

Insecticide Treated Bednet Possession and Associated Factors 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 and associated factors among pregnant women who were living in internally displaced persons' (IDP) Camps where buildings offered little or no protection against mosquito.

Methods

We conducted a cross sectional study in 20 randomly selected IDP camps in Aswa and Omoro counties, Gulu district. Probability proportion to size cluster sampling technique was used to determine the numbers of expectant mothers in the selected camps. Consecutive sampling method was used by moving to the next nearest household until the required numbers of respondents were generated from each camp. Data collection was attained by using well designed pretested questionnaires before the survey.

Results

ITN possession: 42% of respondents (95% CI 1.54 – 1.61) possessed ITN.

Factors associated with ITN possession were; Have attended antenatal service (aOR 1.92, 95% CI 1.24 – 2.98, P-value 0.004); Having attained formal education (aOR 1.55, 95% CI 1.03 - 2.35, P-value 0.036); Willingness to buy ITN (aOR 1.98, 95% CI 1.22 – 3.21, P-value 0.006) and Willingness to recommend ITN use to others (aOR 3.77, 95% CI 1.12 – 12.77, P-value 0.033).

Conclusion

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

Use of insecticide treated mosquito net (ITN) is an effective strategy for preventing malaria in children and pregnant women [6]. In Uganda, currently ITN use is one of the mainstay strategies for malaria control amongst others strategies like indoor residual spraying, Intermittent Presumptive Treatment (IPT) and case detection and management [1]. In 2001, the African heads of state met in Abuja and set a target of 60% ITNs coverage among the vulnerable group of children and pregnant women [7]. The Roll Back Malaria global strategic plan (2005 – 2015) had set a target of 80% universal coverage of ITN among people at risk for malaria [8]. The Ministry of Health, Uganda had set a target of 50% of ITN coverage among the vulnerable groups especially pregnant women and children under 5 years by the year 2007 [1]. There has been promising signs of rapid scaling-up of ITNs coverage in many African countries [9]. However, the target set by the Ministry of Health, Uganda was not met as noted in annual health sector performance report of 2007 [1].

The poor bear the highest burden of malaria as they are at higher risk of becoming infected with malaria because they live in dwelling that offer little protection from mosquitoes [10]. As a result of the appalling life situation in the post conflict internally displaced persons' (IDP) camps, it was necessary to conduct the study to determine ITN possession and associated factors among pregnant women in Gulu district IDP camps.

37 **Methods**

38 **Study area**

39 We conducted a cross-sectional study using quantitative data collection technique in Gulu
40 district IDP camps from March 3 to 19, 2009. Gulu district is one of the districts affected by
41 the armed insurgency in northern Uganda since 1986. As of 2005, nearly 90% of the
42 population had relocated to camps and bednet coverage was low at only 25.5% [11].. The
43 district has a municipality and two counties (Aswa and Omoro). The district had 31 IDP
44 camps [12] made up of grass thatch huts or tents provided by the non-governmental
45 organizations. There were 10,888 pregnancies [13] from July 2007 to June 2008.

47 **Sample size and Sampling**

48 We used the modified Kish and Leslie formula of 1965 with a 95% confidence level, a
49 precision of 5%, an estimated proportion of the pregnant women having ITN at 50%
50 (proportion is unknown) and a conservative design effect of 2 to cater for intra-cluster
51 variability [14] to estimate sample size. The calculated sample size was 769 pregnant
52 mothers. We selected twenty (20) IDP camps using simple random sampling as clusters for
53 survey with ten (10) IDP camps in each County. The name of the IDP camps in each county
54 was written on a piece of paper. The piece of paper was folded and put inside a non
55 transparent polythene bag for each county. The pieces of paper with the IDP camp name in
56 them were then picked once at a time without replacement from the polythene bag until the
57 names of the 10 IDP camps in each of the two counties were generated. We used probability
58 proportional to size cluster sampling method to determine the numbers of pregnant women
59 to be interviewed per IDP camp. We divided the population of pregnant women in each of
60 the IDP camps to be surveyed by the total numbers of pregnant women in all the clusters
61 and multiplying by the sample size (769) to get the numbers of pregnant women to be
62 interviewed per IDP camp. In each of the IDP camp, we first determined the centre of the
63 camp. We then spun a bottle on the ground and the direction of movement was where the

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

Data collection, management and analysis

Data was collected using questionnaire which were administered by trained research assistants who were fluent in the local language (Acholi). The questionnaire was translated into Acholi with the help of an expert linguistic and back translated into English and pretested before administering to the study population. The collected data was entered into Epidata version 3.1 cleaned, edited and exported to STATA 11 for analysis. We calculated 95% confidence interval (CI) for factors associated with ITN possession and any p-value < 0.05 was taken as statistically significant. Any factor with p-value ≤ 0.2 at bivariate analysis was taken for multivariate analysis. Continuous variables were summarised using means and categorical variables were displayed into tables for general description.

90 **Results**

91 **Socio-demographic characteristics of the respondents**

92 A total of 769 pregnant women were interviewed with age ranging from 14 to 45 years with a
93 mean age of 25.3 years and standard deviation (SD) of 6.2. Majority of pregnant women
94 (70%) had primary education. Most pregnant women (62%) were cohabiting. Most
95 respondents (84%) were Multigravidae. Table 1 summarises the socio-demographic
96 characteristics of the respondents.

97

98 **ITN possession and use by respondents**

99 Slightly less than half of the pregnant women (42%) had at least an ITN. Majority of the
100 pregnant women (72%) were given ITN from health facilities. Most of the pregnant women
101 (85%) who owned at least an ITN had a high compliance of use in the last one week before
102 the survey. Table 2 summarises the results for ITN possession and use by respondents

103

104 **Respondents' perception and attitude toward ITN**

105 Majority of the respondents (98%) said it was good to use ITN. More than half of the
106 pregnant women (53%) reported the benefit of using ITN as it prevent mosquito bites while
107 slightly less than half (42%) of them indicated that ITN prevent malaria transmission. Majority
108 of pregnant women (97%) perceived ITN as effective at preventing mosquito bites. Most
109 respondents (96%) who had ITN were willing to continue using their ITN. About half of the
110 pregnant women (51%) were not willing to buy ITN and most of them (88%) cited lack of
111 money. Table 3 summarises the results for respondents' perception and attitude toward ITN.

112

113 **Bivariate results for socio-demographic characteristics associated with ITN** 114 **possession**

115 Factors associated with ITN possession at the Bivariate level were; no formal education (OR
116 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

117 and P-value 0.000), not having any form of business (OR 0.58, 95%CI 0.40 – 0.83 and P-
118 value 0.003), being single/widow/divorce (OR 0.19, 95%CI 0.09 – 0.42 and P-value 0.000)
119 and pregnancy of 6 months and above (OR 1.50, 95%CI 1.12 – 2.01 and P-value 0.007).
120 Table 4 summarises the Bivariate results for socio-demographic characteristics associated
121 with ITN possession.

122

123 **Bivariate results for attitude and perception associated with ITN possession**

124 Factors associated with ITN possessions were; Not knowing whether ITN is effective at
125 preventing mosquito bites (OR 0.61, 95% CI 0.44 – 0.86, P-value 0.004); Willingness to buy
126 ITN (OR 2.39, 95% CI 1.77 - 3.24, P-value 0.000); Willingness to recommend ITN use to
127 others (OR 5.01, 95% CI 1.72 – 14.63, P-value 0.001). Table 5 summarises the bivariate
128 results for attitude and perception associated with ITN possession.

129

130 **Multivariate logistic regression analysis of predictors of ITN possession**

131 Factors associated with ITN possession were; Have attended antenatal service (aOR 1.92,
132 95% CI 1.24 – 2.98, P-value 0.004); Having attained formal education (aOR 1.55, 95% CI
133 1.03 - 2.35, P-value 0.036); Willingness to buy ITN (aOR 1.98, 95% CI 1.22 – 3.21, P-value
134 0.006) and Willingness to recommend ITN use to others (aOR 3.77, 95% CI 1.12 – 12.77, P-
135 value 0.033). Table 6 summarises the logistic regression results for the predictor of ITN
136 possession among pregnant women in Gulu district IDP camps.

137

138 **Discussion**

139 **ITN possession and use**

140 Our study showed that ITN possession was low at only 42% among pregnant women in post
141 conflict IDP camps of Gulu district. That was quite below the target set by Ministry of Health
142 of 50% ITN coverage among the vulnerable group by the year 2007 [1], the Roll Back
143 malaria global partnership of 60% ITN coverage among vulnerable groups by 2005 [15] and

144 the Roll Back Malaria global strategic plan (2005 – 2015) of 80% coverage among the
145 population [8]. The Uganda Demographic and Health Survey of 2006 indicate that 34% of
146 households had ITN. The report further reveals that 41.8% of IDP households had ITNs.
147 However, only 20.9% of the pregnant women had slept under their ITN the night prior to the
148 survey [16].

149 Majority of the ITN owned by the respondents were given from health facilities for free.
150 Therefore, there is need to stock up ITN at the health facilities so that pregnant women who
151 go for antenatal visit for the first time are given ITN. Other studies also indicated that majority
152 of ITN owned by respondents were given through mass campaign [17]. The respondents
153 who did not possess ITN gave various reasons for not possessing ITN. Majority of the
154 respondents were not given ITN from the health centres where they had gone for antenatal
155 visit. These could be due to stock out of ITN from the health facilities. The distributions of
156 ITN among the IDP population in northern Uganda were spearheaded by Non Governmental
157 Organisations (NGOs). The NGOs activities were always programme specific which may
158 make certain places not to be covered. Similar result was reported in another study in which
159 the main reason given for not owning a net by pregnant women was lack of access to nets
160 [18].

161 In Uganda, Ministry of Health has design two strategies for ITN distributions. The first one is
162 going to scale which needs fast distribution and high proportion of population reached. The
163 main distribution mechanism was mass campaigns or community distribution through public
164 sector and civil society targeting households with children under five and or the poor. The
165 second component is replacement which needs sustainable long term distribution
166 mechanisms. Here, the health facility based distribution targeted to pregnant women was
167 being used [1]. It is evidence that these strategies have not help much in improving ITN
168 possession by pregnant women who were living in the IDP camps. The majorities of
169 pregnant women had at least attended antenatal services once or were multigravidae. All
170 these conditions should have made at least the pregnant women to have had an ITN if these

171 strategies were working properly. Therefore there is need to redesign strategies to ensure
172 that ITN possession by pregnant women is increased.

173 The majority of respondents who owned at least an ITN had high compliance with ITN use in
174 the last one week prior to the survey. This was a surprise since the study was conducted in
175 the dry season when temperature would go very high. This could be because the pregnant
176 women value the protective benefit of ITN. Others studies done in Nigeria indicated that ITN
177 use by pregnant women were low [19, 20]. While a study done in Ghana showed that
178 compliance with ITN use was high during the wet and cool season, but lower in the hot and
179 dry season [21].

180 Most of the ITN owned by respondents were washed four times and above. Majority of the
181 ITN owned by the respondents were not retreated. Only a few respondents had their ITN
182 retreated. ITN retreatment helps in restoring the protective value of ITN as the chemical will
183 be potent enough to kill or repel mosquitoes. Similar result was reported in a study done in
184 Luwero district of central Uganda where only about half of pregnant women reported a net
185 re-treatment with an insecticide within the last 6 months [22]. It is evidence that ITN
186 retreatment service is lacking in Uganda. Therefore, there is need to scale it up so that those
187 in need can access them to have their ITN retreated to restore its protective value.

188

189 **Perception and attitude toward ITN**

190 Most of the respondents reported that it was good to sleep under ITN while a few stated that
191 it was not good to sleep under ITN. The following benefits were revealed by the majority of
192 respondents who agreed that it was good to sleep under ITN; ITN prevent mosquitoes bite,
193 ITN prevent malaria and others (bed bugs, cockroaches and other crawling insects, provide
194 warmth during cold weather). Other study also shows that pregnant women who associated
195 bed net with beneficial value were more likely to use [23]. Respondents who think that it was
196 not good to sleep under ITN gave the following reasons; ITN being hot at night, not being
197 aware whether ITN is good and getting malaria despite sleeping under ITN. Other study

198 showed that the most common reasons for non-use of net were hot weather, absence of the
199 owner of net, a leaking roof and an absence of mosquitoes [21]. While a study conducted in
200 Mbarara district of Uganda indicates that there were doubts about bed net efficacy in
201 preventing malaria. The barriers that were expressed for bed nets used were difficulty to
202 keep free from holes, being inconvenient by increasing heat and sweating, causing
203 suffocation and difficulty in buying nets for large family [24]. Other studies indicate that
204 participants used bed nets when mosquitoes were plentiful and keep them in the dry season
205 [24, 25].

206 In our study the majority of the respondents reported that they will continue using their ITN
207 while a few stated otherwise. The reasons given for not continuing using ITN were that ITN
208 causes itching of the eyes, ITN being torn already, the weather is still hot and there was no
209 mosquito at the moment. In other study pregnant women gave various reasons for not using
210 an ITN during pregnancy or discontinuing use after pregnancy were lack of an ITN,
211 perceived inconvenience of the ITN e.g., hot, bad smell and difficult to tie and perceive
212 absence of mosquitoes [23].

213 Majority of the respondents knew that ITN was factory treated net to kill or repel mosquitoes.
214 This high level of awareness was quite good for public health intervention. This could
215 probably explain why majority of those who owned ITN had high compliance sleeping under
216 it in the week prior to the survey. Few of the respondents were either not sure or they did not
217 know that their ITN had been factory treated prior to distributions. Almost half of the ITN
218 owned by the respondents had developed holes. These ITN could have developed holes as
219 a result of becoming old which meant it had outlived its usefulness or due to overcrowding in
220 the house that rendered ITN use an impracticable. The IDP houses were small grass
221 thatched huts which made the ITN to be tied at night and removed in the morning to provide
222 space in the house making it a real inconvenience. This would therefore render the ITN to
223 lose its protective values. The mosquitoes would therefore be able to gain access to the
224 pregnant woman who was sleeping under and could transmit to her malaria parasite.

225

226 **Factors associated with ITN Possession**

227 Our study showed that respondents who indicated that they were willing to buy ITN were
228 almost twice more likely to possessed ITN than respondents who were not willing to buy ITN.
229 This could be due to lack of money to purchase an ITN as reported by more than half of the
230 respondents who were not willing to buy ITN. Other studies have reported cost a hindering
231 factor to ITN ownership and use [26, 27 - 30]. Previous studies have found that free
232 distribution of ITNs has resulted in substantial increase in net coverage compared to
233 subsidize [28, 31]. Therefore it might be necessary to have free mass distribution of ITNs to
234 achieve the targets of Roll Back Malaria (RBM) as suggested by another study [32]. While
235 another study suggested that free mass distribution of ITN allows for equitable ownership
236 which makes pregnant women more likely to use them regardless of their socio-economic
237 status [33]

238 Respondents who had gone for antenatal visit were almost twice as likely to possess ITN as
239 their counter parts who had not gone for antenatal visit. During antenatal services, women
240 undergo health education session which will encourage them to acquire and use ITN. Also,
241 some ITN may be given as an incentive to encourage pregnant women to attend antenatal
242 services as indicated by majority who owned ITN that their main source was health facilities.
243 Other study shows that provision of the LLINs to women free of charge at their first antenatal
244 clinic visit increased the reported use of bed nets dramatically the night before enrolment
245 [34].

246 Our finding indicates that respondents who had formal education were more likely to
247 possess ITN than those who had no formal education. This is most likely due to increased
248 awareness about ITN and its benefits as a result of sensitisation by teachers. Similar result
249 was reported in a review by Singh *et al* [35]. However, another study indicates that education
250 was not associated with ITN ownership [36].

251 Respondents who indicated that they were willing to recommend ITN use to others were
252 almost four times more likely to possessed ITN than their counterparts who were not willing
253 to recommend ITN use to others. These respondents could be aware of ITN benefits and so
254 they want others to get the benefit of ITN use. This attitude was good because those
255 respondents who possessed ITN and were recommending its use to others will provide
256 valuable information to others basing on their personal experiences while using ITN. This
257 would in turn unlock the might associated with ITN use and therefore promote ITN uptake in
258 the society.

259

260 **Conclusion**

261 More than half of the respondents did not possessed ITN which was quite below the target
262 set by the Roll Back Malaria Global Partnership and the Ministry of Health Uganda. Most of
263 the respondents who did not possess an ITN stated that they were not given during their
264 antenatal visit to the health facilities. Therefore government and other stakeholders must
265 scale up free ITN distributions among the vulnerable groups if the Ministry of Health and the
266 Roll Back Malaria Global Partnership Target is to be achieved. Also, economic
267 empowerment of pregnant women will make them able to purchase ITN as it has been
268 shown that respondents who were not willing to buy an ITN were almost two times less likely
269 to possess an ITN.

270 Also, ITN retreatment services were low among pregnant women in the IDP camps.
271 Therefore, ITN retreatment services should be provided to those who need them so that they
272 can retreat their ITN which will allow the net to regain its protective value.

273

274 **Competing interests**

275 The authors declare that they have no competing interests.

276

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387

388 **Tables**

389 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
Household monthly income		
0.00 to 5,000 Shillings	529	69
5,001 to 10,000 Shillings	077	10

10,001 to 29,999 Shillings	056	07
30,000 to 500,000 Shillings	107	14

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>Sources of ITN</i>		
Given from Health Centre	233	72
Given by NGO	041	13
Bought it Myself	041	13
Others	008	02
<i>Numbers of ITN owned</i>		
2 or more ITN	082	11
1 ITN	242	31
No ITN	445	58
<i>ITN usage in the last one week before survey</i>		
Low Compliance	023	07
Moderate Compliance	024	08
High compliance	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

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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
<i>Willingness to recommend ITN use to others</i>		
Yes	728	96
No	30	04

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

	Frequency	Have an ITN		OR	95% CI	P-Value
Variable	n	Yes	No			
<i>Age group</i>						
14 - 25	418	184	234	1.00		
26 - 45	345	138	207	0.85	0.63 - 1.13	0.264
<i>Have formal education</i>						
Yes	569	258	311	1.00		
No	196	066	130	0.61	0.44 - 0.86	0.004
<i>Antenatal visit</i>						
Yes	511	243	268	1.00		
No	255	081	174	0.51	0.37 - 0.71	0.000
<i>Experience of child death immediately after birth</i>						
Yes	105	049	056	1.00		
No	534	226	308	0.84	0.55 - 1.28	0.412
<i>Experience of miscarriage</i>						
Yes	126	057	069	1.00		
No	639	266	373	0.86	0.59 - 1.27	0.453
<i>Having some business</i>						
Yes	147	078	069	1.00		
No	620	246	374	0.58	0.40 - 0.83	0.003
<i>Having Salary Paying job</i>						
Yes	007	003	004	1.00		
No	761	322	439	0.97	0.22 - 4.39	0.974
<i>Household monthly income</i>						
1 st Quartile (0.00 to 5,000 Shillings)	529	211	318	1.00		
2 nd Quartile (5,001 to 10,000 Shillings)	077	034	043	1.19	0.74 - 1.93	0.476
3 rd Quartile (10,001 to 29,999 Shillings)	056	021	035	0.90	0.51 - 1.60	0.729
4 th Quartile (30,000 to 500,000 Shillings)	107	058	049	1.78	1.17 - 2.72	0.006
<i>Gravidity</i>						
Primigravidae	126	048	078	1.00		
Multigravidae	641	276	365	0.81	0.55 - 1.21	0.303
<i>Marital Status</i>						

Married/Cohabiting	708	316	392	1.00		
Single/Widow/Divorce	059	008	051	0.19	0.09 - 0.42	0.000
<i>Months of pregnancy</i>						
1 - 5 Months	341	125	216	1.00		
6 - 10 Months	420	195	225	1.50	1.12 - 2.01	0.007

Table 5: Bivariate results for Attitude and Perception associated with ITN possession

	Frequency	Have an ITN		OR	95% CI	P-Value
Variable	n	Yes	No			
<i>Is it Good to use ITN</i>						
Yes	740	318	422	1.00		
No	13	004	009	0.59	0.18 - 1.94	0.378
<i>ITN effective at preventing mosquito bites</i>						
Yes	742	312	430	1.00		
No	019	009	010	0.61	0.44 - 0.86	0.004
<i>Willingness to buy ITN</i>						
No	382	123	259	1.00		
Yes	374	268	175	2.39	1.77 - 3.24	0.000
<i>Willing to recommend ITN use to others</i>						
No	30	004	026	1.00		
Yes	728	317	411	5.01	1.72 - 14.63	0.001

Table 6: Logistic regression analysis of socio-demographic predictors of ITN possession

Variables	Crude OR	95% CI	P-Value	Adjusted OR	95% CI	P-value
Having some business	1.57	1.07 - 2.31	0.022	1.57	0.96 - 2.57	0.072
Have attended Antenatal service	1.92	1.38 - 2.68	0.000	1.92	1.24 - 2.98	0.004
Have formal education	1.55	1.09 - 2.22	0.015	1.55	1.03 - 2.35	0.036
<i>Willingness to buy ITN</i>	1.98	1.45 - 2.69	0.000	1.98	1.22 - 3.21	0.006
<i>Willing to recommend ITN use to others</i>	3.77	1.27 - 11.24	0.017	3.77	1.12 - 12.77	0.033

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List of IDP Camps in Gulu District as of June 2008 and Clusters

Camp Name	County NAME	Sub-county NAME	Parish NAME	Popn (2008) Individuals	Women of child bearing age (15 – 49 years) (23% of the population)	Women expected to become pregnant (5% of the population)	IDP Camps Selected	Proportion of pregnant women selected in each IDP camp for survey
Oroko	Aswa	Palaro		3,439	791	40	Yes	28
Palaro	Aswa	Palaro	Labworomor	7,435	1710	86	Yes	60
Cet Kana	Aswa	Bungatira	Atiaba	1,272	293	15	No	
Koro-abili	Omoro	Koro	Pageya	7,316	1683	84	Yes	59
Corner Agula	Omoro	Lalogi	Lukwor	2,567	590	30	Yes	21
Paicho	Aswa	Paicho	Kal-Umu	6,525	1501	75	Yes	52
Monroc	Aswa	Bungatira		2,304	530	26	Yes	18
Cwero	Aswa	Paicho	Pagik	3,966	912	46	Yes	32
Acet	Omoro	Odek	Binya	13,383	3078	154	Yes	108
Patiko-Ajulu	Aswa	Patiko	Kal	5,873	1351	68	Yes	48
Lugore	Aswa	Palaro	Owalo	2,155	496	25	No	
Lukodi	Aswa	Bungatira		1,215	279	14	No	

Adak	Omoro	Lalogi	Lukwir	1,915	440	22	No	
Te-tugu	Omoro	Koro	Lapainat West	5,636	1296	65	Yes	45
Palenga	Omoro	Bobi	Palenga	4,756	1094	55	Yes	38
Atoo Hill	Aswa	Paicho	Kal-Umu	1,064	245	12	Yes	8
Alokolum	Omoro	Ongako	Alokolum	4,061	934	47	Yes	33
Awach	Aswa	Awach	Paduny	4,747	1092	55	Yes	38
Odek	Omoro	Odek	Binya	1,488	342	17	No	
Coope	Aswa	Bungatira	Agonga	4,451	1024	51	Yes	36
Awere (Gulu)	Omoro	Odek	Lamola	1,766	406	20	No	
Dino	Omoro	Odek	Palaro	1,474	339	17	Yes	12
Unyama	Aswa	Paicho	Pakwelo	5,058	1163	58	Yes	41
Lalogi	Omoro	Lalogi	Gem	3,264	751	38	No	
Okwir	Omoro	Bobi		150	35	2	No	
Opit	Omoro	Lalogi	Parwec	4,951	1139	57	Yes	40
Ongako	Omoro	Ongako	Kal	2,710	623	31	Yes	22
Bobi	Omoro	Bobi	Paidwe	1,813	417	21	No	
Omel Apem	Aswa	Paicho	Omel	353	81	4	No	
Awoo	Omoro	Lakwana	Parak	3,780	869	43	Yes	30
Minakulu	Omoro	Bobi	Palwo	3,450	794	40	No	
TOTAL	31			114,187	26263	1098		769

465 Source: IDP camps and population were based on UNHCR data as of 28th July, 2008.

466 Population of women of reproductive age and expected pregnancies were based on

467 Ministry of health statistical abstract of 2008/9