

Community awareness, perceptions, acceptability and preferences for using LLIN against malaria in villages of Uttar Pradesh, India

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Abstract

Background & Objectives: Long-lasting insecticidal nets (LLINs) have been introduced in India recently into the vector control programme. A study was undertaken to assess the community perception regarding use of LLIN, their acceptability, collateral benefits, etc. in certain villages of District Gautam Budh Nagar, Uttar Pradesh, India where LLINs are in use by the community.

Method: A randomized community-based survey was undertaken during April–May 2009 covering 596 respondents in LLIN villages where LLINs have been distributed along with 307 respondents in untreated net villages where untreated nets were distributed using structured questionnaire. Qualitative data were collected and the difference in proportion was calculated by z-test.

Results: A substantial number of respondents had good knowledge of the symptoms of malaria. According to respondents, LLINs were very much effective in bringing down the malaria incidence in their families. About 98.3% of the respondents asserted the use of LLINs as their use not only reduced the number of mosquitoes as well as other non-target insects, but also reduced the malaria incidence. About 93.2% of the respondents were ready to purchase LLINs if available at nominal prices. All the respondents were satisfied about the performance of the LLINs in reducing the mosquito nuisance, safety of use and collateral benefits in LLIN villages.

Conclusion: LLINs are safe, socially acceptable and should be promoted for vector control to reduce the disease burden in the communities.

Key words Community perception, LLIN, malaria, mosquitoes

Introduction

Long-lasting insecticidal nets (LLINs) are gaining a huge promotion in vector control programmes world over. Several studies on LLINs in different countries showed their efficacy against the malaria vectors^{1–5}. At present WHOPEs has given full recommendations to Olyset[®] net, incorporated with permethrin into polyethylene and Permanet[®] 2, coated on polyester with deltamethrin whereas interim recommendations to Netprotect[®] (Icon-Life) deltamethrin-incorporated into polyethylene filaments, Interceptor[®] coated on polyester with alpha-

cypermethrin and Duranet[®] alpha-cypermethrin incorporated into polyethylene filaments⁶. Community participation is very much essential in achieving and sustaining malaria prevention and elimination⁷. Acceptance of LLIN by individuals and communities is affected by a number of factors which include perceptions, misconceptions, associated risk, perceived value, safety and effectiveness of the nets, socioeconomic factors, gender issues, experience of use and different styles of living and household routines. Different barriers also include knowledge about the use of nets, sleeping practices, fear of side effects, family size, and housing pattern³. Hence, evaluation of

community participation is essential to understand the LLIN compliance rate and acceptability among the users.

In view of this, a study was undertaken to assess the community responses, investigating the preferences for using LLINs in villages of Khandera, Dairykoat and Gulawati Khurd, where LLINs are in use for some years in comparison to untreated net villages Beel Akbarpur, Phoolpur and Nangla Chamru of District Gautam Budh Nagar, Uttar Pradesh, India where untreated nets were in use to evaluate the differences in the perceptions of community members and to identify whether these LLINs were effective in their village conditions against the vector population, man-vector contact and morbidity related to malaria. These findings were used to evaluate community members' acceptability and preferences about LLINs, readiness to purchase and to assess the response of LLINs against malaria vectors.

Material & Methods

Study area: A randomized community based survey was carried out in April–May 2009 in different villages of Gautam Budh Nagar district. The survey was carried out in 6 villages, out of which 3 villages namely Khandera, Dairykoat and Gulawati Khurd in Dadri PHC were those in which LLINs were distrib-

uted whereas in other 3 villages untreated nets were given. The details of nets distributed, population of villages, number of persons interviewed are furnished in Table 1. All the villages had more or less similar eco-topography, socioeconomic background and vector productivity. In these villages, the population mainly includes agricultural labourers. The native language is Hindi. Malaria is endemic in these villages throughout the year with peaks during the rainy season.

The design was descriptive and cross-sectional and sample population was selected by a random sampling covering 596 respondents in LLIN villages along with 307 respondents in untreated net villages. The data were collected using structured questionnaire to assess the perception, acceptability, awareness related to LLIN use in surveyed community. Pre-informed consent from the inhabitants was also obtained for inclusion in the study.

Data analysis: After conducting the interview with the help of structured questionnaire the data were collected carefully from all the villages and entered into Microsoft database to calculate the percentage of responses. Z-test was used wherever required to compare the difference in proportion of responses in LLIN villages as well as in untreated net villages at 95% confidence level and the results were consid-

Table 1. Specifications of LLINs/bed nets distributed in LLIN villages/untreated net villages

LLIN villages & name of net distributed	Population	No. of nets distributed	Month & year of distribution	No. of people interviewed
Khandera (Olyset)	1800	1203	August 2004	102
Dairykoat (Permanet)	1187	1084	May 2007	394
Gulawati Khurd (Icon Life)	1381	1233	May 2008	100
Total number of respondents				596
<i>Untreated net villages</i>				
Beel Akbarpur	1800	1289	August 2004	87
Phoolpur	1155	1052	May 2007	100
Nangla Chamru	1840	1600	May 2008	120
Total number of respondents				307

ered significant at 5% level of significance.

Results

Altogether data were collected from 596 respondents in LLIN villages (55% males + 45% females) whereas in untreated net villages, 307 respondents were included (62% males + 38% females). Education status of respondents from LLIN and untreated net distributed villages is shown in Table 2. The educational status of respondents was more or less the same among the villages.

Awareness about malaria: Table 3(a) gives the information about awareness of the community about malaria and various methods used for protection. About 80% of the respondents had knowledge about malaria disease and they knew that it is spread through mosquito bites, but the details of transmission are not known to them, whereas 20% of the respondents related the disease with dirty surroundings, weather, body pain, etc. About 82% of the villagers basically knew about the symptoms of malaria such as fever, cold and periodic shivering in LLIN villages, whereas in untreated net villages, 85.6% of respondents knew about malaria disease. In untreated net villages 14.4% of respondents related the malaria with other reasons such as dirty living conditions, stale food and dust and 81.4% of respondents were aware about the malaria symptoms. Before the distribution of nets in these villages about 12% were using bed nets in both LLIN and untreated net villages ($72/596=12\%$ vs. $38/307=12.3\%$, $z=0.023$) which showed insignificant difference and less knowledge about bed nets. The number of respondents using smoke as a pro-

tection method was quite high in LLIN villages as well as in untreated net villages than mosquito coils, repellent creams and bed nets. It is clear that use of smoke of neem leaves and cow dungs was the most commonly used method for protection in these villages before the distribution of bed nets. It can also be seen that knowledge regarding malaria and different protection measures used by villagers was more or less similar in both LLIN and untreated net villages.

This study revealed that 2.8% of the respondents have reported skin irritation/itching in LLIN villages (in Olyset net villages). Only 0.16% of respondents reported eye irritation and 1.5% of respondents reported suffocation (Permanet village) Table 3(b).

LLIN and untreated net villages showed more or less the similar pattern of malaria cases as per the perceptions of respondents before the distribution of LLIN/untreated nets in both types of villages. About 68% respondents in both LLIN villages and untreated net villages suffered from malaria in the past, whereas 79.1% of respondents in LLIN villages with 72.9% of respondents in untreated net villages experienced malaria in their family members prior to the distribution of LLIN/bed nets. But after the distribution of LLIN/bed nets the malaria cases were brought down to 0.5% (self cases) in LLIN villages as compared to 4.5% (self cases) in untreated net villages whereas in family members the malarial cases were 1% in LLIN villages as compared to 7.1% in untreated net villages. It was clearly evident from these figures that LLIN were very much effective in bringing down the malaria cases in the LLIN villages of Gautam Budh Nagar, Uttar Pradesh.

About 98.3% of the respondents in LLIN villages had asserted the use of LLIN as these were very much effective in controlling the mosquito densities and proved to be effective method of personal protection and about 98.8% of the respondents in LLIN villages also reported that there was a considerable reduction in mosquitoes as compared to 38.7% in untreated net villages ($z = 20.695$).

Table 2. Educational status of all the respondents of LLIN and untreated net distributed villages

Educational status	LLIN villages (%) n=596	Untreated net villages (%) n=307
Illiterate	8	12
Primary education	28	30
Secondary level	46	36
Higher secondary or more	18	22

Table 3. Community perceptions, awareness about the malaria disease and practices used for protection in villages of District Gautam Budh Nagar, Uttar Pradesh

Characteristics	LLIN villages (n=596, M-328, F-268)		Untreated net villages (n=307, M-190, F-117)	
	Yes	No	Yes	No
(a) Community knowledge regarding malaria and various protection method used				
<i>Awareness about malaria (% Yes/No)</i>				
Dirty water	10	90	3.5	96.5
Mosquito bite	80	20	85.6	14.4
Foul smell	8	92	3	97
Stale food	2	98	7.5	92.5
<i>Knowledge about the symptoms of malaria</i>				
High grade fever with chills & shivering	82	18	81.4	18.6
Vomiting, nausea, headache or pain in limbs except fever	18	82	18.6	81.4
<i>Methods used for protection against mosquito bites</i>				
Bed nets	12	88	12.3	87.7
Repellent creams	15	85	17	83
Mosquito coils	10	90	12.3	87.7
Smoke of leaves and cow dung	20	80	32.5	67.5
(b) Community perceptions regarding use of LLIN				
	LLIN		Untreated net	Z-value
Like the use of LLIN (% yes)	98.3		NA	—
<i>Adverse effects of LLIN experienced by respondents (% yes)</i>				
Skin irritation/itching	2.8		NA	—
Eye irritation	0.16		NA	—
Suffocation	1.5		NA	—
Fear of poisoning	0.16		NA	—
Nil	95.3		NA	—
<i>Whether LLIN provided protection against insects (% yes)</i>				
Mosquitoes	98.8		38.7	20.695*
Bedbugs	96.6		7.8	26.708*
Head lice	91.9		1.3	26.4*
<i>Malaria history before intervention (% yes)</i>				
Self	68.7		68	0.167
Family	79.1		72.9	2.026*
<i>Malaria history after intervention (% yes)</i>				
Self	0.50		4.5	3.931*
Family	1		7.1	4.807*
Willingness to purchase (% yes)	93.2		65.7	10.563*
Recommend others to purchase bednets (% yes)	93.9		72.3	8.944*

*z value significant at 5% level.

There was also very good reduction in the numbers of bedbugs ($576/596=96.6\%$ vs. $24/307 = 7.8\%$, $z=26.708$) in LLIN villages as compared to untreated net villages. About 91.9% of respondents in LLIN villages also reported reduction in head lice as compared to 1.3% in untreated net villages ($548/596=91.9\%$ vs. $4/307 = 1.3\%$, $z=26.4$). These results imply that the LLINs are useful in reducing the non-target insects besides mosquitoes.

Respondents willingness to buy LLIN was significantly higher in LLIN villages as compared to untreated net villages ($556/596=93.2\%$ vs. $202/307=65.7\%$, $z=10.563$). Reduction in malaria cases and reduced density of mosquitoes and other insect pests were the main reasons for the readiness to purchase these LLINs. 93.9% of respondents in LLIN villages recommended the use of LLIN/bed nets to others for use as a personal protection.

Discussion

Almost every respondent liked the intervention of LLIN as it results in the reduction of malaria cases and mosquitoes as well as other insect pests such as bedbug, human lice etc. Olyset net has been reported to reduce the man-vector contact⁸ in Olyset net used villages and also malaria cases significantly where only one positive case of *P. falciparum* was observed⁹. Similarly, PermaNets also reduced mosquito vector density significantly in villages over the untreated net used villages in District Ghaziabad¹. The studies carried out in these LLIN distributed villages area showed the beneficial effects of LLINs in prevention and control of malaria in the area where the community has expressed enthusiastic response in the favour of LLIN use.

Moderately perceived side-effects may cause concern and affect acceptance of these bed nets. Hence, people need to be informed that the insecticide is safe and minor side-effects could be experienced particularly within few days of use. Hence for full realization of LLIN each minute complaint needs to be taken care of so that it can be scaled-up further

for wider community use purposes¹⁰. It should be informed to the community members that LLIN could not pose any health related problems as it has very low mammalian toxicity because of the presence of synthetic pyrethroids. Respondents were highly motivated and showed willingness to purchase these nets. To provide a subsidized net was the common request by the rural communities¹¹. Recently in a study in Ethiopia, it was seen that the utilization of long-lasting insecticide-treated bed nets (LLINs) was hampered by behavioral factors such as low awareness and negative attitude of the community¹². Hence, knowledge on LLIN use should be given due emphasis while distributing these nets to the community members so that they can use these nets tactfully for their personal protection. This study was important in recognizing that LLIN has not only given relief from malaria cases in LLIN villages but also provided sustained protection against high densities of mosquitoes. Information, Education, communication (IEC) activities should be done by several Government, non-Government organizations, health care personnel and volunteers to communicate the benefits related to LLIN by organizing different health camps at the malaria prone regions. In India, it will be highly appreciated if Government explores the possibility of distributing LLIN free of cost or at nominal charges to all deserving sections of people (socially/economically poor and/or underprivileged)¹³. If we want to boost community motivation for the use of LLIN as a vector control method we have to provide adequate information and knowledge to the community members regarding their use, value, safety and effectiveness. Distribution of LLINs at nominal charges along with promotion of IEC activities are the pre-requisites by which LLINs can prove their potential against malaria.

Conclusion

LLINs are widely acceptable in the user communities and the safest method to use. The demand for LLIN is clearly evident where IRS and other vector control methods are not feasible. There should be more emphasis on the promotion of these LLINs so

that affected communities get knowledge to use LLINs as a personal protection method. IEC activities should be promoted more to inform the community members about this method.

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