

Research Paper

Insecticide Treated Bednet Possession among Pregnant Women in Gulu: a post conflict district in Northern Uganda

Abstract

Background

Insecticide Treated Net (ITN) is one of the main strategies to control malaria in Uganda. The Uganda Ministry of Health had set a target of 50% of households to be covered with ITN by the year 2007. Therefore the study was conducted to determine ITN possession among pregnant women who were living in internally displaced persons' (IDP) Camps where buildings offer little protection against mosquito.

Methods

We conducted a cross sectional study in 20 randomly selected camps. We used proportion to size cluster sampling technique to determine the numbers of respondents to be surveyed in each camp. We used consecutive sampling method by moving to the next nearest household until we generated the required number of respondents in each camp.

Results

42% of respondents (95% CI 1.54 – 1.61) possessed ITN. Factors associated with ITN possession were; being single/widow/divorce (aOR 0.22, 95% CI 0.12 - 0.42, P-value 0.000); No business (aOR 0.62, 95% CI 0.39 - 0.98, P-value 0.041); Have attended Antenatal service (aOR 1.92, 95% CI 1.31 – 2.83, P-value 0.001); Have formal education (aOR 1.69, 95% CI 1.11 - 2.56, P-value 0.014).

Conclusion

More than half of the respondents do not possess ITN which is below the target set by the Uganda Ministry of Health. Therefore government and other stakeholders must scale up free ITN distributions among the vulnerable groups if the Ministry of Health and the Roll Back Malaria Global Partnership Target is to be achieved.

Keywords: ITN, Possession, pregnant women, post conflicts, internally displaced persons camps.

Introduction

Background

Malaria is endemic in Uganda and constitutes a major public health challenge. An estimated 7.9 million malaria cases were reported in 2008 [1]. Surveillance reports show that

12 proportionate mortality ratio (PMR) due to malaria for all ages has increased progressively
13 from 20.2% in 1988 to 32.1% in 2004 [2]. Malaria infection during pregnancy is a major
14 cause of maternal anaemia, abortion, stillbirth, intrauterine growth retardation and low birth
15 weight, an important risk factor for neonatal and infant mortality [3 – 5]. An estimated
16 75,000–200,000 infant deaths annually are associated with malaria infection during
17 pregnancy [5].

18 Use of insecticide treated mosquito net (ITN) is an effective strategy for preventing malaria in
19 children and pregnant women [6] and is one of the mainstay strategies for malaria control in
20 Uganda [1]. In 2001, the African heads of state met in Abuja and set a target of 60% ITNs
21 coverage among vulnerable children and pregnant women [7]. There has been promising
22 signs of rapid scaling-up of ITNs coverage in many African countries [8]. However the Abuja
23 target, the Millennium Develop Goal six (MDG 6) (80% coverage of children and pregnant
24 women) [9] and Uganda Ministry of Health target of 50% of households to be covered with
25 ITN by the year 2007 [1] were not met as noted in annual health sector performance report
26 of 2007.

27 The poor bear the highest burden of malaria as they are at higher risk of becoming infected
28 with malaria because they live in dwelling that offer little protection from mosquitoes [10].
29 Because of the appalling life situation in the post conflict internally displaced persons' (IDP)
30 camps, it was necessary to conduct the study to determine ITN possession and associated
31 socio-demographic characteristics among pregnant women.

32 **Methods**

33 We conducted a cross-sectional study using quantitative data collection technique in Gulu
34 district IDP camps from March 3 to 19, 2009. Gulu district had 31 IDP camps [11] and had
35 10,888 pregnancies [12] from July 2007 to June 2008. Proportion to size cluster sampling
36 method was used to determine the numbers of pregnant women to be interviewed per IDP
37 camp. In each of the IDP camp, we first determined the centre of the camp. We then spun a

38 bottle on the ground and the direction of movement was where the bottle top face. All the
 39 households in that direction were counted and given a number. Corresponding numbers
 40 were written on a piece of papers which were folded and placed in non transparent
 41 polythene bag. A piece of paper was then picked blindly from the non transparent polythene
 42 bag to determine the starting household. We then interviewed 769 pregnant women using
 43 consecutive sampling methods by moving to the next nearest household. Our inclusion
 44 criteria were pregnant women who gave self report of carrying pregnancy; were residents of
 45 the 20 selected IDP camps and present on the interview date after giving a written informed
 46 consent to participate in the study. The exclusion criteria were pregnant women who were
 47 seriously sick or were in labour. The study was approved by the Faculty of Medicine
 48 Research and Ethics Committee, Makerere University that granted permission to study
 49 pregnant women less than 18 years old as emancipated minors.

50 We used questionnaire to collect data which were administered by trained research
 51 assistants who were fluent in the local language (Acholi). The questionnaire was translated
 52 into Acholi with the help of an expert linguistic and back translated into English and pretested
 53 before administering to the study population. The collected data was entered into Epidata
 54 version 3.1 cleaned, edited, coded and exported to STATA 11 for analysis. Continuous
 55 variables were summarised using means and categorical variables were displayed into
 56 tables for general description.

57

58 **Results**

59 A total of 769 pregnant women were interviewed with age ranging from 14 to 45 years with a
 60 mean age of 25.3 years and standard deviation (SD) of 6.2. Majority of pregnant women had
 61 primary education (540). Most pregnant women were cohabiting (477) followed by married
 62 pregnant women (232). Most respondents were Multigravidae (648). Table 1 summarises
 63 the socio-demographic characteristics of the respondents.

324 pregnant women had at least an ITN while 445 pregnant women had no ITN. Of the 324 pregnant women who own ITN, 265 pregnant women had slept under the ITN 5 times or more in the last one week before the survey. Also, 262 respondents had their ITN washed while 285 respondents indicated that their ITN were not retreated. Reasons for not having an ITN: 6 respondents said they gave theirs to children, 13 said they had no reason for not having an ITN, 24 said they had not gone for antenatal visit, 38 respondents said their ITN were burnt, 42 said they had not bought, 59 said their ITN were old, 87 said their ITN were torn and 164 said they were not given from the health centres. Table 2 summarises the results for ITN possession and use by respondents

740 respondents said it is good to use ITN while 13 said otherwise. 301 respondents were willing to continue using ITN that they were having while 12 were not willing to continue using ITN. Reasons for not continuing ITN use were causing itching of the eye 1, is torn 1, still hot 4 and no mosquitoes at the moment 6. 241 respondents were aware that their ITN were treated, 44 said their ITN was not treated while 39 respondents said they were not sure whether ITN is a treated net. 374 respondents were willing to buy ITN while 382 were not willing to buy ITN. Reasons for not willing to buy ITN were: 330 respondents indicated they had no money, 34 said they still have ITN and 12 respondents indicated other reasons. Table 3 summarises the results for respondents' perception and attitude toward ITN.

Factors associated with ITN possession at the Bivariate level were; no formal education (OR 0.61, 95%CI 0.44 – 0.86 and P-value 0.004), no antenatal visit (OR 0.51, 95%CI 0.37 – 0.71 and P-value 0.000), no business (OR 0.58, 95%CI 0.40 – 0.83 and P-value 0.003), being single/widow/divorce (OR 0.19, 95%CI 0.09 – 0.42 and P-value 0.000) and pregnancy of 6 months and above (OR 1.50, 95%CI 1.12 – 2.01 and P-value 0.007). Table 4 summarises the Bivariate results for socio-demographic characteristics associated with ITN possession.

Factors which affects ITN possession were; being single/widow/divorce (aOR 0.22, 95% CI 0.12 – 0.42, P-value 0.000), not having some business (aOR 0.62, 95% CI 0.39 – 0.98, P-

90 value 0.041), Have attended antenatal service (aOR 1.92, 95%CI 1.31 – 2.83, P-value
91 0.001) and having formal education (aOR 1.69 95%CI 1.11 – 2.56 and P-value 0.014).

92

93 **Discussion**

94 **ITN possession and use**

95 Our study shows that ITN possession was low at 42% among pregnant women in post
96 conflict IDP camps of Gulu district. This is quite below the target set by Ministry of Health of
97 50% ITN coverage among the vulnerable group by the year 2007 [1], the Roll Back malaria
98 global partnership of 60% ITN coverage among vulnerable group by 2005 [13] and the MDG
99 6 [9]. The respondents who did not possess ITN gave various reasons for not possessing
100 ITN. Majority of them stated that they were not given ITN from the health centres where they
101 had gone for antenatal visit. These could be due to stock out of ITN from the health facilities.
102 The distribution of ITN among the IDP population in northern Uganda were spearheaded by
103 Non Governmental Organisations and their activities were always programme specific which
104 may make certain places not to be covered. Other study indicates that the main reasons
105 given for not owning a net by pregnant women were lack of access to nets and a belief that
106 ITNs could not prevent malaria [14].

107 In Uganda, Ministry of Health has design two strategies for ITN distributions. The first one is
108 going to scale which needs fast distribution and high proportion of population reached and
109 the main distribution mechanism is mass campaigns or community distribution through
110 public sector and civil society targeting households with children under five and or the poor.
111 The second component is replacement which needs sustainable long term distribution
112 mechanisms and for this purposes health facility based distribution targeted to pregnant
113 women was being used [1]. It is evidence that these strategies have not help much in
114 improving ITN possession by pregnant women who were living in the IDP camps. The
115 majority of pregnant women had at least attended antenatal services once or were
116 multigravidae. All these conditions should at least make these pregnant women to have an

117 ITN if these strategies were working properly. Therefore there is need to redesign strategies
118 to ensure that ITN possession by pregnant women is increased.

119 The majority of respondents who owned at least an ITN had slept under their ITN five times
120 and above in the last one week prior to the survey. This was a surprise since the study was
121 conducted in the dry season when temperature would go very high. This could be because
122 the pregnant women value the protective benefit of ITN and they have to endure the high
123 temperature at night sleeping under ITN. Others studies done in Nigeria indicate that ITN
124 use by pregnant women were low [15,16]. While a study done in Ghana shows that
125 compliance with ITN use was high during the wet and cool season, but lower in the hot and
126 dry season [17].

127 Most of the ITN owned by respondents were washed four times and above and majority of
128 them were not retreated. Only a few respondents had their ITN retreated. ITN retreatment
129 helps in restoring the protective value of ITN as the chemical will be potent enough to kill or
130 repel mosquitoes. Similar result was reported in a study done in Luwero district of central
131 Uganda where only about half of pregnant women reported a net re-treatment with an
132 insecticide within the last 6 months [18]. Therefore it is evidence that this service is lacking in
133 Uganda and there is need to scale it up so that those in need can access them to have their
134 ITN retreated to restore its protective value.

135

136 **Perception and attitude toward ITN**

137 Most of the respondents reported that it was good to sleep under ITN while a few stated that
138 it was not good to sleep under ITN. The following benefits were revealed by the majority of
139 respondents who agreed that it was good to sleep under ITN; ITN prevent mosquitoes bite,
140 ITN prevent malaria and others (bed bugs, cockroaches and other crawling insects, provide
141 warmth during cold weather). Other study also shows that pregnant women who associated
142 bed net with beneficial value were more likely to use [19]. Respondents who think that it was
143 not good to sleep under ITN gave the following reasons; ITN being hot at night, not being

144 aware whether ITN is good and getting malaria despite sleeping under ITN. Other study
 145 shows that the most common reasons for non-use of net were hot weather, absence of the
 146 owner of net, a leaking roof and an absence of mosquitoes [17]. While a study conducted in
 147 Mbarara district of Uganda indicates that there were doubts about bed net efficacy in
 148 preventing malaria and barriers that were expressed for bed nets used were difficulty to keep
 149 free from holes, being inconvenient by increasing heat and sweating, causing suffocation
 150 and difficulty in buying nets for large family [20]. Other studies indicate that participants used
 151 bed nets when mosquitoes were plentiful and keep them in the dry season [20, 21].

152 In our study the majority of the respondents reported that they will continue using their ITN
 153 while a few stated otherwise. The reasons given for not continuing using ITN were that ITN
 154 causes itching of the eyes, ITN being torn already, the weather is still hot and there is no
 155 mosquito at the moment. Other similar results were reported in a study conducted in Kenya
 156 where reasons given by pregnant women for not using an ITN during pregnancy or
 157 discontinuing use after pregnancy were lack of an ITN, perceived inconvenience of the ITN
 158 e.g., hot, bad smell and difficult to tie and perceive absence of mosquitoes [19].

159 Majority of the respondents knew that ITN is a factory treated net to kill or repel mosquitoes.
 160 This high level of awareness is quite good for public health intervention and could probably
 161 explain why majority of those who owned ITN had slept under it five time and above in the
 162 week prior to the survey. Few of the respondents were either not sure or they did not know
 163 that their ITN had been factory treated prior to distributions. Almost half of the ITN own by
 164 the respondents had developed holes. These ITN could have developed holes as a result of
 165 becoming old which mean it has outlived it useful life or due to overcrowding in the house
 166 since the IDP buildings were small grass thatch huts which make the ITN to be tied in the
 167 night and removed in the morning to provide space in the house. This would therefore render
 168 the ITN to lose its protective values as mosquitoes would be able to gain access to the
 169 pregnant woman who is sleeping under and could transmit to her malaria parasite.

170

171 **Factors associated with ITN Possession**

172 Single/widow/divorce pregnant women were less likely to possess ITN than pregnant women
173 who were married/cohabiting. This could be due to lack of social support that
174 married/cohabiting pregnant women received from their husbands who encourage them to
175 acquire ITN for personal protection. Other studies have reported similar findings [22, 23]. A
176 study in Kinshasa shows that male partners were supportive of ITN use by their pregnant
177 wives [24].

178 Also, pregnant women who indicated that they were not doing some business were less
179 likely to possess ITN than those who indicated that they do have some business. This is due
180 to lack of money to purchase an ITN as reported by more than half of the respondents who
181 were not willing to buy ITN. Other studies have reported cost a hindering factor to ITN
182 ownership and use [25 - 28]. Previous studies have found that free distribution of ITNs has
183 resulted in substantial increase in net coverage compared to subsidize [26, 29]. Therefore it
184 might be necessary to have a mass and free distribution of ITNs to achieve the targets of
185 Roll Back Malaria (RBM) as suggested by other study [30]. While another study suggested
186 that free mass distribution of ITN allows for equitable ownership which makes pregnant
187 women more likely to use them regardless of their socio-economic status [31]

188 Respondents who had gone for antenatal visit were almost twice as likely to possess ITN as
189 their counter parts that had not gone for antenatal visit. During antenatal services, women
190 undergo health education session which will encourage them to acquire and use ITN. Also,
191 some ITN may be given as an incentive to encourage pregnant women to attend antenatal
192 services. Other study shows that provision of the LLINs to women free of charge at their first
193 antenatal clinic visit increased the reported use of bed nets dramatically the night before
194 enrolment [24].

195 Our finding indicates that respondents who had formal education were more likely to
196 possess ITN than those who had no formal education. This is most likely due to increased

197 awareness about ITN and its benefits as a result of sensitisation by teachers. Other study
198 shows that education was not associated with ITN ownership [23].

199

200 **Conclusion**

201 More than half of the respondents do not possess ITN which is quite below the target set by
202 the Roll Back Malaria Global Partnership and the Ministry of Health Uganda. Most of the
203 respondents who did not possess an ITN stated that they were not given during their
204 antenatal visit to the health facilities. Therefore government and other stakeholders must
205 scale up free ITN distributions among the vulnerable groups if the Ministry of Health and the
206 Roll Back Malaria Global Partnership Target is to be achieved. Also, economic
207 empowerment of pregnant women will make them able to purchase ITN as it has been
208 shown that respondents who do not own some business were less likely to possess an ITN.
209 Also, ITN retreatment services were low among pregnant women in the IDP camps.
210 Therefore, ITN retreatment services should be provided to those who need them so that they
211 can retreat their ITN which will allow the net to regain its protective value.

212

213 **Competing interests**

214 The authors declare that they have no competing interests.

215

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304

305 **Tables**

306 Table 1: Socio-demographic characteristics of respondents

Variable	Frequencies	Percentage
	n	(%)
<i>Age</i>		
14 - 25	423	55
26 - 45	346	45
<i>Level of Education</i>		
No Formal education	198	26
Primary	541	70
Secondary	026	04
Tertiary	002	00
<i>Marital Status</i>		
Married	232	30
Single	058	08
Cohabiting	477	62
Divorced	001	00
Widowed	001	00
<i>Gravidity</i>		
Multigravidae	648	84
Primigravidae	121	16
<i>Gestation Age in months</i>		
1 – 5 months	341	45
6 – 10 months	420	55
Have gone for antenatal visit		
Yes	511	67
No	255	33
Having experience child death immediately after birth		
Yes	105	16
No	534	84
Have ever experience miscarriage		
Yes	126	16
No	639	84
Having some business		
Yes	147	19

No	620	81
Having salary paying job		
Yes	007	01
No	761	99

Table 2: ITN possession and pattern of use by pregnant women

Variables	Frequencies (n)	Percentage (%)
<i>Owning an ITN</i>		
Yes	324	42
No	445	58
<i>Numbers of ITN owned</i>		
2 or more ITN	082	11
1 ITN	242	31
No ITN	445	58
<i>Number of times slept under ITN in the last one week</i>		
1 – 2 Times	023	07
3 – 4 Times	024	08
5 Times and above	265	85
<i>ITN washed</i>		
No	062	19
Yes	262	81
<i>Numbers of time ITN washed</i>		
1 Time	029	11
2 Times	049	19
3 Times	044	17
4 Times and above	140	52
<i>ITN retreatment</i>		
Yes	039	12
No	285	88
<i>Reasons for not having ITN</i>		
I have given to children	006	01
No reason	013	03
I have not gone for antenatal visit	024	06
Burnt	038	09
Not bought	042	10
ITN is old	059	14
ITN torn	087	20
Not given from health centres	164	38

Table 3: Respondents' perception and attitude toward ITN

Variables	Frequency	Percentage
	n	%
<i>Is it Good to use ITN</i>		
No	013	02
Yes	740	98
<i>Reasons for not being good to sleep under ITN</i>		
Hot at night	007	54
I do not know if it is good	005	38
I still get malaria even if I sleep under ITN	001	08
<i>Benefits of using ITN</i>		
Others	036	05
Prevent Malaria	306	42
Prevent Mosquito	383	53
<i>ITN effective at preventing mosquito bites</i>		
No	019	03
Yes	742	97
<i>Will you continue using ITN</i>		
No	012	04
Yes	301	96
<i>Reasons for not continuing ITN use</i>		
Causes itching of the eye	001	08
Is torn	001	08
Still hot	004	34
No mosquitoes at the moment	006	42
<i>Knew whether their ITN was treated</i>		
Not sure	039	12
No	044	14
Yes	241	74
<i>Willingness to buy ITN</i>		
Yes	374	49
No	382	51
<i>Reasons for not willing to buy ITN</i>		
Others	012	03
Still have ITN	034	09
No money	330	88
<i>ITN developing holes</i>		
Yes	149	46
No	175	54

Table 4: Bivariate results for socio-demographic characteristics and possession of ITN

	Frequency	Have an ITN		OR	95% CI	P-Value
	n	Yes	No			
Variable						
Age group						
14 - 25	418	184	234	1.00		
26 - 45	345	138	207	0.85	0.63 - 1.13	0.264
Have formal education						
Yes	569	258	311	1.00		
No	196	066	130	0.61	0.44 - 0.86	0.004
Antenatal visit						
Yes	511	243	268	1.00		
No	255	081	174	0.51	0.37 - 0.71	0.000
Experience of child death immediately after birth						
Yes	105	049	056	1.00		
No	534	226	308	0.84	0.55 - 1.28	0.412
Experience of miscarriage						
Yes	126	057	069	1.00		
No	639	266	373	0.86	0.59 - 1.27	0.453
Having some business						
Yes	147	078	069	1.00		
No	620	246	374	0.58	0.40 - 0.83	0.003
Having Salary Paying job						
Yes	007	003	004	1.00		
No	761	322	439	0.97	0.22 - 4.39	0.974
Gravidity						
Primigravidae	126	048	078	1.00		
Multigravidae	641	276	365	0.81	0.55 - 1.21	0.303
Marital Status						
Married/Cohabiting	708	316	392	1.00		
Single/Widow/Divorce	059	008	051	0.19	0.09 - 0.42	0.000
Months of pregnancy						
1 - 5 Months	341	125	216	1.00		
6 - 10 Months	420	195	225	1.50	1.12 - 2.01	0.007

333 Table 5: Logistic regression analysis of socio-demographic predictors of ITN possession
334

Variables	Crude OR	95% CI	P-Value	Adjusted OR	95% CI	P-value
Being Single/widow/divorce	0.22	0.10 - 0 .48	0.000	0.22	0.12 - 0.42	0.000
No business	0.62	0.43 – 0.90	0.012	0.62	0.39 – 0.98	0.041
Have attended Antenatal service	1.92	1.39 – 2.66	0.000	1.92	1.31 – 2.83	0.001
Have formal education	1.69	1.19 – 2.39	0.003	1.69	1.11 - 2.56	0.014

335