Determinants of impregnated net ownership and utilization in rural community on the Thai-Myanmar border in Prachuab Khiri Khan, Thailand

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Abstract

Efficacy of Insecticide-treated Nets (ITNs), Long Lasting Insecticidal Nets (LLINs) and Indoor Residual Spraying (IRS) in reducing malaria transmission are strongly presented in various countries. ITNs, LLINs and IRS free-of-charge have been used to control among Thai vulnerable populations since 2008. Studies found that the utilization of impregnated net among vulnerable Thai was low. This study investigated factors associated with impregnated net ownership and utilization among population living in rural community. Random samples of 1,673 respondents living in 678 households on the Thai-Myanmar border in Prachuab Khiri Khan province were interviewed from October 2010 to May 2011. The prevalence of impregnated nets ownership was 41\% and 70\% of their own utilized them. In multivariate analysis, Thailadthin ethnicity (adjusted Odds ratio (aOR) 2.1; 95\% CI: 1.2-3.6) and access to IRS (aOR 2.3; 95\% CI: 1.6-3.1) were associated with impregnated net ownership. Malaria infection (aOR 4.2; 95\% CI: 1.8-9.4), and irregularly use of electric fan (aOR 2.0; 95\% CI: 1.3-3.1) were positively associated with net utilization. Whereas, high level of barrier to ITN/LLIN utilization (aOR 0.6; 95\% CI: 0.4-0.9) was associated with net utilization. Our findings reflect an existing gap between net ownership and utilization. To scale-up the adoption of impregnated net utilization, enforcing ownership through sustainable strategies that involved social marketing should be addressed.

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1. Introduction

Malaria trend in Thailand has markedly reduced in morbidity and mortality since 1950s because of insecticide control of vector mosquitoes. However, most of transmission with more severity occurs along the Thailand-Myanmar border where the southern region had the second highest morbidity caused by multidrug resistant strains of Plasmodium falciparum due to a declining in efficacy of artesunate-containing regimens among migrants and ethnic minority [1]. Studies had shown that factors associated with malaria risk including being and living in poor housing and occupations nearby or within forest areas e.g. agriculturist and laborer [2]. Moreover, lack of knowledge and/or perception regarding to protection against malaria, lacking of malaria prevention resources, difficulty to assess to health care services, and receive malaria control, as well as cultural and health beliefs are important factors that can either encourage or discourage preventive health behaviors [1, 3]. To reduce malaria infection among vulnerable populations, WHO/Global Malaria Programme (WHO/GMP) has subsidized indoor residual spraying (IRS) in combination with impregnated nets i.e. insecticide-treated net (ITN) and long lasting insecticidal net (LLIN). Numbers of evidence documented the efficacy and efficiency of sleeping under impregnated net in reducing malaria morbidity and mortality in children, and adult in various malaria affected countries [4]. Studies found that the utilization of impregnated net among Thai was low [5, 6]. We investigated determinants of impregnated net ownership and its utilization in Thai populations living in rural community on the Thailand-Myanmar border in Prachuab Khiri Khan province.

2. Methodology and Design

The methods and study setting in this study were described elsewhere [6]. Briefly, this study was undertaken in Prachuab Khiri Khan province, the top ten of the highest morbidity. The data was collected from Ban Chairaj sub-district, the southernmost district of the province. Apart from registered population of 6,371 comprising 1,844 households, 10% of the residents are ethnic minority “Thaipladthin”.

A random sample of 678 households was invited to participation from October 2010 to May 2011. The constructed questionnaire was face-to-face interview. The definition of impregnated net ownership in this study defined as household that own impregnated net either ITN or LLIN. Net utilization defined as self-report of individual member in family sleeping under net the night prior to the interview. For each household, the head of the random household was interviewed for his/her socio-demographic, number of children under 5 years and pregnancy, any member with history of malaria infection during January 2010 to May 2011, personal protection behavior, primary vector control uptake and housing characteristics. While the individual questionnaire comprised of socio-demographic variables including sex, age, education level, occupation, marital status, being Thaipladthin ethnicity. In addition, the information focused on net utilization was asked to each family member for the type of nets that he/she had slept at last night as well as the number of persons sharing the net. An open-ended question was also asked to the head of household who own the impregnated net for the reason of no ITNs/LLINs utilization. Global positioning system (GPS) waypoint were used to identify household’s location using eTrex™ GPS device. Procedures were followed according to eTrex™ user’s manual. This study was approved for ethical consideration from the Institutional Review Board at the Faculty of Public Health, Mahidol University (approval number MUPH2010-180).

Descriptive statistics was used to describe characteristics of surveyed participants. Households were categorized into two groups according to ownership status. Chi-square test or Fisher’s exact test were used to identify household characteristics that potentially associated with own at least one impregnated. Odds ratio and 95% confidence interval were calculated. Potential exposures from bivariate analysis (p value < 0.10) were included in the multiple logistic regression. To identify factor associated with net utilization, all individuals living in the household that own at least one impregnated net were included in the analysis as the above procedure. All variables with p value <0.05 indicated statistical significance. All analyses were performed using SPSS 18.0 (SPSS Inc, Chicago IL).
3. Result

Household characteristics: Of 678 households, median number of family member was 3.5 (IQR: 3-5). Median number of children under five was 1 (IQR: 1-1). Median income was 15,000 baht (IQR: 10,000-20,000). Of 678, 43.9% received indoor residual spraying during the year of the study. Of 678, almost of households (92.9%) had at least one mosquito net regardless of net type.

Individual characteristics: Of 1,673 individuals living in 678 households participated in the study, 168 (10.0%) were Thaipladthin ethnicity. Two-thirds of respondents were female, median age was 42 years old (IQR: 31-52). Seventy-six percent completed primary education and seventy-one percent working as rubber tapper. Nearly one-fifth had high level of perceived barrier of malaria prevention. The distribution of sleeping under impregnated net coverage was clustered by study areas (from left to right as Moo 4, 2 and 3, respectively) as showed in Fig. 1.

Fig. 1. Distribution of impregnated net coverage by cluster of study areas

Impregnated net ownership: Of 678 households, 279 (41.1%; 95% CI: 37.4-45.0) own impregnated net at least one net regardless of net types (ITN or LLIN). Median number of impregnated net own per household was 2 (IQR: 1-2). Impregnated net owner household had higher proportion of Thaipladthin ethnicity than the other group. The prevalence of impregnated use at household level was 70.2 % (95% CI 64.5-75.6) and 29.8% of the net owner household had none of their family member slept under the impregnated net. The reasons were that the net is too small (67.5%), don’t like the smell (19.6%) and want to keep the net for future use such as guest/relative visits (12.9%). Households reported the non-use reason of too small net size had slightly higher number of family member. The factors associated with impregnated net ownership after controlling for other variables, Thaipladthin ethnicity (adjusted OR = 2.1; 95% CI: 1.2-3.6) and access to IRS (adjusted OR = 2.3; 95% CI: 1.6-3.1) were the household characteristics associated with impregnated net ownership. (Data not shown)

While about 70% (492/707); 95% CI: 66.0-73.0) of the individual living in the impregnated ownership’ households said that they slept under the net the night before the interview. Table 1 shows factors associated with impregnated net utilization among the respondent living in the household that own the net were malaria infection during the year that the survey took place (aOR 4.2; 95% CI: 1.8-9.4), irregularly use of electric fan (aOR 2.0; 95% CI: 1.3-3.1) were positively independently associated with net utilization whereas high level of barrier to ITN/LLIN utilization was associated with net utilization (aOR 0.6; 95% CI: 0.4-0.9).

4. Conclusion and Discussion

Net usage depends on net access. The prevalence of impregnated net ownership reported in this study was low, resulting in low utilization rate, existing with wide gap between net ownership and utilization. The reported rate of non-used net (30%) was similar to the previous finding that report 15-50% [7]. We found that net size is the major
obstacle of net utilization among household with more members. Together with the previous finding that found sleeping elsewhere especially at the temporary shelter in the plantation is another non-use reason [5]. Therefore, family’ size and occupation should be considered regarding to net distribution. Malaria infection during the survey was taken was associated with ITNs/LLINs use with similar to study of Nonaka D [8]. Another expectable finding was that irregular use of electric fan at night was associated with sleeping under net. The finding was expectable as heat and seasonality are common reason for non-use net. To scale-up the adoption of impregnated net use, obstacles should be overcome and sustainable strategies that health education involved social marketing should be addressed.

Table 1: Factors associated with impregnated net utilization among those who own net

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number (%) of impregnated net</th>
<th>OR (95% CI)</th>
<th>aOR* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n=492)</td>
<td>No (n=215)</td>
<td></td>
</tr>
<tr>
<td>Barrier to ITN/LLIN utilization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>324 (66.1)</td>
<td>166 (33.9)</td>
<td>0.6 (0.4-0.8)**</td>
</tr>
<tr>
<td>Low/moderate</td>
<td>168 (77.4)</td>
<td>49 (22.6)</td>
<td>1</td>
</tr>
<tr>
<td>Malaria infection during 2010-2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>482 (70.9)</td>
<td>198 (29.1)</td>
<td>4.1 (1.9-9.2)**</td>
</tr>
<tr>
<td>Yes</td>
<td>10 (37.0)</td>
<td>17 (63.0)</td>
<td>1</td>
</tr>
<tr>
<td>Use electric fan at night</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not always</td>
<td>425 (71.6)</td>
<td>169 (28.4)</td>
<td>1.7 (1.1-2.6)†</td>
</tr>
<tr>
<td>Always</td>
<td>67 (59.3)</td>
<td>46 (40.7)</td>
<td>1</td>
</tr>
</tbody>
</table>

n = number of individual in household had slept at last night, OR = Odds ratio,
* aOR = adjusted odds ratio, 95% CI = 95% confidence interval, † P value < 0.05, ‡ P value < 0.001

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References