is therefore a clarion call to review the current strategies used in the distribution of free ITNs in order to target families that needed it most and those that believed in its benefits in reducing morbidity and mortality from malaria disease among under-five children.

The adherence to the use of ITNs in this study was observed to increase with increasing age of the mothers and was found statistically significant. This probably could be attributed to the increasing contacts of the older mothers with the antenatal and infant welfare clinics where health talks such as adherence to the use of ITNs are usually given at the health facilities in the state. The older mothers by virtue of their parity and increased family size could have had frequent antenatal and infant welfare clinic visits more than the younger ones.

Adherence to ITNs use in this study was significantly influenced by maternal occupation. The highest adherence among housewives compared to other maternal occupational group could be due to the observation that housewives by virtue of not being preoccupied by any employment or trade were more likely to have time to attend antenatal and infant welfare clinics frequently. Mothers who were involved in one form of occupation or the other spend several hours working outside the home in such occupation as peasant farming or petty trading in order to contribute to the family income in addition to caring for the children. In such families where the mothers are housewives, the fathers maintain the traditional role as the primary breadwinners while the mothers are the primary home managers.

The size of the family significantly influenced adherence to the use of ITNs. This finding is similar to the report that small rather than large family size encourages the adherence to the use of ITNs.[16] A small family size facilitates good family support on health promotion practices such as the use of ITNs and causes minimal rate of family stress and distress as well as fewer family disruptions that militate against adherence to the use of ITNs. This is probably a function of family communication between husband and wife on ITNs. In addition, small family size is generally seen as a proximal indicator of family unity and harmony in which case the health promotional needs of the under-five children are guaranteed.

The finding of most significantly higher adherence among spouses that live together has buttressed the fact that living together of both parents has a great impact on the success of health promotion practices such as adherence to the use of ITNs. It does appear that couples living together were able to influence themselves on adherence to ITNs use in order to promote the under-five child health positively. More importantly, functional family discussion especially that between mother and father is critically important in adherence to key family practices such as the use of ITNs. In addition, living together of spouse is believed to play a significant role in shaping the families belief, attitude and health promotion choices and practices that will impact positively and potentially improve adherence. The spousal discussion on health issues such as malaria prevention, gives more opportunity for deliberations on the content of health talks which the mothers received regularly at the antenatal and infant welfare clinics. The fathers are more likely to accept the use of ITNs, participate and be involved in its use after discussion leading to the decision favouring adherence to its use. Living together of spouse could go a long way in addressing the problem of adherence. Antenatal and infant welfare clinics may need to be structured to provide relevant and adequate information on adherence to ITNs use. The involvement of fathers as part of this health talk in antenatal and infant welfare clinics could be an effective family oriented strategy to improve on adherence on ITNs use.

The most significant predictor of adherence to ITNs was living together of both parents. This association could be explained by the influence of spousal discussion and concurrence on ITNs use leading to positive attitude towards its use and adherence for their children's wellness and health promotion. Furthermore, parents living together are more likely to be functional families[24], supporting each other to ensure regular and consistent use of ITNs for the under-five children. In addition, families living together are more likely to adhere to health message and information after discussion. More so, it seems that living together of husband and wife promotes family psychological wellbeing to overcome the problem of forgetting to put up the net regularly and husbands are eager on health

promotion issues that improve the wellness and lives of their children.

This study observed that the most common reason proffered by non-adhering mothers was forgetfulness. This reason is at disparity with the commonest reason for non-adherence to ITNs reported in Egbema, Rivers state (hot night time temperature)[13] and northern Ghana (no mosquito).[20] In Southern Ghana, non-adherence was linked to the traditional belief that malaria was caused by multiple factors many of which were difficult to prevent.[25] Similar traditional beliefs were also reported in Northern Ghana[20] and Western Kenya.[21] Forgetfulness is parent-related factor of non-adherence and could be attributed to the family bio-psychosocial demands. However, non-adherence to the use of ITNs for the high risk under-five children is costly in terms of morbidity and mortality from malaria disease especially in rural Nigeria.[22,26]

STUDY IMPLICATIONS

This study has significant implications for key family and health promotion practices such as adherence to the use of ITNs aimed at reducing the incidence of malaria among the under-five children. It is only by taking cognizance of the family variables driving adherence to the use of ITNs that we plan for effective intervention aimed at improving adherence to its use for this special group of children. The findings of this study probably will provide useful and interesting clues to the promotion of family variables favouring adherence to ITNs use for the under-five children especially in an environment such as rural communities where families complain of strains and stresses for good family health. In addition, this study may provide useful and interesting clues to the interacting family variables militating against adherence to the use of ITNs in the study area. This study was therefore necessitated by the need to obtain information on adherence to the use of ITNs from families of under-five children for comparative and promotional purposes. This will guide institutional and diverse authorities in designing relevant and appropriate family-oriented ITNs messages to promote its adherence.

STUDY LIMITATIONS The limitations of this study are recognized by the authors. First and foremost, the sample for the study was drawn from hospital attendees in the community. Hence, the findings of this study may not be general conclusions regarding the influence of family biosocial variables on adherence to the use of ITNs for the under-five children with malaria disease in the study area. Generalization of the results of this study to the entire community and its environs should be done with caution. Secondly, the study was based on interview method and may be prone to information bias on ITNs use by the respondents since some respondents couldn't clinically and socially give acceptable and true responses in questions related to health practices. However, their effects were minimized by structuring the questions as well as assuring the respondents of confidentiality prior to the conduct of the interview. Furthermore, the questionnaire was pre-tested for clarity and acceptability internally and in a similar rural mission general hospital in another local government area in Imo state.

CONCLUSIONS

This study has shown that the adherence to the use of ITNs was low however the family belief in the benefits of ITNs was high. The family biosocial variables significantly associated with adherence were older maternal age of =30 years, maternal occupation (house wives), family size =4 and spouse living together. The most significant predictor of adherence was living together of spouse. Others included the source of ITNs. The commonest reason for non-adherence was forgetfulness. Measures targeted at these family biosocial variables are recommended in order to improve and establish a culture of adherence. There is also the need to create enabling family environment amidst current distribution of free ITNs that recognized malaria as a serious family health problem focusing strongly on family health information, education and communication on adherence to ITNs use.

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REFERENCE

1. Iloh GUP, Amadi AN, Nwankwo BO, Ugwu VC. Common under-five morbidity in South-Eastern Nigeria: a study of its pattern in a rural Mission General Hospital in Imo state. Niger J Med 2011; 20(1): 99-104.
2. Webster J. Malaria in complex emergencies. Afr Health 2000; 22(6):29-31.
3. Gallop JL, Sachs JD. The economic burden of malaria. Am J Trop Med Hyg 2001; 64: 85-96.
4. FMOH. National Antimalaria Treatment Policy: National Malaria and Vector Control Division, Abuja, Nigeria.FMOH 2005.
5. WHO. Roll Back Malaria-Africa Summit, Abuja, Nigeria. WHO News Letter 2000: 15(2); 1-22.
6. Yameh G. African Heads of States promise action against malaria. BMJ 2000; 329:1228.
7. Lengeler C. Insecticide treated nets for malaria control: real gains. Bulletin of the WHO, 2004; 82(2).
8. Jones C. Overcoming barriers to the use of insecticide treated nets. Afr Health 2000; 22(6): 18-20.
9. WHO. Scaling up insecticide treated netting

programme in Africa: a strategic framework for co-ordinate national activity. Geneva. WHO/CDS.RBM.2002.
10. Aikins MK, Pikering H, Alonzo PL. A malaria control trial using ITNs and targeted chemoprophylaxis in the rural area of the Gambia, West Africa perceptions of the causes of malaria and its treatment and prevention in the study area. Trans R Trop Med Hyg 1993; 87: 25-30.
11. Klein RE, Weller SC. Knowledge, beliefs and practices in relation to malaria transmission and vector control in Guatemela. Am J Trop Med Hyg 1995; 52: 583-588.
12. Sebanjo IO, Adeodu OO, Ogunlesi TA, Anyabolu CH, Okunsanya AA. The use of antimalaria drugs and insecticide treated nets in Ile-Ife, Nigeria. Niger J Med 2006; 15(3): 277-280.
13. Ordinioha B. The use of insecticide treated bed nets in a semi-urban community in south-south Nigeria. Niger J Med 2007; 16(3): 223-226.
14. Onwujekwe OE, Akpala CO, Ghasi S, Shu EN, Okonkwo PO. How do rural households perceive and prioritize malaria and mosquito nets? A case study in 5 communities in Nigeria. Public Health 2000; 114: 407-410.
15. Hawley WA, Terkuile FO, Steketee RS. Implications of the Western Kenya permethrin-treated bed net study for policy, program implementation and future research. Am J Trop Med Hyg 2003; 68(suppl 4): 168-173.
16. Aliali JA. Hawley WA, Kolczak MS, Terkiule FO, Giming JE, Vaule JM et al. Factors affecting the use of permethrin treated bed nets during a randomized control trial in Western Kenya. Am J Trop Med Hyg 2003; 68(suppl4): 137-141.
17. Hsu J. Adherence. John Hopkins point of care information technology 2005; 24:4-6.
18. Araoye MO. Sample size determination. Research Methodology with Statistics for Health and Social Sciences, Ilorin, Nathadex Publishers, 2004; p115-121.
19. Omoigberale AI, Airauhi LU. Aspects of the epidemiology of intestinal parasitoses in children: knowledge, practices and perceptions of mothers. Niger J Clin Pract 2006; 9(2): 109-113.
20. Binka FN, Adongo P. Acceptability and use of insecticide treated bed nets in a Ghana. Trop Med Int Health 1997; 2: 499-507.
21. Alali JA, Van de Borne HW, Kachur SP et al . Community reactions to the introduction of permethrin-treated bed nets for malaria control during a randomized controlled trial in Western Kenya. Am J Trop Med Hyg 2003; 64(suppl 4): 128-136.
22. Nwankwo BO, Okafor JO. Effectiveness of insecticide treated bed nets in malaria prevention among children aged 6 months to 5 years in a rural community in Imo state, Nigeria. International Journal of Tropical Medicine 2009; 4(1): 41-49.
23. Holtz TH, Marum LH, Mkandala C, Chizani N, Roberts JM, Macheso A et al. Insecticide treated bed net use, anaemia and malaria parasitaemia in Blantyre district, Malawi. Trop Med Int Health 2002; 7: 220-230.
24. Inem AV, Ayankogbe OO, Obazee M, Ladipo MM, Udonwa NE, Odusote K. Conceptual and contextual paradigm of the family as a unit of care. Nig Med Pract 2004; 45 (1-2): 9-13.
25. Ahorlu CK, Dunyo SK, Afari EA, Koram KA, Nkrumah FK. Malaria-related beliefs and behaviour in southern Ghana: Implications for treatment, prevention and control. Trop Med Int Health 1997; 2(5): 488-499.
26. Rasheed S, Johnson H, Dongier P, Moreau R, Lee C, Lambert C. Economic impact of febrile morbidity and use of permethrin-impregnated bed nets in a malarious area: study of demographics, morbidity and household expenditures associated with febrile morbidity in the Republic of Benin. Am J Trop Med Hyg 2000; 62(2): 173-180.