

CrossRef DOI of original article:

1 Assessment of Long Lasting Insecticide Treated Net among
2 Women of Child Bearing Age in a Community in South Eastern
3 Nigeria

4 Valentine Nnachetam Unegbu

5 Received: 1 January 1970 Accepted: 1 January 1970 Published: 1 January 1970

7 **Abstract**

8 Globally, there have been attempts towards improving the coverage of malaria preventive
9 measures with the 2015 goal of the World Health Organization's (WHO's) Roll Back Malaria
10 Partnership centered to reduce global malaria cases by 75

12 *Index terms—*

13 **1 Introduction**

14 According to a publication by center for Disease Control (2014), malaria infection is caused by a protozoan
15 (Plasmodiae). However the report posited that malaria infection occurs when favorable environmental conditions
16 of temperature, rainfall, and humidity are created for the female Anopheles mosquitoes, carrying the Plasmodium,
17 to bite a susceptible host (CDC, 2014). Malaria infection is endemic in Nigeria, with a prevalence of 919 per
18 10,000 of population; it remains one of the leading causes of morbidity and mortality (Ganihu & Jimo, 2013; Oche
19 et al., 2011; Aribodor et al., 2017) It accounts for seven out of ten outpatient visits in Nigerian hospitals as well as
20 being responsible for about 20% and 30% of infant and under-5 mortality rate, respectively (Oche et al., 2011).

21 Following the attempts towards improving the coverage of malaria preventive measures, the 2015 goal of the
22 World Health Organization's (WHO's) Roll Back Malaria Partnership are to reduce global malaria cases by 75%
23 and to reduce malaria deaths to near zero through universal coverage by effective prevention and treatment
24 interventions ??RBM, 2010). Among other preventive interventions, WHO recommends the use of insecticide
25 treated nets (ITNs), particularly Long-Lasting Insecticide Nets, which have been shown to be costeffective, to
26 reduce malaria episodes among children under 5 years of age by approximately 50% and allcause mortality by
27 17%. Universal coverage with ITNs is defined as use by > 80% of individuals in populations at risk (WHO,
28 2019; RBM, 2010). Aribodor et al. (2017) in a report posited that the usage of long lasting insecticide treated
29 nets is largely affected by distribution patterns and also the knowledge of people and their perception about it.
30 Behavioral patterns of people-utilization of the LLITNs are dependent on their socio demographic characteristics
31 on the consequence of nonuse ??Aina and Ganihu & Jimo, 2013). Isah and Nwobodo (2009) reported that despite
32 evidence that the use of LLITNs decreases malaria-related morbidity and mortality, the use of LLITNs in Africa
33 remains relatively low. Estimates suggest that in 2005, only 3% of children under five years of age slept under
34 LLITNs, while up to ten times as many are thought to sleep under any bed net (Baley & Deressa, 2008). This
35 shows that the fact that ITNs are very effective in malaria prevention does not necessarily mean that people will
36 use them after they have received those (Baley & Deressa, 2008). While the evidence based on the effectiveness
37 of LLITNs in reducing malaria transmission has grown rapidly in recent years, utilization rates of LLITNs in
38 most African countries have been very low (Chukwuocha et al., 2010; Ganihu & Jimo, 2013). The renewed Abuja,
39 Nigeria, target for roll back malaria (RBM), a control program for malaria, targeted 80.0% of children <5 years
40 of age and pregnant women to use long lasting insecticide-treated mosquito nets (LLITN) between 2006 and 2010
41 (FMOH, 2015; (Denye et al., 2011).

42 The millennium development goal 6 has a target of halting and beginning to reverse the incidence of malaria
43 in 2015 (Baley & Deressa, 2008). These control programs are aimed at reducing the morbidity and mortality,
44 resulting from malaria infections in at-risk groups particularly at Households. The past decades have witnessed
45 an increase in international funding for malaria control. This increased funding has led to an increase in accessing

8 I) RELIABILITY OF INSTRUMENT

46 LLITNs in Sub-Saharan Africa (Denye et al., 2011). At the end of 2010, approximately 289 million LLITNs were
47 delivered to the Several Households at Sub-Saharan African region; this is enough to take care of 76% of the 765
48 million persons at risk ??Denyeet al., 2011). Insecticide Treated Nets is currently one of the most cost-effective
49 options for reducing malaria-related morbidity and mortality and has been reported to reduce malaria mortality
50 by 17% in children <5 years of age (Runsewe-Abiodun et al.,

51 2 2012).

52 Regrettably, malaria still constitutes a serious public health problem in Nigeria (Aina and Ayeni, 2011;Mbanugo
53 and Okorudo, 2015;Aribodor et al., 2017). Malaria is endemic in the poorest countries in the world, causing 400
54 to 900 million clinical cases and up to 2.7 million deaths each year (Guyatt & Ochola, 2014). More than 90%
55 of malaria deaths occur in Sub-Saharan Africa, resulting in an estimated 3,000 deaths each day. Almost all the
56 deaths are among high-risk groups including women of childbearing age, women during pregnancy, non immune
57 travelers, refugees and other displaced persons, and people of all ages living in Household areas of unstable malaria
58 transmission (Mbanugo & Okorudo, 2015;Iwu et al., 2010: Aina & Ayeni, 2011: Ganihu & Jimoh, 2013). In highly
59 endemic countries, malaria poses a serious danger to women of child bearing age, women in pregnancy and their
60 unborn children (Mbanugo & Okorudo, 2015). Malaria in pregnancy causes maternal anaemia, miscarriage, and
61 low birth weight. In endemic countries, it is the leading cause of maternal mortality and one of the primary
62 causes of neonatal deaths (Mbanugo & Okorudo, 2015).

63 According to some reports in Nigeria, malaria is the leading cause of Maternal Mobility contributing 33% of
64 deaths among women of child bearing age and 25% infant mortality (Oche et al., 2011;Iwu et al., 2010)

65 3 e) Exclusion criteria

66 The study excluded the following; i. Women of child bearing age who refused to give in their consent for the
67 study ii. Women of child bearing age who were lunatic, sick or disabled during the time of data collection.

68 4 f) Sampling i. Sample size Calculation

69 The sample size was determined using the Yamene formula (1967) for sample size determination. $n = N_1 + Ne$
70 Where: n is the desired sample size N is the population size (12,389) = population of women of childbearing
71 age at Nwangele LGA (NPC, 2010). e is margin of error (0.05) Therefore, $n = 392.30362210$ Furthermore, to
72 adjust for a 10% rate of non response and invalid response (i.e 90% expected response rate =0.9). $n = n/\text{expected}$
73 response rate $n = 392/0.90 = 435.5$ $n = 436$

74 5 ii. Sampling Methods

75 A Probability based multi stage sampling method was adopted for the study on the coverage of Long Lasting
76 Insecticide Treated Nets among women of child bearing age in Nwangele LGA.

77 First stage-Selection of Communities: A total of Three (3) Out of the communities in Nwangele LGA was
78 selected by the researcher using simple random sampling via balloting to give every community an equal chance
79 of selection. Second stage-Selection of villages: Three (2) villages each out of the total number of villages in the
80 selected community was selected via simple random sampling using balloting giving every village in the selected
81 community an equal chance of being selected. Third stage-Selection of Streets: A total of Five (5) streets each
82 in the selected Six (6) villages were selected via simple random sampling (balloting) to give every street an equal
83 chance of being selected. Fourth stage: Selection of households: A systematic probability sampling method was
84 used to select each household in the selected streets giving each household an equal chance of selection. Fifth
85 stage: Selection of Respondents: the researcher selected women of child bearing age in each household or any
86 one present at the time of study. Selection of respondents was done via simple random sampling.

87 6 g) Instrument for data collection

88 A semi-structured questionnaire was used as the instrument of data collection for this study on the coverage of
89 Long Lasting Insecticide Treated Nets among women of child bearing age in Nwangele LGA.

90 7 h) Validity of the instrument

91 The validity of the instrument of data collection by the researcher took the following shape; the questionnaire as
92 the instrument of data collection was developed by researcher and submitted to the research supervisor for Face
93 validity and proper scrutiny as well as two experts from department of public health for consensus validity in
94 order to ensure that the questionnaire meets the objectives of study before reliability testing.

95 8 i) Reliability of Instrument

96 The Reliability of the instrument of data collection was determined using test retest method. Copies of the
97 questionnaire were given to some respondents outside the area of study by the researcher. This area shared
98 similar characteristics with Nwangele LGA that was used for this study. Chrombach alpha test was used to test

99 for the reliability of the questionnaire to determine the consistency of the results with a reliability coefficient of
100 0.8 obtained.

101 **9 j) Method of Data Collection**

102 Data was obtained using an interviewer based semi structured questionnaire. This will be done with the aid of
103 Two (2) field assistants who will be Hired and trained to aid the researcher in the data collection process.

104 **10 k) Method of Data Analysis**

105 The Statistical Package for the Social Sciences (SPSS) was used in the analysis of the data gotten from the study.
106 Results will be expressed in percentages, frequencies, tables and charts (Descriptive Statistics). Chi square was
107 used to test the hypothesis statement of the study ($p=0.05$).

108 **11 l) Ethical Consideration**

109 A letter of introduction and ethical clearance was obtained from the School of Postgraduate studies Ethical
110 clearance committee in Federal University of Technology Owerri (FUTO) before the research was conducted.
111 The purpose of the research was explained to each respondent and verbal informed consent obtained from them
112 before inclusion into the study. Also, anonymity of the respondents was assured and ensured. The confidentiality
113 of the information they gave was also maintained.

114 **12 III.**

115 **13 Results**

116 A total of four hundred and thirty six (436) copies of questionnaires were distributed for the study. They were
117 properly filled and crosschecked for correctness, and 404 questionnaires were retrieved and were used for the
118 purpose of the analysis.

119 **14 a) Socio Demographic Factors of the Respondents**

120 From the table 1 below, 41.5% (169) of the respondents were aged between 26-30 years, 20.5% (83) between ages
121 15-20, 9.9% (40) were people in their early 20's (21-25), 14.3% (58) were between 31-40 years of age and 13.3%
122 (54) were adults within 41-45 year age bracket. On ethnicity, 38.1% (154) opted for ethnic groups not listed
123 but label 'others', 93.7% (379) were of the Igbo ethnic group, 1.9% (8) Yoruba, and 0.4% (2) of the respondents
124 were Hausa/Fulani. On educational backgrounds, 30.9% (125) of the respondents had Informal education, 12.8%
125 (52) had attained the Tertiary level of Education, and 22.2% (90) had primary education and 37.1% (150) of the
126 respondents with secondary level of education. 50.7% (205) of the respondents did occupations not listed but
127 label 'others', 17.3% (70) were civil servants, 18.8% (76) of the respondents housewives while just 13.1% (53) were
128 self employed. On the marital status of the respondents, 26.2% (106) were widowed, 24.7% (100) were single,
129 24.5% (99) married while 12.6% (51) of the respondents were separated. 11.8% (48) opted to choose 'others'.
130 27.2% (110) of the respondents had an income level between 1-10,000, 21.7% (88) had an income level between
131 31,000-50,000, 20.2% (82) earned above 100,000, 17.0% (69) had an income level between 11,000-30,000, and the
132 least percentage 13.6% (55) earned an income between 51,000-100,000.

133 **15 b) Level of Knowledge of Long Lasting Insecticide-Treated 134 Nets**

135 Table 2 considering the level of knowledge of long lasting insecticide treated nets, a majority of the respondents
136 with 96.5% (390) said "Yes" when they were asked if they had heard about malaria at any time prior to the
137 questionnaires, while a small 3.4% (??4) denied. When asked if they had suffered from malaria, a majority if the
138 respondents also with 95.2% (385) replied "Yes" while just 4.7% (19) said "No". 61.6% (249) of the respondents
139 believe mosquito bites causes malaria, 26.2% (106) said malaria is caused by dirt/stagnant water, 9.6% (39) chose
140 plasmodium organisms and 4.7% (19) said "germs". Upon question on how malaria is transmitted, 44.0% (178)
141 opted to choose 'Bites of any Mosquito', 19.0% (77) said "Bites of insect which has bitten a malaria Patient",
142 and 36.8% (149) opted for 'Stagnant water and unclean environment'. 74.0% (299) of the participants replied
143 "Yes" when asked if they had heard about LLITNs, while 25.9% (105) said "No". 24

144 **16 c) Distribution and Ownership of Long Lasting Insecticide- 145 Treated Nets among Respondents**

146 The table 3 below revealed the choices of respondents relative to Distribution and Ownership of Long Lasting
147 Insecticide-Treated Nets. When asked if Insecticide Treated Nets had been distributed in their environs, 48.0%
148 (194) replied "Yes" while 51.9% (210) said "No". When the respondents were asked if they had any Insecticide
149 Treated Net, 71.2% (288) affirmed, while 28.7% (116) said "No". The respondents were asked if they owned a

22 DISCUSSION

150 Long Lasting Insecticide Treated Nets, 45.0% of the respondents (182) said Yes, while 54.9% (222) denied. On
151 the question 'How did you get it?', 38.3% (155) chose Health Centers, 33.1% (134) said "Market", 7.1% (29) said
152 "Friends", 15.0% (61) of the respondents replied "School" while some respondents 6.1% (25) chose options not
153 listed but label 'Others'. When asked How Many ITNs their household Owned, 41.3% (167) of the respondents
154 said "None", 17.8% (72) replied "1", 29.9% (121) said between 2-4, 10.8% (44) of the respondents said "Above
155 4".

156 **17 (74.0%) 105 (26.0%)**

157 **18 Good knowledge**

158 Poor knowledge

159 **19 d) Level of Utilization of Long Lasting Insecticide-Treated
160 Nets**

161 Table 4 shows the Level of Utilization of Long Lasting Insecticide-Treated Nets among respondents. When asked
162 if they had ever slept under an LLITN, 44.3% (179) said "Yes", while 55.6% (225) replied "No". The respondents
163 were asked if they slept under an LLITN the previous night, 66.0% (267) confirmed, while 33.9% (137) denied.
164 Respondents that denied were in turn asked when last they slept under an LLITN, 42.3% (58) told less than
165 7days ago, 33.5% (46) said between 8-29days, 24.0% (33) more than 30 days. When asked if their children/family
166 members sleep under LLITN, 66.0% (267) confirmed "Yes", while 33.9% (137) said "No". The respondents who
167 replied "No" were then asked if their children/family members slept under an LLITN the previous night, 62.8%
168 (254) confirmed, while 37.1% (150) denied. Respondents that denied were in turn asked when last they slept
169 under an LLITN, 32.0% (48) told less than 7days ago, 21.3% (32) said between 8-29days, 46.6% (70) more than
170 30 days.

171 **20 f) Relationship between Socio-demographic characteristics
172 and level of utilization of long lasting Insecticide Treated
173 Nets**

174 Based on the Relationship between sociodemographic characteristics and level of utilization of long lasting
175 insecticide treated nets, the table below shows that age not significantly associated with level of utilization
176 insecticide treated nets ($P = 0.5301$). Furthermore, the table 4.6 shows that religion is not significantly associated
177 with utilization of LLITNs ($P = 0.115$). Also, ethnicity doesn't show significant association with utilization of
178 LLITNs ($P = 0.074$). Marital status is significantly associated with utilization of LLITNs ($P = 0.0001$). Moving
179 further, the table reveals that parity is significantly associated with the level of utilization of LLITNs ($P =$
180 0.0001). Also, level of education shows significant association with level of utilization of LLITNs ($P = 0.0001$).
181 Occupation is not significantly associated with level of utilization of LLITNs ($P = 0.942$). The level of income of
182 the respondents shows significant association with level of utilization of LLITNs ($P = 0.006$) (Table 6

183 **21 below).**

184 **22 Discussion**

185 Based on the finding of this study on Long Lasting Insecticide Treated Nets among women of child bearing age in
186 Nwangele LGA, considering the socio demographic characteristics, it was revealed that majority 41.5% (169) of
187 the women were aged between 26-30 years. This finding goes in consistent with a study by Odoko et al., (2012),
188 that women of child bearing age have a mean age of 32.4yrs. The study revealed that majority 93.8% (379)
189 of the respondents were Igbo region. This could be due to the fact that the study was conducted in Nwangele
190 LGA which is the southeastern part of Nigeria dominated by people of Igbo origin. The findings of the study
191 revealed that 27.2% (110) of the respondents had an income level between 1-10,000 naira. A study by Kenneth
192 and Amefume (2013) posited a significant improvement in income level among women in rural areas. However
193 this goes in contrast with the study with women of child bearing age mostly involved in petty trading.

194 Considering the level of knowledge of long lasting insecticide treated nets, the study showed that a majority of
195 the respondents with 96.5% (390) are aware and have had heard about malaria prior to the study in consistence
196 with a similar study conducted among groups of women of childbearing age (WOCBA) in Malawi by Owen et
197 al (2018) on the awareness of Malaria among pregnant women. Information on Malaria is now widely open with
198 several source of information existing. The study posited that 74.0% (299) of the participants had knowledge
199 of long lasting insecticide treated nets. Studies by Kyi et al. (2020) and Adebayo et al (2014) showed that
200 respondents in an area had 69.6%, 81.5% respectively knowledge of long lasting insecticide treated nets which
201 corroborates with the finding of this study. Women of child bearing age at Nwangele are more likely to get
202 information on the utilization and adequate knowledge following community meetings, hospital visits and at
203 educational institutions. The study further revealed that majority 24.2% (98) had heard about LLTINs from

204 Health centers. This goes against a finding by Atenchong et al (2014) that revealed that majority of women had
205 good knowledge of LLITNs and ITNs from a community follow up program. However from this study it implies
206 that health workers proffer information to women on antenatal and other related periodic health visit by women
207 of child bearing age in the community.

208 From the study it was revealed that the women when asked if Insecticide Treated Nets had been distributed in
209 their environs, 48.0% (194) agreed. However this shows a poor reach of LLITNs in the community. The findings
210 of this study on distribution of LLITNs reveal that women of child bearing age might experience shortfall of these
211 LLITNs. A study by Kenneth and Amefume (2013) However in this study, participants posited that Considering
212 the Distance to Facility, 62.8% (254) of the respondents said it was a factor towards their utilization. This
213 implies that the health center is situated far away from them. When asked about Cultural Acceptance, 55.6%
214 (225) denied it could influence their utilization and the coverage of LLITNS in the area. This goes against a
215 study conducted at rural Dars es Salaam that showed majority of respondents agreeing cultural acceptance as
216 a modifier to Malaria preventive behavior. The study revealed also that information during Distribution being
217 a factor influencing use of LLITNs was met with 44.0% (178) confirming among the women of child bearing
218 age (Charles et al., 2019). A publication by Kyi et al. (2020) revealed that source of information on malaria
219 preventive approaches was imperative in determining its uptake. The finding of this study shows that for women
220 of child bearing age, information on utilization is essential for them to utilize LLITNs.

221 Based on the Relationship between sociodemographic characteristics and level of utilization of long lasting
222 insecticide treated nets, the study revealed that marital status is significantly associated with utilization of
223 LLITNs ($P = 0.0001$). This implies that husbands acceptance of the utilization of LLITNs is a motivating factor.
224 This goes in line with a study by Atenchong et al (2014) which found marital status to be associated with uptake
225 of bed nets among pregnant women ($P=0.004$). Moving further, the study also demonstrated that parity is
226 significantly associated with the level of utilization of LLITNs ($P = 0.0001$). This could be due to the fact that
227 increasing number of children can lead to uptake as well as less number of children. This goes in contrast with
228 a report published by Nankanga et al (2012) on Parity and Usage of Nets. Also, from the study among women
229 of child bearing age in Nwangele, it was posited that level of education shows significant association with level
230 of utilization of LLITNs ($P = 0.0001$). Women of child of bearing age with educational level and information on
231 ITNs would likely utilize LLITNs. The study revealed that the level of income of the women shows significant
232 association with level of utilization of LLITNs ($P = 0.006$). A study by Owen et al (2018) opined that women
233 with higher income status could afford malaria preventive. This implies that from the findings of this study
234 among women of child bearing age at Nwangele it is more likely for them to purchase LLITNs if they have the
235 money.

236 V.

237 **23 Conclusion**

238 However, from the study, the coverage and distribution of long lasting insecticide treated nets in Nwangele LGA
239 forms part of the component of the 2011 RBM integration which is effective in rapidly increasing household
240 possession and use of bed nets, achieving national bed net coverage goals set by National Health Development
241 Plan (NHDPP) 2012-2015. Low Ownership of LLITNs was reported in the study and malaria is a very serious
242 public health problem; prompt treatment alone cannot guarantee the achievement of the goal. All strategies must
243 be strengthened and employed in fight against malaria, if the desired goal is to be achieved. Findings from this
244 study showed that majority of the residents had a considerable good knowledge of the use of insecticide treated
245 nets but low ownership.

246 **24 VI.**

247 **25 Recommendations**

248 The recommendations for this study include the following;

249 1. Health education on the effective use of long lasting insecticide treated nets among residents and practices
to improve ownership and function. ¹

Figure 1:

250

¹© 2023 Global Journals

25 RECOMMENDATIONS

1

Characteristics	Frequency (n=404)	Percentage (%)
Age		
15-20	83	20.5%
21-25	40	9.9%
26-30	169	41.5%
31-40	58	14.3%
41-45	54	13.3%
Total	404	100
Ethnicity		
Igbo	379	93.8%
Hausa/ Fulani	2	0.4%
Yoruba	8	1.9%
Others	15	3.7%
Total	404	100
Educational level		
Informal education	52	12.8%
Primary	90	22.2%
Secondary	150	37.1%
Tertiary	112	27.7%
Total	404	100
Occupation		
Self employed	53	13.1%
House wife	76	18.8%
Civil servant	70	17.3%

Figure 2: Table 1 :

2

.2%

Figure 3: Table 2 :

3

Variables	Frequency (n=404)	Percentage (%)
Insecticide Treated Nets distribution in your Area		
Yes	194	48.0%
No	210	51.9%
Total	404	100
Have any Insecticide Treated Net		
Yes	288	71.2%
No	116	28.7%
Total	404	100
Own Long Lasting Insecticide Treated Net		
Yes	182	45.0%
No	222	54.9%
Total	404	100
How did you get it		
Health Center	155	38.3%
Market	134	33.1%
Friend	29	7.1%
School	61	15.0%
Others	25	6.1%
Total	404	100
How Many ITNs do your household Own		
None	167	41.3%
1	72	17.8%
2-4	121	29.9%
Above 4	44	10.8%
Total	404	100

Figure 4: Table 3 :

25 RECOMMENDATIONS

4

Variable	Frequency	Percentage
Have you Ever Slept under an LLITN?		
Yes	179	44.3%
No	225	55.6%
Total	404	100
Did you sleep under an LLITN Last Night?		
Yes	267	66.0%
No	137	33.9%
Total	404	100
If No, when was the last time you slept under an LLITN?		
<7days ago	58	42.3%
8-29days	46	33.5%
> 30 days	33	24.0%
Total	137	100
Do your children/family Members sleep under LLITN		
Yes	267	66.0%

Figure 5: Table 4 :

5

Year 2023	Volume	Nets Inflicts Rashes Yes No	Variable	Frequency	Percentage (%)
50	XXIII		(n=404)	299	74.0% 25.9%
Issue I				105	
Version I					
D D D D)	Total Distance to Facility			404	100
(Yes			254	62.8%
Medical	No Total Cultural Acceptance Yes			150	37.1%
Research	No Total Family Factors			404	100
Global	Yes No Total Religious Acceptance/Factors Yes No Total Religious Acceptance			288	71.2%
Journal of				116	28.7%
				404	100
				19	4.7%
				385	95.2%
				404	100
	Difficulty to Hang				
	Yes			165	40.8%
	No			239	59.1%
	Total			404	100
	Have Door Nets				
	Yes			260	64.3%
	No			120	35.6%
	Total			404	100

Figure 6: Table 5 :

Characteristics	Treated			Decision
	X 2	D.F	P value	
Age	106.411	36	0.5301	NS
Religion	33.340	318	0.115	NS
Ethnicity	53.008	36	0.074	NS
Marital status	106.124	127	0.0001	S
Parity	81.645	36	0.0001	S
Education level	153.283	36	0.0001	S
Occupation	31.133	45	0.942	N.S
Level of income	71.977	45	0.006	S
IV.				

Figure 7: Table 6 :

Figure 8:

Figure 9:

25 RECOMMENDATIONS

- 251 enact them to help protect the wider community at large.
- 252 [?????????????] , ????????????? .
- 253 [Ethnicity] , *Ethnicity* (d) Fulani [] (e) Others (please specify)
- 254 [Aluko and Oluwatosin ()] , J O Aluko , A O Oluwatosin . 2012.
- 255 [World Health Organization ()] , *World Health Organization* 2017. (World Malaria Report)
- 256 [Kenneth and Amefume ()] ‘A crosssectional survey of Chewaka district settlement area of southwest Oromia. Determinants of the use of ITNs in a southwest area of Ethiopia’. W Kenneth , N Amefume . *International Journal of Community Medicine and Public Health* 2013. p. .
- 257
- 258
- 259 [Deneye et al. ()] ‘A pilot study to evaluate malaria control strategies in Ogun State’. A K Deneye , A S Jegede , M A Mafe , E E Nwokocha . *Nigeria. World Heath Population* 2011. 9 (2) p. .
- 260
- 261 [Atenchong et al. ()] ‘Attitudes toward Utilization of Insecticide-Treated Bed Nets among Pregnant Women and Care-Takers of Under-Five’. M Atenchong , U Ngwibete , I Ozims , N James . *Nigerian Medical Journal* 2014. 88 (14) p. .
- 262
- 263
- 264 [Runsewe-Abiodun et al. ()] ‘Awareness and knowledge about Insecticide treated nets amongst pregnant mothers in Ogun state, Western Nigeria: A descriptive cross sectional study’. T I Runsewe-Abiodun , A C Inyanwura , S A Sotimehin . *Educational Research Journal* 2012. 2 (5) p. .
- 265
- 266
- 267 [Iwu et al. ()] ‘Awareness and use of Insecticide treated among pregnant women attending antenatal clinic at Federal Medical centre and General Hospital Owerri, Imo State’. R U Iwu , B C Ijioma , A S Egeruoh , I N Awurum , C N Ohalete . *Report and Opinion* 2010. 2 (12) p. .
- 268
- 269
- 270 [Oche et al. ()] ‘Awareness and Use of Insecticide treated nets among pregnant women attending antenatal at Usman Dan Fodio University Teaching Hospital Sokoto’. M O Oche , I G Ameh , A S Umar , G Gana , C H Njoku . *Nigerian Journal Parasitology* 1117-4145. 2011.
- 271
- 272
- 273 [Ganihu and Jimo ()] ‘Awareness and Use of Insecticide treated nets among women attending antenatal clinic in a Northern state of Nigeria’. A S Ganihu , R O Jimo . *Journal of Pak. Medical Association* 2013. 6 p. .
- 274
- 275 [Musa et al. ()] ‘Awareness and use of Insecticide treated nets among women attending antenatal clinic in a Northern state of Nigeria’. O I Musa , G A Salaudeen , R O Jimo . *Journal of Pak. Med. Assoc* 2017. 59 (6) p. .
- 276
- 277
- 278 [Salaudeen and Jimoh ()] ‘Awareness and use of insecticide treated nets among women attending antenatal clinics in a Northern state of Nigeria’. G A Salaudeen , K Jimoh . <http://www.jpma.org.pk> *Journal of Pak Medicine Association* 2009.
- 279
- 280
- 281 [Isah and Nwobodo ()] ‘Awareness and Utilization of Insecticide treated mosquito nets among pregnant mothers in a tertiary health institution in North-Western Nigeria’. A Y Isah , R Nwobodo . *Nigerian Journal of Medicine* 2009. 18 (2) p. .
- 282
- 283
- 284 [Okoye and Isara ()] ‘Awareness on the use of Insecticide treated nets among women attending antenatal clinic in a tertiary heath facility in South-South Nigeria’. C A Okoye , A R Isara . *Nigerian Medical Practitioners Journal* 2011. 52 (2) p. .
- 285
- 286
- 287 [Diema et al. ()] *Barriers to sustained use of the insecticide treated bednet in the upper east region of Ghana*, K D Diema , M Konlan , J A Aarah-Bapuh , K K Abdulai . 2015.
- 288
- 289 [Bites of insect which has bitten a malaria Patient [] c) Stagnant water and unclean environment [] 13. Have you heard about Long Lasting Insecticide treated Nets (LLITNs)? (a) Yes 12. How is malaria Transmitted? (a) Bites of any Mosquito]b66 ‘Bites of insect which has bitten a malaria Patient [] (c) Stagnant water and unclean environment [] 13. Have you heard about Long Lasting Insecticide treated Nets (LLITNs)? (a) Yes’ 12. *How is malaria Transmitted?* (a) *Bites of any Mosquito*, (b) No[] 14. How did you hear about it? (a) Health center. d) Publications/Journals [] (e) School [] (f) others???????)
- 290
- 291
- 292
- 293
- 294
- 295 [CDC Malaria Fact sheet N°94: Malaria vaccine: CDC position paper. (PDF) Weekly Epidemiological Record () ‘CDC Malaria Fact sheet N°94: Malaria vaccine: CDC position paper. (PDF)’. *Weekly Epidemiological Record* 2014. 91 (4) p. . Center of Disease Control.
- 296
- 297
- 298 [Johnson et al. ()] ‘Cost Analysis of insecticide treated nets among households in teh rural community of sourthern Nigeria’. A C Johnson , U I Inyang , U D Etuknwa , U O Ekanem , M Udo , H Ubom . *Scholars Journal of Applied Medical Sciences* 2018. 3 (2A) p. .
- 299
- 300
- 301 [Charles et al. ()] ‘Coverage and usage of insecticide treated nets (ITNs) within households: associated factors and effect on the prevalance of malaria parasitemia in the Mount Cameroon area’. N Charles , Y Njumkeng , O Tobias . *BMC Public Health* 2019. 19 p. 1216.
- 302
- 303
- 304 [Sarkar et al. ()] ‘Critical care aspects of malaria’. P K Sarkar , G Ahluwalia , V K Vijayan , A Talwar . *Journal of Intensive Care Medicine* 2009. 25 (2) p. .
- 305

25 RECOMMENDATIONS

- 306 [Dupas and Cohen ()] 'Decreased motivation in the use of insecticide-treated nets in a malaria endemic area in
307 Burkina Faso'. U Dupas , I O Cohen . *Malaria Journal* 2009. 8 (1) p. 175.
- 308 [Kiwuwa and Stergachis ()] 'Determination of use of Insecticide treated nets for the prevention of malaria in
309 pregnancy: Jinga Uganda'. M S Kiwuwa , A Stergachis . *PLOS ONE* 2012. 7 (6) p. .
- 310 [Emergency department management of mosquito-borne illness: Malaria, dengue, and west Nile virus Emergency Medicine Practice
311 'Emergency department management of mosquito-borne illness: Malaria, dengue, and west Nile virus'.
312 *Emergency Medicine Practice* 2015. 16 (5) p. . Federal Ministry of Health Nigeria
- 313 [Emergency department management of mosquito-borne illness: Malaria, dengue, and west Nile virus Emergency Medicine Practice
314 'Emergency department management of mosquito-borne illness: Malaria, dengue, and west Nile virus'.
315 *Emergency Medicine Practice* 2015. 16 (5) p. . Federal Ministry of Health Nigeria
- 316 [Bernard et al. ()] 'Equity and coverage of insecticide-treated bed nets in an area of intense transmission of
317 Plasmodium falciparum in Tanzania'. J Bernard , G Mtové , R Mandike , F Mtei , C Maxwell , H Reyburn .
318 *Malaria Journal* 2009. 8 p. 65.
- 319 [Owen et al. ()] 'Factors associated with insecticide-treated net usage among women of childbearing age in
320 Malawi: a multilevel analysis'. B Owen , I F Nkoka , V O Ting-Wu , H I Chuang . *Malaria Journal* 2018. 17
321 p. .
- 322 [Final report of the Commission on Social Determinants of Health. Publications and documents: Towards health-equitable globalization
323 'Final report of the Commission on Social Determinants of Health. Publications and documents: Towards
324 health-equitable globalization: rights, regulation and redistribution'. *World Health Organization* 2016.
- 325 [Ukibe et al. ()] 'Free distribution of insecticide treated bed nets to pregnant women in Kinshasa: an effective
326 way to achieve 80% use by women and their newborns'. U N Ukibe , E Tailor , D Nku , S Duvail , M Tabala
327 , S Meshnick , E Bechets . *Tropical Medical International Health* 2017. 14 (1) p. .
- 328 [Nankinga et al. ()] 'Hospital: perspective of child caregivers'. Z 1 Nankinga , J K Muliira , J Kalyango , J
329 Nankabirwa , S Kiwuwa , D Njama-Meya , K Karamagi . *Journal of Community Health* 2012. 37 (5) p. .
- 330 [Attanayake et al. ()] 'Household costs of malaria morbidity: a study in Matale district'. N Attanayake , J Fox-
331 Rushby , A Mills . doi: 10.1046/j.1365-3156.2000.00612.x. *Tropical Medicine and International Health* 2018.
332 5 (9) p. .
- 333 [Bennett et al. ()] 'Household Possession and Use of Insecticide-Treated Mosquito Nets in Sierra Leone 6 Months
334 after a National Mass-Distribution Campaign'. A Bennett , S J Smith , S Yambasu , A Jambai , W Alemu ,
335 A Kabano . *PLoS ONE* 2012. 7 (5) p. .
- 336 [If No, when was the last time they slept under an LLITN? (a) <7days ago [] b) 8-29days [] (c) > 30 days
337 [] SECTION E: FACTORS INFLUENCING THE COVERAGE OF LONG LASTING INSECTICIDE-
338 TREATED NETS Please tick (?) the correct options that influence Utility and coverage of Long lasting]b70
339 If No, when was the last time they slept under an LLITN? (a) <7days ago [] (b) 8-29days [] (c) > 30
340 days [] SECTION E: FACTORS INFLUENCING THE COVERAGE OF LONG LASTING INSECTICIDE-
341 TREATED NETS Please tick (?) the correct options that influence Utility and coverage of Long lasting, (Insecticide treated Nets in the)
- 342 [Roll Back Malaria (RBM). (ed.) ()] *Insecticide treated Mosquito nets*, Roll Back Malaria (RBM). (ed.) 2010. p.
343 .
- 344 [Wagbasoma and Aigbe ()] 'ITNs Ownership and Utilization among pregnant women attending ANC in Manki
345 West'. V A Wagbasoma , E E Aigbe . *Uganda. African Journal of Clinical Practice* 2010. 13 (2) p. .
- 346 [Aina and Ayeni ()] 'Knowledge and use of Insecticide treated net as a malaria preventive tool among pregnant
347 women in a local Government area of Lagos State'. B A Aina , F A Ayeni . *Nigerian Journal of Applied
348 Pharmaceutical Science* 2011. (07) p. .
- 349 [Ruben-Diaz ()] 'Level of awareness, Ownership and Use of Insecticide Treated Bed Nets (ITNs) by Pregnant
350 Women Attending Antenatal Clinics in Anambra state'. L O Ruben-Diaz . *South Eastern Nigeria. African
351 Journal of Reproductive Health* 2011. 15 (1) p. .
- 352 [Long Lasting Insecticide treated Nets (LLITNs) is effective in the Prevention of Malaria when it is air dried frequently (a) Yes []
353 b) No [] SECTION C: DISTRIBUTION AND OWNERSHIP OF LONG LASTING INSECTICIDE-
354 TREATED NETS AMONG RESPONDENTS 17. Has Insecticide Treated Nets been distributed in your
355 Area? (a) Yes]b68 Long Lasting Insecticide treated Nets (LLITNs) is effective in the Prevention of Malaria
356 when it is air dried frequently (a) Yes [] (b) No [] SECTION C: DISTRIBUTION AND OWNERSHIP OF
357 LONG LASTING INSECTICIDE-TREATED NETS AMONG RESPONDENTS 17. Has Insecticide Treated
358 Nets been distributed in your Area? (a) Yes, (18. Do you have any Insecticide Treated Net? (a) Yes [] (b)
359 No [] 19. Do you Own any Long Lasting Insecticide treated net(a) Yes [] (b) No [] 20. How did you get it?
360 a) Health center [] (b) Market [] (c) A Friend [] (d) others???????
- 361 [Long Lasting Insecticide treated Nets (LLITNs) is Key in Prevention of Malaria due to its Durability (a) Yes]
362 Long Lasting Insecticide treated Nets (LLITNs) is Key in Prevention of Malaria due to its Durability (a)
363 Yes,
364

- 365 [Aribodor et al. ()] 'Malaria among Primigravid attending antenatal clinics in Awka Anambra State, South
366 Eastern Nigeria'. D N Aribodor , O C Nwaorgu , C I Eneanya , O B Aribodor . *Nigerian Journal of Parasitology*
367 2017. 28 (1) p. .
- 368 [Azabre et al. ()] 'Malaria control strategies in the Kasena-Nankana east and west districts of Ghana'. B A
369 Azabre , K J Teye , J A Yaro . *Ghana Journal of Geography* 2013. p. .
- 370 [Rijken et al. ()] 'Malaria in pregnancy in the Asia-Pacific region'. M J Rijken , R McGready , M E Boel , R
371 Poespoprodjo , N Singh . *Lancet Infectious Diseases* 2012. 12 (1) p. .
- 372 [Osero et al. ()] 'Maternal use of Insecticide treated nets in the prevention of malaria among children under 5
373 years in Nyamira district Kenya'. J S Osero , M E Otieno , A S Orago . *East African Medical Journal* 2015.
374 82 (10) p. .
- 375 [Mbanugo and Okorudo ()] J I Mbanugo , O Okorudo . *Prevalence of Plasmodium infections in Pregnant women*
376 in, 2015.
- 377 [Nigerian Census and population committee National Population Commission ()] 'Nigerian Census and popula-
378 tion committee'. *National Population Commission* 2006.
- 379 [Adebayo et al. ()] 'Ownership and utilisation of insecticidetreated mosquito nets among caregivers of underfive
380 children and pregnant women in a rural community in southwest Nigeria'. A M Adebayo , O O Akinyemi , E
381 O Cadmus . *Journal of Preventive Medicine and Hygiene* 2014. 55 (2) p. .
- 382 [Kweku et al. ()] 'Ownership and utilization of long lasting insecticide treated nets (LLIN) and factors associated
383 to non-utilization among pregnant women in Ho municipality of Ghana'. A Kweku , G Sodofia , E Kye-Duedo
384 , I Agboli , U Agbemafle . *Central African Journal of Public Health* 2016. 2 (1) p. .
- 385 [Espino ()] 'Perceptions of malaria in a low endemic area in Nigeria: transmission and prevention of disease'. F
386 Espino . *Acta Tropica* 2017. 1997. 63 p. .
- 387 [Chukwuocha et al. ()] 'Perceptions on the Use of Insecticide Treated Nets in parts of Imo River basin, Nigeria:
388 Implications for preventing malaria in pregnancy'. U M Chukwuocha , I N S Dozie , C O Onwuliri , B E
389 Nwoke , B O Nwankwo , E A Nwoke , J C Nwaokoro , O G Uduji , B C &adindu . *African Journal of*
390 *Reproductive Health* 2010. 14 (1) p. .
- 391 [Collins and Barnwell ()] 'Plasmodium knowlesi: finally being recognized'. W E Collins , J W Barnwell . *Journal*
392 *of Infectious Diseases* 2009. 199 (8) p. .
- 393 [Mueller et al. ()] 'Plasmodium malariae and Plasmodium ovale-the "bashful" malaria parasites'. I Mueller , P
394 A Zimmerman , J C Reeder . *Trends in Parasitology* 2017. 23 (6) p. .
- 395 [Okwa ()] 'Preliminary investigations on malaria in sickle cell patients among pregnant women ang infants in
396 Lagos'. O O Okwa . *Nigerian Journal of Parasitology* 2004. 25 p. .
- 397 [Questionnaire on the Evaluation of the Coverage of Long Lasting Insecticide Treated Nets Among Women of Child Bearing Age
398 *Questionnaire on the Evaluation of the Coverage of Long Lasting Insecticide Treated Nets Among Women*
399 *of Child Bearing Age in Nwangele Lga, Imo State, South Eastern Nigeria SECTION A: SOCIO*
400 *DEMOGRAPHIC CHARACTERISTICS INSTRUCTION: Please tick (?) the correct options besides each*
401 *question and also fill in the spaces, (provided where appropriate with the correct options)*
- 402 [Randomized Control Trail and Utilization of Insecticide treated nets during pregnancy among postpartum women in Ibadan Kenya:
403 'Randomized Control Trail and Utilization of Insecticide treated nets during pregnancy among postpartum
404 women in Ibadan Kenya: a cross sectional study'. *BMC Pregnancy and Child birth* 12 p. 21.
- 405 [SECTION B: KNOWLEDGE OF LONG LASTING INSECTICIDE-TREATED NETS Please tick (?) the correct options beside
406 *SECTION B: KNOWLEDGE OF LONG LASTING INSECTICIDE-TREATED NETS Please tick (?) the*
407 *correct options besides each quest ion and also fill in the spaces, 000 [] (d.) 51,000- 100,000. 31 p. 0. (What*
408 *is your Level of Income. provided where appropriate with the correct options)*
- 409 [SECTION D: LEVEL OF UTILIZATION OF LONG LASTING INSECTICIDE-TREATED NETS Please tick (?) the correct op-
410 *SECTION D: LEVEL OF UTILIZATION OF LONG LASTING INSECTICIDE-TREATED NETS Please*
411 *tick (?) the correct options besides each question and also fi ll in the spaces, (How Many ITNs do your*
412 *household Own? (a) None [] (b) 1 [] (c) 2-3 [] (d) 4 [] (e) above 4. provided where appropriate with the*
413 *correct options)*
- 414 [Aguata and State] 'South Eastern Nigeria'. Anambra Aguata , State . *Journal of Environmental Health* 2 (2) p.
415 .
- 416 [Richard et al. ()] 'The burden of malaria in pregnancy in malaria endemic areas'. W S Richard , L Bernard , L
417 Nah , E Mornica , U Parise , M Clara . *American Journal of tropical Medicine Hygiene* 2008. 64 (12) p. .
- 418 [Chima et al. ()] 'The economic impact of malaria in Africa: a critical review of the evidence'. R I Chima , C
419 Goodman , A Mills . *Health Policy* 2013. 63 p. .
- 420 [Hartman et al. ()] 'The impact of maternal malaria on newborns'. T K Hartman , S J Rogerson , P R Fischer .
421 *Annals of Tropical Paediatrics* 2019. 30 (4) p. .

25 RECOMMENDATIONS

- 422 [Worrall et al. ()] *The relationship between socioeconomic status and malaria: a review of the literature.*
423 *Background paper for ensuring that malaria control interventions reach the poor*, E Worrall , S Basu , K
424 Hanson . 2012. 56.
- 425 [Odumegwu ()] ‘Undernutrition as an underlying cause of malaria morbidity and mortality in children less than
426 five years old in Nigeria’. L Odumegwu . *Nigerian Journal of Tropical Medicine and Hygiene* 2013. 71 (2) p. .
- 427 [Arnott et al. ()] ‘Understanding the population genetics of Plasmodium vivax is essential for malaria control
428 and elimination’. A Arnott , A E Barry , J C Reeder . *Malaria Journal* 2012. p. 14.
- 429 [Adeyemi et al. ()] ‘Use and Prevalence of Insecticide treated Mosquito bed nets among pregnant population in
430 Oshogbo Nigeria’. A S Adeyemi , D A Adekande , S E Akinola . *Nigerian Medical Practice* 2007. 52 (2) p. .
- 431 [Guyatt and Ochola ()] ‘Use of bednets given free to pregnant women in Kenya’. H Guyatt , S Ochola . *Lancet*
432 2014. 62 (9395) p. .
- 433 [Baley and Deressa ()] ‘Use of insecticide treated nets by pregnant women and associated factors in a predomi-
434 nantly rural population in Northern Ethiopia’. M Baley , W Deressa . *Tropical Medical International Health*
435 2008. 13 (1) p. .
- 436 [Amedo ()] *Utilisation of insecticide treated mosquito nets among caregivers of children under five years in Hohoe
township in Ghana*, E K Amedo . 2016. Accra, Ghana. University of Ghana (Ph.D. thesis)
- 438 [Odoko et al. ()] ‘Utilization of insecticide treated nets against malaria among pregnant women in Southern
439 Nigeria’. J O Odoko , E U Nwose , E Igumbor . *Malaria Journal* 2012. 77 (16) p. .
- 440 [Kyi et al. ()] ‘Utilization of insecticide-treated bed nets and care-seeking for fever and its associated sociodemo-
441 graphic and geographical factors among under-five children in different regions: evidence from the Myanmar
442 Demographic and Health Survey’. V Kyi , C Thar-Min , H Thae , A A Maung . *Malaria Journal* 2020.
443 2015-2016. 19 p. .
- 444 [World Malaria Report. Switzerland: World Health Organization WHO World Health Organization ()] ‘World
445 Malaria Report. Switzerland: World Health Organization WHO’. *World Health Organization* 2019. p. .
- 446 [Your occupation: (a) Artisan e.g Carpenter, Hairdresser, Tailor, Driver [] b) Civil servant e.g Teacher]b64
447 Your occupation: (a) Artisan e.g Carpenter, Hairdresser, Tailor, Driver [] (b) Civil servant e.g Teacher, (d)
448 Unemployed [] (e) Professionals e.g. Doctor, Nurse, Lawyer, Accountant [] (f) Others (please specify)