Knowledge of malaria prevention among pregnant women and female caregivers of under-five children in rural southwest Nigeria

Ayodeji M. Adebayo, Oluwaseun O. Akinyemi, Eniola O. Cadmus

Introduction: The morbidity and mortality from malaria is still unacceptably high in the developing countries, especially among the vulnerable groups like pregnant women and under-five children, despite all control efforts. The knowledge about the preventive measures of malaria is an important preceding factor for the acceptance and use of malaria preventive measures like Insecticide Treated Nets (ITN) by community members. Therefore, this study assessed the knowledge of malaria prevention among caregivers of under-five children and pregnant women in a rural community in Southwest Nigeria. Methodology: This is part of a larger malaria prevention study in rural Southwest Nigeria. A descriptive cross-sectional survey was conducted among pregnant women and caregivers of under-five children in Igbo-Ora, a rural town in Southwest Nigeria using a semi-structured, interviewer-administered questionnaire. Information was obtained on knowledge of malaria prevention and overall composite scores were computed for knowledge of malaria prevention and ITN use. Data were analyzed using SPSS version 16. Associations between variables were tested using Chi-square with the level of statistical significance set at 5%. Results: Of the 631 respondents, 84.9% were caregivers of under-five children and 67.7% were married. Mean age was 27.7±6.3 years with 53.4% aged between 20 and 29 years. Majority (91.1%) had at least primary school education and 60.2% were traders. Overall, 57.7% had poor knowledge of malaria prevention. A good proportion (83.5%) were aware of the use of ITN for malaria prevention while 30.6% had poor knowledge of its use. Respondents who were younger (<30 years), had at least primary education and earn <10,000/ per month had significantly poor knowledge of ITN use in malaria prevention. Majority (60.0%) respondents had poor attitude regarding use of ITNs. Conclusion: This study showed that the knowledge of malaria prevention is still low among under-five caregivers and pregnant women in rural Southwest Nigeria despite current control measures. There is need for concerted health education intervention to improve the knowledge of rural dwellers regarding malaria prevention including the use of ITN. This will go a long way to improve the reported low level of ownership and utilization of ITN in the rural areas.

2 **Knowledge of Malaria Prevention among Pregnant Women and Female Caregivers of Under-**
3 **Five Children in Rural Southwest Nigeria**

7 **Keywords:** Malaria prevention, Under-five caregivers, Pregnant women, Insecticide treated net,
8 Rural dwellers, Nigeria

12 **Ayodeji M. Adebayo[1], Oluwaseun O. Akinyemi[2]* and Eniola O. Cadmus[1]**

13 [1]*Department of Preventive Medicine and Primary Care, College of Medicine, University of Ibadan,*

14 *Ibadan, Nigeria*

15 [2] *Department of Health Policy and Management, College of Medicine, University of Ibadan, Ibadan,*

16 *Nigeria*

18 **Original Article**

20 *Corresponding author: Dr. Oluwaseun O. Akinyemi

21 Address: Department of Health Policy and Management, Faculty of Public Health, College of

22 Medicine, University of Ibadan, Ibadan, Nigeria

23 seunakinyemi@hotmail.com

24 +234 803 502 0136

Introduction

Malaria is a completely preventable disease; however, about 3.4 billion people are at risk of the disease globally with 1.2 billion people at high risk (World Health Organization 2013). In 2012, malaria was responsible for the death of approximately 482,000 under-five children even though an estimated 136 million Insecticide Treated Nets (ITNs) were distributed to endemic countries the same year (World Health Organization 2013). Thus, malaria is still a major public health concern particularly in sub-Saharan Africa and other parts of the developing world (Pluess et al. 2009; Pluess et al. 2010). In Nigeria, malaria is responsible for around 60% of the out-patient visits to health facilities, 30% of childhood death, 25% of death in children under one year and 11% of maternal deaths (National Population Commission 2008; Noland et al. 2014). Similarly, about 70% of pregnant women suffer from malaria; contributing to maternal anemia, low birth weight, still births, abortions and other pregnancy-related complications (Federal Ministry of Health Abuja 2005). The financial loss due to malaria is estimated to be about 132 billion Naira ($797 million) annually in form of treatment costs, prevention costs, loss of man-hours (Noland et al. 2014; World Health Organization 2012).

Malaria, a debilitating febrile and life threatening illness, is caused by a parasite called Plasmodium. Its route of transmission still remains bites from infected female anopheles mosquitoes. Environmental factors and behavioral patterns of vectors and human populations combine to provide favorable conditions for malaria transmission (Boutin et al. 2005). Proven effective options to reduce morbidity and mortality include early diagnosis, combined with prompt effective therapy and malaria prevention through reduction of human-vector contact, especially with the use of ITNs (World Health Organization 2007). Perceptions about malaria illness, particularly households' perceived susceptibility and beliefs about the seriousness of the disease are important preceding factors for decision-making concerning preventive and curative actions (Rakhshani et al. 2003). The understanding of the possible causes, modes of transmission, and individuals' preference and decision about adoption of preventive and control measures vary from community to community and among individual households (Adongo et al. 2005). There have been a considerable number of reports about knowledge, attitudes, and practices relating to malaria and its control from different parts of Africa. These reports concluded that misconceptions concerning malaria still exist and that practices for the control of malaria have been unsatisfactory (Ahorlu et al. 1997; Alaii et al. 2003; Laver et al. 2001; Obol et al. 2011).

Achieving sustainable control of the disease depend on extensive public health promotional programs which focus on current and proven methods of malaria prevention and management. While much is

57 known about vector biology and behaviour and the malaria parasites, the importance of human behaviour
58 in malaria transmission has not been critically evaluated. Studies focusing on the current practices of
59 malaria prevention and treatment options in the population are sparse. Thus, it is expedient to evaluate
60 current knowledge of malaria prevention practices and management options as well as the uptake of the
61 management options. In most high-burden countries (including Nigeria), ITN coverage is still below
62 agreed targets (Minja & Obrist 2005). This may be related to the perception of its use among the
63 community members. The knowledge about the preventive measures of malaria is an important
64 preceding factor for the acceptance and use of ITN for malaria control by the community members (Minja
65 et al. 2001). Therefore, this study assessed the knowledge of malaria prevention with emphasis on
66 knowledge of ITN use among pregnant women and caregivers of under-five children in Igbo-Ora.

67 Igbo-Ora is a rural community in Ibarapa Central Local Government Area (LGA) of Oyo State,
68 Southwest Nigeria. The main towns in the LGA are Igboora and Idere. Igboora is the larger town with a
69 population of 60,000 people. The LGA has ten political wards with seven located in Igboora, the study
70 site. Igbo-Ora is located about 128km from Lagos - the Nigerian economic capital. The predominant
71 language in the study area is Yoruba. However, migrant farm labourers from the republic of Benin, Togo
72 and Ghana reside in the LGA. There are some nomadic Fulanis who live in settlements around the town.

73 Igbo-Ora is further divided into six census areas comprised of 62 enumeration areas, each with an average
74 population of 600 people. Furthermore, each enumeration area is divided into compounds and each
75 compound has about 100 women in the reproductive age group.

Methodology

The study population is made up of pregnant women in their reproductive age (15-49 years) and female caregivers of under-five children, who have lived in the community for at least one year. For the purpose of this study, caregivers may include mothers and female guardians of under-five children.

A community-based descriptive cross-sectional survey was carried out using a multistage cluster sampling technique. Three enumeration areas were selected by simple random sampling through balloting from each of the six census areas. Subsequently, two compounds were selected from each of these enumeration areas by balloting. A minimum sample size of 126 was estimated using Leslie and Kish formula for approximating sample size for cross sectional study. This was multiplied by a factor of two to adjust for clustering effect. A total of 631 eligible and consenting caregivers of under-five children and pregnant women in the households within the selected compounds were then interviewed. All the people who were approached consented to participate in the study.

A pre-tested semi-structured interviewer-administered questionnaire was used to collect information on the socio-demographic characteristics of respondents, knowledge of malaria prevention and knowledge of ITN use; and perception of ITN use in malaria prevention. Knowledge about malaria prevention and ITN use were assessed through a six-point score each. A point was given to each correct answer 0 to wrong answer. The mean knowledge score was used to dichotomize knowledge scores. Knowledge about malaria prevention was categorized into "good" (4-6) and "poor" (0-3) while scores of 0-4 were deemed poor and 5-6 were considered good for knowledge of ITN use for malaria prevention. The questionnaire was translated to Yoruba in order to enable proper understanding by respondents and back-translated to English to ensure that the original meaning was retained. Questionnaire administration was done by four trained research assistants whose minimum educational qualification was National Certificate in Education (NCE) or Ordinary National Diploma (OND) and were fluent in speaking the local dialect. The questionnaire was pre-tested in Idere, the second main town in Ibarapa Central LGA.

Data were analyzed using the Statistical Package for Social Sciences (SPSS version 16). Associations between variables were tested using Chi-square with the level of statistical significance set at 5%. The raw data for this study may be accessed through:

https://docs.google.com/a/cartafrica.org/file/d/0B62N6G90gxJZNzdIT05NQ2w1QWs/edit .

105 The Oyo State Ethical Review Committee, Ministry of Health, Ibadan gave ethical clearance and

106 approval for this study (reference number: AD 13/479/76). Informed verbal consent was also gotten from

107 individual research participant before data collection. The respondents were also reminded of their right

108 to decline to take part in the study as well as to withdraw any time during the interview. Confidentiality

109 was assured and maintained throughout the study. The importance of the study was explained to

110 participants as well as how their participation in the study will contribute towards malaria prevention

111 programing in Nigeria.

112 **Results**

113 Figure 1 shows the distribution of respondents. A total of 631 respondents were interviewed, out of whom

114 536 (84.9%) were caregivers of under-five children. The socio-demographic characteristics of

115 respondents are shown in Table 1. The mean age of respondents was 27.7±6.3 years with about 53%

116 aged between 20 and 29 years. More than 90% have at least primary education while trading (60.2%)

117 was the most common occupation among respondents. About 70% were married and living with their

118 spouses. A greater proportion, (71.9%) of respondents were either in or from a monogamous relationship.

119 About 60% of respondents have 2 children or less while almost all (97.5%) have 2 or less under-five

120 children. About 97% were from the Yoruba ethnic affiliation and more than half, (57.6%) were Muslims.

121 Most respondents, 64.7% earned less than ₦10, 000 ($59.4) monthly. Only 8.4% earned ₦30,000

122 ($178.2) and above. The median average income was ₦5000 ($29.7); range: ₦1000 – ₦150,000.

123 Table 2 revealed that less than half of respondents (42.3%) had good knowledge of malaria prevention.

124 Table 3 shows respondents' knowledge regarding methods of malaria prevention. About 85%, 82%, and

125 75% knew that malaria could be prevented through keeping the environment clean, clearing of bushes

126 around houses and use of ITN respectively. However, approximately 77% and 82% of respondents felt

127 taking native concoction and using malaria prophylaxis respectively could prevent occurrence of malaria

128 infection.

129 Nearly 84% of participants had heard of ITN while almost 70% had good knowledge of the use of ITN

130 in malaria prevention (Table 4). Regarding the use of ITN in malaria prevention, about 80% knew that

131 ITN is useful in malaria prevention and over three-quarters understood that it could kill mosquito (Table

132 5).

133 Table 6 shows attitude of under-five caregivers and pregnant women regarding ITN and its use. Roughly

134 63% of respondents did not agree that window/door nets was better or the same as ITN. Similarly, 61%

135 of participants disagreed with the statement that "ITN does not make any difference in malaria
136 prevention". Well over half of participants (56.1%) agreed that "either one uses mosquito net or not,
137 those that will be infected with malaria will definitely have it". Majority were indifferent as to whether
138 ITN causing irritation, heat rash, cough, vomiting in pregnancy, miscarriage, mortality in children and
139 bad odor.

140 Table 7 demonstrated that mothers and under-five caregivers with higher educational status, who were
141 civil servants, with higher income, and married had good knowledge of malaria prevention (p<0.05).
142 Similarly respondents who earned high income and were married had significantly better knowledge of
143 ITN use (Table 8).
144

145 **Discussion**
146 This study was conducted to assess knowledge of malaria prevention with emphasis on ITN use among
147 female caregivers of under-five children and pregnant women in Igbo-Ora, a rural community in
148 Southwest Nigeria. The overall knowledge of malaria prevention practices among majority of the
149 respondents was found to be poor. This finding agrees with the submissions of Fawole and Onyeaso
150 (2008) who showed that even among health workers in Ibadan, Southwest Nigeria, knowledge of malaria
151 preventive strategies was poor. However, this finding is at variance with the conclusions of Adegun et
152 al (2011) and Oyewole & Ibidapo (2007) who showed that the general knowledge about malaria
153 prevention among urban residents in Southwest Nigeria was good. The knowledge picture seen among
154 respondents in this study could be as a result of lack of exposure to health education messages regarding
155 malaria prevention, being rural dwellers, or respondents' poor health seeking behavior. For those who
156 had exposure to health messages in health facilities, some might find it difficult to understand malaria
157 prevention information given during antenatal and postnatal clinics. This might be due partly to
158 inappropriate means of communication and delivery of these messages by the health workers in addition
159 to the respondents' low level of education. Respondents' level of education was found to be significantly
160 associated with knowledge of malaria prevention. Therefore, achieving malaria prevention, just like any
161 other health message, depend on the level of education of respondents among other reasons.

162 Furthermore, relatively high proportions of the respondents in our study knew that use of antimalarial
163 prophylaxis in pregnancy, clearing of bushes around the house and keeping the environment clean were
164 part of malaria prevention strategies. The knowledge of the importance of prophylaxis for malaria

165 prevention may be a function of the fact that they had benefited from intermittent preventive treatment
166 (IPT) during index or previous pregnancies during which they might have had health education on the
167 issue. However, other studies from Nigeria (Falade et al. 2006; Okeke et al. 2006) and Tanzania (Comoro
168 et al. 2003) have documented that gaps still exist in the knowledge of causation and treatment of malaria
169 in rural areas and that these gaps have serious public health implications.

170 Most of these rural respondents still exhibited some myths and misconceptions about malaria prevention.
171 Drinking of native concoction and use of antibiotics for malaria treatment were some of the erroneous
172 believes reported. The finding on the use native concoction by pregnant women in Nigeria is
173 corroborated by Fakeye and colleagues (2009) who advised that questions on herbal drug use should be
174 routinely asked by health workers during antenatal care to forestall dangerous drug interactions. Herbal
175 preparations, though not medically recommended for the treatment of diseases like malaria is an innate
176 traditional practice which is considered normal by people because of a deep cultural attachment.
177 Inadequate information from health workers and respondents' low level of education could also
178 contribute to the misconceptions of malaria treatment. Continuous efforts at providing necessary
179 information by relevant health organizations are needed to control and prevent incidence of malaria in
180 the general public.

181 More than two-thirds of the respondents had good knowledge of ITN use for malaria prevention. Awosan
182 et al (2013), in a study to determine the prevalence and barriers to the use of insecticide treated nets among
183 pregnant women attending ante-natal clinic in a Specialist Hospital at Sokoto, reported similar finding.
184 However, in a hospital-based study about awareness of ITN use in Abeokuta, Southwest Nigeria,
185 Runsewe-Abiodun et al (2012) reported low awareness and linked this to the low utilization among the
186 pregnant women interviewed. The current ongoing aggressive public health campaign which involves
187 mass distribution of ITNs at PHC centers could account for the high awareness noted in this study.
188 However, some respondents had poor attitudes and misconceptions about the use of ITNs. Respondents'
189 attitudes may have a strong implication on ownership and utilization of ITNs (Onwujekwe et al. 2005).

190 **Conclusion and recommendations**

191 Despite concerted efforts at malaria control nationwide, knowledge of malaria prevention was below
192 average among rural caregivers of under-five children and pregnant women in the study area. Myths and
193 misconceptions about malaria prevention is still prevalent. There is a need for a concerted health
194 education intervention to improve the knowledge of rural dwellers regarding malaria prevention

195   especially with the use of Insecticide Treated Net. Continuous efforts at providing necessary information
196   by relevant health organizations are needed to control and reduce incidence of malaria in the general
197   public.

199 **References**

200 Adegun JA, Adegboyega JA, and Awosusi AO. 2011. Knowledge and the preventive strategies of
201 Malaria among Migrant Farmers in Ado-Ekiti Local Government Area of Ekiti State, Nigeria.
202 *American Journal of Scientific and Industrial Research, Science Hub.*

203 Adongo PB, Kirkwood B, and Kendall C. 2005. How local community knowledge about malaria
204 affects insecticide-treated net use in northern Ghana. *Tropical Medicine & International*
205 *Health* 10:366-378.

206 Ahorlu CK, Dunyo SK, Afari EA, Koram KA, and Nkrumah FK. 1997. Malaria-related beliefs and
207 behaviour in Southern Ghana: Implications for treatment, prevention and control. *Tropical Medicine &*
208 *International Health* 2:488-499.

209 Alaii JA, Van den Borne H, Kachur SP, Shelley K, Mwenesi H, Vulule JM, Hawley WA, Nahlen
210 BL, and Phillips-Howard PA. 2003. Community reactions to the introduction of permethrin-
211 treated bed nets for malaria control during a randomized controlled trial in western Kenya. *The*
212 *American journal of tropical medicine and hygiene* 68:128-136.

213 Awosan KJ, Ibrahim MTO, Alayande MO, Isah BA, Yunusa E, and Mahmud MB. 2013. Prevalence
214 and barriers to the use of insecticide treated nets among pregnant women attending ante-natal clinic at
215 Specialist Hospital Sokoto, Nigeria. *Journal of Public Health* 5:416-420.

216 Boutin J-P, Pradines B, Legros F, Rogier C, and Migliani R. 2005. *Epidemiology of malaria. La Revue*
217 *du praticien* 55:833-840.

218 Comoro C, Nsimba S, Warsame M, and Tomson G. 2003. Local understanding, perceptions and
219 reported practices of mothers/guardians and health workers on childhood malaria in a
220 Tanzanian district—implications for malaria control. *Acta tropica* 87:305-313.

221 Fakeye TO, Adisa R, and Musa IE. 2009. Attitude and use of herbal medicines among pregnant
222 women in Nigeria. *BMC Complementary and Alternative Medicine* 9:53.

223 Falade CO, Ogundiran MO, Bolaji MO, Ajayi IO, Akinboye DO, Oladepo O, Adeniyi JD, and
224 Oduola AM. 2006. The influence of cultural perception of causation, complications, and
225 severity of childhood malaria on determinants of treatment and preventive pathways.
226 *International quarterly of community health education* 24:347-363.

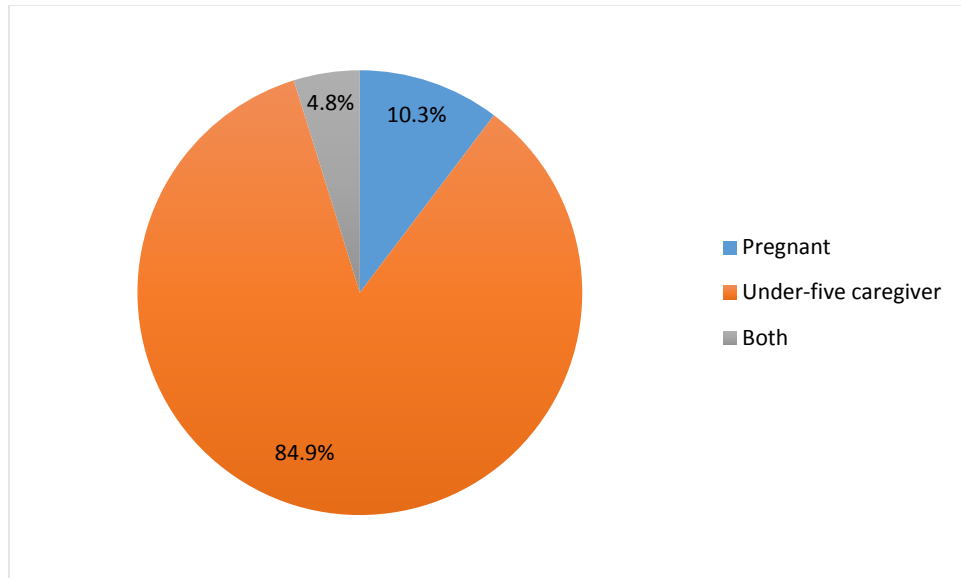
227 Fawole AO, and Onyeaso NC. 2008. Perception and practice of malaria prophylaxis in pregnancy
228 among primary health care providers in Ibadan, Nigeria. *West African journal of medicine* 27:92-
229 96.

230 Federal Ministry of Health Abuja. 2005. National Malaria Control Programme annual report.
231 Abuja: Federal Ministry of Health, Nigeria.

232 Laver SM, Wetzels J, and Behrens RH. 2001. Knowledge of malaria, risk perception, and
233 compliance with prophylaxis and personal and environmental preventive measures in
234 travelers exiting Zimbabwe from Harare and Victoria Falls International airport. *Journal of*
235 *travel medicine* 8:298-303.

236 Minja H, and Obrist B. 2005. Integrating local and biomedical knowledge and communication:
237 experiences from KINET project in southern Tanzania. *Human Organization* 64:157-165.

238 Minja H, Schellenberg JA, Mukasa O, Nathan R, Abdulla S, Mponda H, Tanner M, Lengeler C, and
239 Obrist B. 2001. Introducing insecticide-treated nets in the Kilombero Valley, Tanzania: the
240 relevance of local knowledge and practice for an Information, Education and Communication (IEC)
241 campaign. *Tropical Medicine & International Health* 6:614-623.
242 National Population Commission. 2008. Nigeria demographic and health survey 2008. Nigeria and
243 ICF Macro.
244 Noland GS, Graves PM, Sallau A, Eigege A, Emukah E, Patterson AE, Ajiji J, Okorofor I, Oji OU,
245 and Umar M. 2014. Malaria prevalence, anemia and baseline intervention coverage prior to mass
246 net distributions in Abia and Plateau States, Nigeria. *BMC infectious diseases* 14:168.
247 Obol J, David Lagoro K, and Christopher Garimoi O. 2011. Knowledge and Misconceptions about
248 Malaria among Pregnant Women in a Post-Conflict Internally Displaced Persons' Camps in Gulu
249 District, Northern Uganda. *Malaria research and treatment* 2011.
250 Okeke TA, Uzochukwu BS, and Okafor HU. 2006. An in-depth study of patent medicine sellers'
251 perspectives on malaria in a rural Nigerian community. *Malaria Journal* 5:97.
252 Onwujekwe O, Uzochukwu B, Ezumah N, and Shu E. 2005. Increasing coverage of insecticide-
253 treated nets in rural Nigeria: implications of consumer knowledge, preferences and
254 expenditures for malaria prevention. *Malaria Journal* 4:29.
255 Oyewole IO, and Ibidapo AC. 2007. Attitudes to malaria, prevention, treatment and management
256 strategies associated with the prevalence of malaria in a Nigerian urban center. *African
257 Journal of Biotechnology* 6:2424-2427.
258 Pluess B, Mueller I, Levi D, King G, Smith TA, and Lengeler C. 2009. Malaria–a major health
259 problem within an oil palm plantation around Popondetta, Papua New Guinea. *Malar J* 8:56.
260 Pluess B, Tanser FC, Lengeler C, and Sharp BL. 2010. Indoor residual spraying for preventing
261 malaria. *Cochrane Database Syst Rev* 4.
262 Rakhshani F, Ansari MA, Alemi R, and Moradi A. 2003. Knowledge, perceptions and prevention of
263 malaria among women in Sistan va Baluchestan, Islamic Republic of Iran. *Eastern Mediterranean
264 health journal* 9:248-256.
265 Runsewe–Abiodun T, Iyabo IA, and Christy SA. 2012. Awareness and knowledge about Insecticide
266 Treated Nets (ITNs) amongst pregnant mothers in Ogun State, Western– Nigeria: a descriptive cross
267 sectional study. *Edu Res J* 2:138-145.
268 World Health Organization. 2007. Insecticide-treated mosquito nets: a WHO position statement.
269 Geneva: WHO.
270 World Health Organization. 2012. Progress & Impact Series: Focus on Nigeria.
271 World Health Organization. 2013. Factsheet on the World Malaria Report 2013. Available at
272 http://www.who.int/malaria/media/world_malaria_report_2013/en/ (accessed 9 November
273 2014).

Distribution of respondents

Socio-demographic characteristics of the respondents

2 **Tables**

3 **Table 1: Socio-demographic characteristics of the respondents (N = 631)**

Socio-demographic characteristics	Frequency	Percent
Age group		
<20	36	5.7
20-29	337	53.4
30-39	230	36.5
≥40	28	4.4
Level of education		
No formal education	56	8.9
Primary	206	32.6
Secondary	275	43.6
Tertiary	94	14.9
Occupation		
Trading	380	60.2
Civil servant	78	12.4
Farming	15	2.4
Unemployed	158	25
Income (₦)		
<1,000	408	64.7
10,000 – 19,000	107	17.0
20,000 – 29,000	63	10.0
≥30,000	53	8.4
Marital status		
Single	30	4.8
Co-habiting	85	13.5
Married, living together	440	69.7
Married, living alone	67	10.6
Separated	8	1.3
Divorced	1	0.2
Family Type		
Monogamous	454	71.9
Polygamous	177	28.1
Total number of children		
0-2	380	60.2
3-4	228	36.1
≥5	23	3.7
Number of U-5 children		
0-2	615	97.5
3-4	16	2.5
Ethnic group		
Yoruba	611	96.8
Igbo	7	1.1
Hausa	5	0.8
Others	8	1.3
Religion		
Christianity	268	42.5
Islam	363	57.6

Respondents' knowledge score of malaria prevention

2 **Table 2: Respondents' knowledge score of malaria prevention**

Knowledge score (0–6)	Frequency	Percentage
Good (4-6)	269	42.3
Poor (0-3)	364	57.7

3 **Mean = 3.4±1.2**

Respondents' distribution of knowledge about methods of malaria prevention

2 **Table 3: Respondents' distribution of knowledge about methods of malaria prevention***

Methods of malaria prevention	Yes (%)	No (%)
Drinking native concoction	485 (76.9)	146 (23.1)
Keeping our environment clean	534 (84.6)	97 (15.4)
Clearing of bushes around the house	516 (81.8)	115 (18.2)
Use of antibiotics	300 (47.5)	331 (52.5)
Use of ITN	473 (75.0)	158 (25.0)
Use of antimalarial prophylaxis	519 (82.3)	112 (17.7)

3 ***Multiple response**

Respondents' awareness of ITN and knowledge score of ITN use in malaria prevention

2 **Table 4: Respondents' awareness of ITN and knowledge score of ITN use in malaria prevention**

Awareness	Number	Percent
Yes	527	83.5
No	104	16.5
Knowledge score of ITN use in malaria (0-6)		
Good (5-6)	438	69.4
Poor (0-4)	193	30.6
Total	631	100.0

3 **Mean knowledge score = 4.4±1.7**

Respondents' distribution of knowledge about the use of ITN in malaria prevention

2 **Table 5: Respondents' distribution of knowledge about the use of ITN in malaria prevention***

Knowledge if ITN use	Yes (%)	No (%)
Keep flies away	409 (64.8)	222 (35.2)
Keep rats away	171 (27.1)	460 (72.9)
Fishing	152 (24.1)	479 (75.9)
Prevents mosquito bite	520 (82.4)	111 (17.6)
Useful in malaria prevention	503 (79.7)	128 (20.3)
Kills mosquitoes	476 (75.4)	155 (24.6)

3 ***Multiple response**

Respondents' attitude towards ITN and its use

2 **Table 6: Respondents' attitude towards ITN and its use**

	Agree (%)	Don't know (%)	Disagree (%)
It is the same as window/door net	97 (15.4)	134 (21.2)	400 (63.4)
It does not make any difference in malaria prevention	103 (16.3)	144 (22.8)	384 (60.9)
ITN smells badly	43 (6.8)	451 (71.5)	137 (21.7)
ITN causes irritation	20 (3.2)	469 (74.3)	142 (22.5)
ITN causes heat rashes	21 (3.3)	466 (73.9)	144 (22.8)
ITN causes cough/illness	10 (1.6)	465 (73.7)	156 (24.7)
ITN causes nightmares/bad dreams	5 (0.8)	459 (72.7)	167 (26.5)
The chemical in ITN can kill children	3 (0.5)	450 (71.4)	178 (28.2)
ITN use in pregnancy can cause miscarriage	2 (0.3)	457 (72.4)	172 (27.3)
ITN can cause vomiting in pregnant women	10 (1.6)	464 (73.5)	157 (24.9)
ITN cannot kill mosquitoes	26 (4.1)	338 (53.6)	267 (42.3)
ITN is not readily available	137 (21.7)	389 (61.6)	105 (16.6)
ITN is expensive	157 (24.9)	419 (66.4)	55 (8.7)
Window nets/door nets are better	35 (5.5)	212 (33.6)	384 (60.9)
Ordinary net (without insecticide) is better/preferable	40(6.3)	202 (32.0)	389 (61.6)
Either you use mosquito net or not those who will have malaria will still have it	354 (56.1)	121 (19.2)	156 (24.7)

Association between respondent characteristics and knowledge of malaria prevention

2 **Table 7: Association between respondent characteristics and knowledge of malaria prevention**

Variables	Knowledge of Malaria Prevention		Chi square	p-value
	Poor n(%)	Good n(%)		
Level of education				
No formal education	33 (58.9)	23 (41.1)		
Primary	131 (63.6)	75 (36.4)	23.145	<0.001
Secondary	165 (60.0)	110 (40.0)		
Tertiary	33 (35.1)	61 (64.9)		
Occupation				
Trading	232 (61.1)	148 (38.9)		
Artisan	34 (50.7)	33 (49.3)	35.317	<0.001
Civil servant	24 (30.8)	54 (69.2)		
Farming	14 (93.3)	1 (6.7)		
Others	58 (63.7)	33 (36.3)		
Average monthly income				
<10000	249 (61.0)	159 (39.0)		
10000-19999	60 (56.1)	47 (43.9)	10.813	0.013
20000-29999	25 (39.7)	38 (60.3)		
>=30000	28 (52.8)	25 (47.2)		
Marital Status				
Never married	86 (74.8)	29 (25.2)	17.436	<0.001
Ever married	276 (53.5)	240 (46.5)		
Religion				
Christianity	142 (53.0)	126 (47.0)	3.661	0.056
Islam	220 (60.6)	143 (39.4)		
Respondents				
Pregnant	42 (64.6)	23 (35.4)		
Under-5-caregiver	310 (57.8)	226 (42.2)	5.128	0.077
Both	12 (40.0)	18 (60.0)		

Association between respondent characteristics and knowledge of ITN use

2   **Table 8: Association between respondent characteristics and knowledge of ITN use**

Characteristics	Knowledge of utilization of ITN		X^2	p value
	Poor n(%)	Good n(%)		
Level of education				
No formal education	20 (35.7)	36 (64.3)		
Primary	74 (35.9)	132 (64.1)	19.504	<0.001
Secondary	88 (32.0)	187 (68.0)		
Tertiary	11 (11.7)	83 (88.3)		
Occupation				
Trading	128 (33.7)	252 (66.3)		
Artisan	20 (29.9)	47 (70.1)		
Civil servant	10 (12.8)	68 (87.2)	13.627	0.009
Farming	5 (33.3)	10 (66.7)		
Others	30 (33,0)	61 (67.0)		
Income				
<10000	149 (36.5)	259 (63.5)		
10000-19999	27 (25.2)	80 (74.8)	13.452	0.004
20000-29999	9 (14.3)	54 (85.7)		
>=30000	8 (15.1)	45 (84.9)		
Marital Status				
Never married	66 (57.4)	49 (42.6)	47.592	<0.001
Ever married	127 (24.6)	389 (75.4)		
Religion				
Christianity	76 (28.4)	192 (71.6)	1.089	0.169
Islam	117 (32.2)	246 (67.8)		
Respondents				
Pregnant	14 (21.5)	51 (78.5)		
Under-5-caregiver	173 (32.3)	363 (67.7)	4.811	0.090
Both	6 (20.0)	24 (80.0)		