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Original Research

Replacement of Long Lasting Insecticide Treated Nets in Malarious Kebeles of Gida Ayana District, East Wollega Zone, Ethiopia

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Abstract

The main objective of the study was to determine the sustainability of owning and utilization of long lasting insecticide treated nets in malarious kebeles of Gida Ayana District. A community-based cross-sectional study design was used to investigate the replacement and utilization of long lasting insecticide treated nets (LLINs) in four malarious kebeles of Gida Ayana District. The study was conducted in June, 2013 on randomly sampled 420 households. Data were collected using structured, pretested, interviewer-administered questionnaire and presences of LLINs in sleeping areas were checked. Data analysis was performed using SPSS 20.0 for windows software. Logistic regression analysis was used for determining LLINS ownership and socio-demographic characteristics. *P* values of less or equal to 0.05 were considered significant. Of the 420 households included in the study, 69.3% possessed one or more LLINs which are owned primary (for the first time) or replaced (substituting the old bed nets after three years of use). There was no significant association between socio-demographic characteristics of respondents and LLINs owing (*P* >0.05). Attrition rate of households in LLINs owing was 101(24 %). Of the 291 households which possessed one or more insecticides, 60.8% have replaced the LLINs after three years of use. 57.8% of respondents knew as LLINs need replacement after 3 years of use. 81.3 and 19.7 % of respondent prefer free supply and cost subsidize supply of LLINs for sustainable owing respectively. Of 114 households who have possessed LLINs primarily, 70.2 % have used the LLINs for more than 3 years. Utilization rate of LLINs available in the households the night prior to the study was 64.9 % and in 69.75 % of households LLINs were hanged in sleeping areas. Proportion of pregnant women and under five children slept under LLINs the night preceding the study was 43.1 and 48.4 % respectively. Old, worn out LLINs have been replaced after three years of use to sustain malaria control in the study area. Utilization of LLINs among malaria risk group was low. Every household in malarious kebeles should be included during substituting LLINs. Regular monitoring of household is required from health extension workers to scale-up and sustain utilization of LLINs in malaria control.

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INTRODUCTION

Malaria is a major public health problem in Ethiopia; it contributes up to 20% of under-five deaths, estimated to cause 5-10 million clinical malaria cases each year and accounts for 12% of outpatient visit and 10% of health facility admissions (Ethiopian MOH, 2004 and President`s malaria Initiative, 2011).

Between 2000 and 2010, malaria mortality rates fell by 26% around the world. In the WHO African Region the decrease was 33%. During this period, an estimated 1.1 million malaria deaths were averted globally, primarily as a result of a scale-up of interventions (WHO, 2012). LLINs or bed nets have been shown to be the most cost-effective prevention method against malaria and are part of WHO's Millennium Development Goals (WHO, 2010). Use of LLINs is one of the Malaria control strategy in Ethiopia (Ethiopian MOH, 2011). In Ethiopia, distribution of Insecticide treated nets for the control of malaria was first introduced in 2004 (Ethiopian MOH, 2006).

A long-lasting insecticidal net is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibres. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and three years of recommended use under field conditions (WHO, 2005). If long-lasting bed nets have physical lifespan of 3 years, they are more cost effective compared to the conventional type insecticide treated nets (Anni-Maria *et al*., 2012).

Some studies indicated effective life span of LLINs in different countries as 2 to 3 years in Tanzania (Erlanger *et al*., 2004), three and four years in Western Uganda (Kilian *et al*., 2011), in SNNP of Ethiopia an estimated 31.0% of all nets owned in the previous three years had been discarded by owners, the majority of whom considered the nets too torn, old or dirty (Batisso *et al*., 2012).

WHO recommended strategy, show that free mass distribution of long-lasting insecticidal nets is a powerful way to quickly and dramatically increase coverage (World Malaria Report, 2005). In Ethiopia, LLINs have been freely supplied to increase possession in malaria endemic areas. Coverage of ITNs has been increased in Ethiopia. National ITN coverage rates increased from 3.4% in 2005 to 53.3% in 2007 (Ethiopian MOH, 2007). Recent studies indicated an increase in coverage of ITNs in Ethiopia; 62.4% (Sibhatu *et al*., 2012), 65.5% (Tesfaye *et al*., 2012). One of Ethiopia National Strategic Plan for Malaria Prevention and Control 2011-2015 is to maintain 100% of households in malarious areas own, on average, two LLINs (President`s malaria Initiative, 2011).

There was wide gap between coverage and utilization of LLINs in Ethiopia. Some LLINs available in the household were not used (Tesfaye *et al*., 2012; Daddi *et al*., 2005; Ayalew and Amsalu, 2009). Not all ITNs freely supplied to households were used (Gashaw and Wakgari, 2008).

Malaria vulnerable groups, young children and pregnant women, should be prioritized to use ITNs available in the household (Jodi *et al*., 2010). Most nations in Africa have policies for distributing ITNs to pregnant women through various mechanisms; however coverage remains well below the targets (Megha *et al*., 2013). Some studies done in Ethiopia indicated proportion of pregnant women who sleep under ITNs the night preceding the studies were less than 50% (Tesfaye *et al*., 2012; Daddi *et al*., 2005). 5.5 lives could be saved per year for every 1000 children under 5 years of age protected by using ITNs (WHO, 2007). In Ethiopia, LLINs utilization rate of children under five years was less than 50% (Sibhatu *et al*., 2012; Tesfaye *et al*., 2012).

This study was carried out to ascertain consistent delivery (owing) and utilization of LLINs in malaria endemic area of Gida Ayana district. As longevity of the net and longevity of insecticidal activity to retain its biological activity on LLINs guarantee for three years, LLINs need continuous replacement every three years to sustain malaria prevention in the community. In Gida Ayana district, LLINs have been used for malaria control since 2007 and the previous distributed old unusable LLINs have to be replaced with new ones to enhance the ongoing efforts to sustain and expand malaria intervention.

MATERIALS AND METHODS

Study Area and Period

The study was conducted in malarious kebeles of Gida Ayana district in June 2013. Gida Ayana district is located 112 Kms from Nekemte, which is the main city of East Wollega Zone. The district consists of 25 kebeles of which 8 are malarious.

Sample Size Determination and Sampling Method

A community based cross-sectional study was conducted in four Kebeles (Gutin 01 kebele, Andode-dicho, Tulu Lencha and Lelistu Anger) which were randomly selected using the lottery method from eight malarious kebeles of Gida Ayana district. The study units were households and the number of households which were included in the study in each selected kebeles was proportional to the total number of households in the kebeles (Table 1).

Table 1: Number of households sampled from selected malarious kebeles of Gida Ayana District.

Kebeles	Population size	Households	Households sampled
Gutin 01	7415	2484	118
Lelistu Anger	6929	1862	88
Tulu Lencha	4281	1040	50
Andode-dicho	15886	3454	164
Total	**34511**	**8840**	**420**

Sample size was determined by using a single population proportion formula, by an expected proportion (ITN coverage) of 47.5% in Oromia (Estifanos *et al*., 2008), 5% margin of error, and 95% confidence of certainty. Considered a 10% adjustment for non-response rate, the calculated sample size was 420 households. The households for the study were systematically (every 21th of households) selected from the kebeles. Then, the heads of households (or their spouse) were interviewed. If the appropriate respondent was not available in the house during initial visit, revisits were considered to contact the appropriate person.

Data Collection Methods

Data were collected by using structured, pre-tested and interviewer administered questionnaire initially prepared in english and then translated to local language Amharic and Afan Oromo. In households where LLINs were reported to be present, interviewers checked and confirmed the presence of the bed nets in the sleeping area. Data were collected by four trained individuals, supervised by one supervisor.

The major variables included in the questionnaire were socio-demographic factors, LLINs owing, replacement of LLINs after three years of use and prioritizing available LLINs for pregnant women and children less than five years.

Data Analysis

Data entry and analysis were performed using SPSS 20.0 for windows software. Logistic regression analysis was used for determining LLINS ownership and socio-demographic characteristics. 95% confidence intervals (CI) were used to examine the strength of association and *P* values of less or equal to 0.05 were considered significant.

Ethical Considerations

The study was conducted after obtaining ethical clearance from Wollega University Ethical Review Committee (Ref. No: WU-RD/191/2013, Dated: 1/03/2013). Permissions were obtained from different administrative officials of the study area. Verbal consent was also obtained from the study participants before administering the questionnaire.

RESULTS

Socio-demographic Characteristics

Of the 420 households included in the study; total population of 2002 were identified of which 3.2 % were pregnant women and 21.8 % were children less than five years of age. Average ± SD household size of 4.77±1.93. The mean age of respondents was 30.2±9.3. 76.2% respondents were female and 65.2% of respondents were illiterate (Table 2).

LLINs Possession

Of the 420 households included in the study, 69.3 % possessed one or more long lasting insecticide treated nets which were owned for the 1st time or replaced. Average LLINs possessed per household was 1.2. The attrition rate of LLINs possession was 24% (Table 3). There was no significant association between socio-demographic characteristics of respondent and LLINs owing (*P* >0.05) (Table 4).

Of the 291 households which possessed one or more LLINs, 60.8% have replaced the long lasting insecticide nets after three years of use and 39.2 % of households owned the bed nets primary (Table 5). Of 114 households who have possessed bed nets for the 1st time, 70.2 % have used the LLINs for more than three years. 57.8% of respondents knew as long lasting insecticide treated nets need replacement after 3 years of use (Table 6). 81.3 % of respondent prefer free supply of bed nets for sustainable use of insecticide treated bed nets for malaria control (Table 5). There was no significant association between educational status and residence of respondents with knowledge of LLINs replacement every three years (Table 6).

Table 2: Socio-demographic characteristics of respondents in malarious kebeles of Gida Ayana district, East Wollega Zone, Oromia, Ethioipa

Variables (n=420)	Number	Percent
Sex		
Male	100	23.8
Female	320	76.2
Ethnicity		
Amhara	248	59
Oromo	129	30.7
Tigrae	41	9.8
Others	2	0.5
Education Status		
Literate	146	34.8
Illiterate	274	65.2

Table 3: Long lasting insecticide treated nets possession of households in Malarious Kebeles of Gida Ayana district, East Wollega Zone, Oromia, Ethioipa.

Variables	Frequency	Percent
LLINs possession		
OwnedPrimary or replaced	291	69.3
Attrition	101	24.0
No bed nets	28	6.7
Number of LLINs owed		
1	237	81.4%
2	50	17.2%
3	4	1.4%

Table 4: Socio-demographic characteristics of respondents and long lasting insecticide treated nets possession in Malarious Kebeles of Gida Ayana district, East Wollega Zone, Oromia, Ethioipa.

Variables	LLINs Owing		Logistic Regression Analysis			
	Yes	No*	OR	DF	P- value	95% C.I. for OR
Sex						
Male	66	34	0.82	1	0.415	(0.508, 1.322)
Female	225	95				
Residence						
Urban	87	31	1.344	1	0.195	(0.86, 2.1)
Rural	204	98				
Education						
Literate	105	41	1.212	1	0.394	(0.78, 1.88)
Illiterate	186	88				

*Household which did not have LLINs during the study (lost or which did not ownedtotal)

Table 5: Status of Long lasting insecticide treated nets possessed by households in malarious kebeles of Gida Ayana, East Wollega Zone, Oromia, Ethiopia.

Variables	Number	Percent
Status of bed nets (n=291)		
Owned for the first time	114	39.2
Replaced	177	60.8
Period of owning LLINs among for the 1st time possessed (n=114)		
Less than 3 years ago	33	30
Before 3 years ago	80	70
Knowledge of bed nets replacement after 3 years of use (n= 391)		
Freely supplied	318	81.3
Cost subsidize supply	73	18.7

Table 6: Educational status and residence of respondents with knowledge of LLINs replacement in malarious kebeles of Gida Ayana District, June, 2013

Variables	Knowledge of bed nets replacement (N= 391*)		Logistic Regression Analysis			
	Yes	No	OR	DF	P-value	95%C.I. for OR
Education status						
Literate	77	59	0.892	**1**	0.597	(0.585, 1.36)
Illiterate	150	105				
Residence						
Urban	72	40	0.99	**1**	0.914	(0.825, 1.188)
Rural	154	125				

*Number of Housed holds who have ownedand lost previously ownedLLINs

Utilization of LLINs

Of 291 households that owned one or more LLINs, any member of the household slept under a net the night prior to the study was 64.9 %.51% of households use the available LLINs always. In 69.75 % of households LLINs were hanged in the sleeping area (Table 7).

Twenty (43.1%) of the 65 pregnant women identified slept under insecticide treated bed nets the night prior to the study. Of the 428 under five children identified during the study, 48.4 % slept under insecticide treated bed nets the night prior to the study (Table 8).

Table 7: Utilization of LLINs in households in in malarious kebeles of Gida Ayana, East Wollega Zone, Oromia, Ethiopia.

Variables	Number	Percent
Sleeping pattern prior to the night of the study		
Yes	189	64.9
No	102	35.1
Frequency of using bed nets		
Always	149	51
Intermittently	137	47.2
Not used	5	1.7
Location of insecticide treated bed nets in households		
In sleeping area	203	69.7
Not in sleeping area	88	31.3

Table 8: Malaria risk groups and utilization of LLINs in in malarious kebeles of Gida Ayana, East Wollega Zone, Oromia, Ethiopia

Variables	Frequency	Percent
Slept under bed nets the night prior the study	207	48.4
Not slept under bed nets the night prior the study	221	51.6

DISCUSSION

Coverage of households owned at least one long lasting insecticide treated nets in the study area was 69.3%. This coverage was low compared to study done in a rural area of Western Kenya which was 95% (Githinji *et al*., 2010). But this finding was higher than the study conducted in Arbaminch Town and the malarious villages of Arbaminch Zuria District (58.8%) (Ayalew and Amsalu, 2009) and it was Comparable to study done in Kersa, Eastern Ethiopia (65.5%) (Tesfaye *et al*., 2012). Average LLINs per household in the study area was 1.2 which was lower than Ethiopia strategic plan to provide, on average, two ITNs per household in all malaria-risk areas (Ethiopian MOH, 2011).

Attrition rate of households in LLINs was 24%. These households lost the old unusable LLINs and they did not have LLINs in their houses during the study. So, every household in malaria endemic area should be considered during replacement of the LLINs to enhance recent efforts in malaria reduction.

Of 291 households which have one or more long lasting insecticide treated nets, 60.8% have replaced the bed nets after three years of use. LLINs have been replaced in the study area to sustain recent efforts exerted in malaria control. Out of 391 households which have LLINs and lost previously owned LLINs, 227 householders' respondents knew the need of LLINs replacement in every 3 years of use for consistent possession and utilization of LLINs. There was no significant association between educational status of respondents and knowledge of LLINs replacement. 81.3% of households' preferred free supply of LLINs to cost subsidized supply to sustain utilization of LLINs as some of the respondents have economic problem and they do not have alternative of getting LLINs rather than free supply of LLINs from local government health organization.

Of 114 households who have possessed bed nets for the 1st time; 70.2% have used the bed nets for more than three years. Hence, some households did not replace the old used nets during redistribution, the bed nets can be damaged/worn out/ and decreased insecticidal effect which can minimize the protection obtained from LLINs.

Of 291 households that owned one or more LLINs, any member of the household slept under a net the night prior to the study was 64.9%. This utilization rate was lower as

compared to study done in Arbaminch area which was 73% (Ayalew and Amsalu, 2009). It is higher than study done in Eastern Ethiopia Kersa (33.5%) (Tesfaye *et al*., 2012) and Gursum district (21.5%) (Sibhatu *et al*., 2012).

Proportion of pregnant women and under five children slept under bed nets the night preceding the study was 43.1 and 48.4% respectively. This finding was higher than the study conducted in Arbaminch area 35% (pregnant women) and 40.3% (children <5 years) (Ayalew and Amsalu, 2009). Utilization rate in under five children in this study was lower than study done in Wonago which was 58% (Gashaw and Wakgari, 2008). Utilization of LLINs among malaria risk group is low. There is a need to have strategy for malaria risk group to increase deliver of bed nets and health information dissemination for effective use of LLINs available in the household.

CONCLUSIONS

In the study area, old (worn out) insecticide treated bed nets have been replaced after three years of use to sustain malaria control. Some households lost previously ownedLLINs and discontinue using the bed nets due to lack of replacement. Utilization of LLINs is low among malaria risk group. It is important to assess durability of LLINs in context of Ethiopia as a different factors that may affect physical intactness and insecticidal effect on LLINs. Health extension workers in malaria endemic area should consider every households during substituting the old unused LLINs by new once in the community.

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