PROMOTION OF INSECTICIDE-TREATED MOSQUITO NETS IN MYANMAR

Khin Lin[1], Soe Aung[1], Saw Lwin[1], Hla Min[1], Nwe Nwe Aye[1] and Roger Webber[2]

[1]Vector Borne Diseases Control Project, Department of Health, 36 Theinbyu Road, Yangon, Myanmar; [2]London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, United Kingdom

Abstract. A simple health promotion message administered by village midwives raised bednet usage to over 60% in trial hamlets in north Shan State, Myanmar. Treatment of the nets in the study villages produced a reduction in malaria cases. Most villagers were prepared to buy their nets at market prices and were willing to pay for the cost of re-treatment of nets, but very poor, members of the Wa ethnic group required a half-price subsidy for them to afford them. The use of insecticide treated bednets was felt to be appropriate for undeveloped and remote areas of the country where malaria control was difficult.

INTRODUCTION

Insecticide-treated mosquito nets (ITMN) are now widely accepted as an effective method of malaria control. They have been extensively used in China (Li *et al,* 1987) and found to be effective in Thailand (Aramrattana 1993; Somboon *et al,* 1998), which share a common border with Myanmar. Indeed trans-border movements of people are considered to be responsible for much of the malaria problem in this area (Aramrattana 1993; Somboon *et al,* 1998; Zhu *et al,* 1994).

Shan State, one of the largest in Myanmar, borders Yunnan Province of China in the east and Lao PDR and Thailand in the south. The border areas of Myanmar, Lao PDR and Thailand are remote and largely undeveloped. The control of malaria by traditional methods of residual house spraying, case detection and treatment, has been impossible so that malaria is largely out of control. ITMN however have the attraction of being a community intervention, whereby the prevention of malaria becomes the responsibility of the family, rather than of a centrally organized malaria program. In addition they have the potential of being copied, if shown to be effective, so might be used in remote areas of the country.

The Shan normally use bednets, partly for privacy, as well as to prevent insect attack, similar to the Chinese who are also found as a minority in the state. It is therefore accepted that bednets are to be bought at market prices from a suitable source, although not everyone uses them. The project set out with the intention of promoting mosquito net usage to control malaria with the added message that treating the nets with insecticide would increase their effectiveness.

Correspondence: Dr Khin Lin, Vector Borne Diseases Control Project, Department of Health, 36 Theinbyu Road, Yangon, Myanmar.

METHODS

A large amount of border trade with China passes along the main highway through Lashio (Fig 1), so a nearby village called Hopeik was chosen as the study area. The village was actually a collection of hamlets containing the three main ethnic groups of this part of north Shan State, the Shan, Wa and Chinese. Six hamlets were chosen, two from each ethnic group, matched as far as possible for topographical features including mosquito breeding sites. The age and sex of the hamlet populations are shown in Table 1. The hamlets surround a large area of rice paddy with forest-fringe hilly land on the other side, ideal conditions for *Anopheles minimus* breeding.

Village midwives were the key figures in the project as they are well known in the local community. They took blood slides from fever cases and promoted the use of bednets as they went round the villages doing their house visits. Special meetings were not held, just the simple message given that net use would protect against malaria and dengue, encouraging people to buy nets if they did not have them. It was explained that insecticide treatment of some of the nets would be tried out. This was done by malaria workers calculating the amount individually for the different size nets,

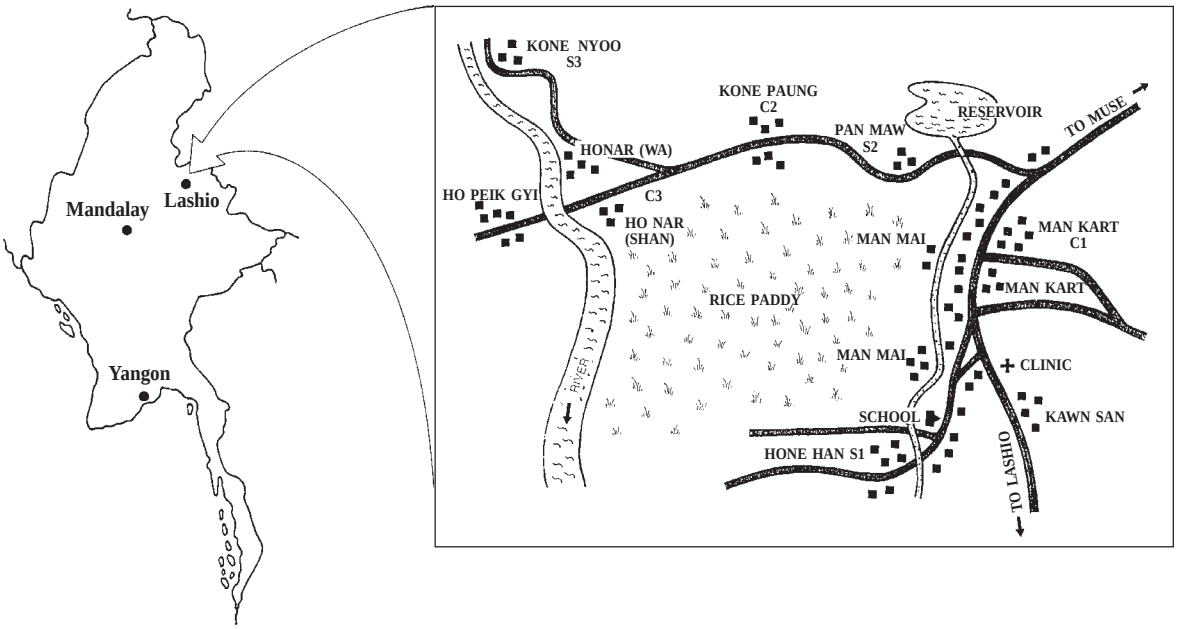

Fig 1–Hopeik study area near Lashio in north Shan State, Myanmar.

Table 1
Bednet utilization before and after promotion in Hopeik hamlets.

Hamlet	Hone Han	Man Kart	Pan Maw	Kone Paung	Kone Nyo	Ho Nar
Ethnic group	Shan	Shan	Chinese	Chinese	Wa	Wa and Shan
Study or control hamlet	study	control	study	control	study	control
Number of households	31	35	10	30	57	31
Total population	168	146	74	195	283	151
Adult males	44	37	25	75	87	22
Adult females	51	47	25	44	92	25
Children under 14 years	73	62	24	76	106	29
No. nets before promotion	66	58	8	138	47	75
Population using nets[a]	(61.9%)	(59.6%)	(14.9%)	(100%)	(26.3%)	(78.8%)
No. nets after promotion	66	62	31	138	88	77
Population using nets[a]	(69%)	(65.8%)	(60.8%)	(100%)	(63.9%)	(80.8%)

[a]Population using bednets is calculated as one person for a single net, two persons for a double net and three persons (two adults and one child) for a family size net.

with the aim of achieving a concentration of 15 mg/m^2 of lambda-cyhalothrin. Net treatment was done in June before the start of the malaria transmission season, which has two peaks the first in June/July and the second in October/November.

The first year of the trial concentrated on promotion, while in the second year one of the paired hamlets was chosen randomly for insecticide treatment of nets. Increased emphasis was made to take blood slides from every fever case. This was done by midwives visiting their areas on a weekly basis taking blood slides from anyone who had a fever in the previous week. During the second year a simple questionnaire survey was undertaken in the three study hamlets to elicit peoples' use of nets and willingness to pay for them and insecticide treatment.

Mosquito collections were done between June and October 1997 and bio-assays performed on a sample of mosquitos caught.

RESULTS

Some 50% of the population were using nets at the start of the trial, except for one Wa and one Chinese hamlet where it was much lower (Table 1). After health education all hamlets exceeded 60% with some much higher. However some of the Wa said that they could not afford to pay for the nets at the market price, so 50 nets were sold at half price to poor and deserving cases.

This was a small trial aimed at testing the promotion of nets rather than their effectiveness, but blood slide collections allowed incidence measurements as seen in Fig 2. The number of positive cases in the population of each hamlet was identified by the surveillance services each week. In total and each ethnic group there was a greater reduction in the ITMN group than the controls, but due to the small numbers significance was not achieved. Over the five months transmission season 141 persons positive for malaria (87 *Plasmodium falciparum* and 54 *P. vivax*) were detected in the study villages and 164 (115 *P. falciparum* and 49 *P.vivax*) in the controls.

The malaria vector species caught were either *An. minimus* or *An. annularis.* Bio-assays were conducted in June, July, August, September and October with 100% mortality of both species to test doses of lambda-cyhalothrin. There was no mortality in the control group of mosquitos.

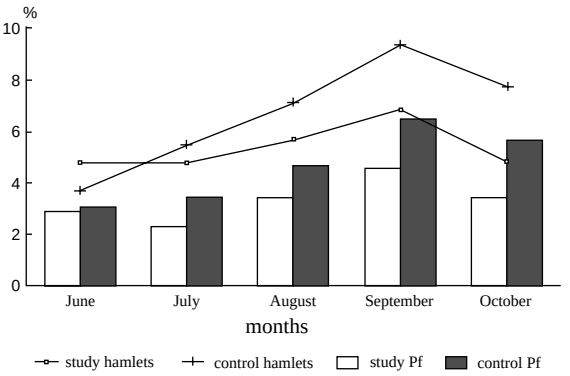

Fig 2–Incidence of malaria in the study and control hamlets (*P. falciparum* as bar chart).

Table 2
Net use and willingness to pay in the three study hamlets.

Hamlet Ethnic group	Kone Nyo Wa	Pan Maw Chinese	Hone Han Shan
Number respondents (% in brackets)	86(30.38)	25(33.78)	78(46.43)
Male: Female	60:40	48:52	46:54
Regular bednet usage	39.53%	80.0%	80.77%
Utilization over one year	72.09	100	80.77
Use every season	27.91	32.0	76.92
Use only in rainy season	13.95	52.0	15.38
Use only occasionally	58.14	20.0	3.85
Reason given for net use. Protection against bites	100	100	100
Frequency of washing nets : less than 3 months	25.58	8	76.92
" : 3 - 6 months		48	11.54
" : 6 - 12 months	74.42	44	11.54
Share net with other adults	2.33	8	3.85
Share net with children	93.02	88	76.92
Spent 200-399 kyats[a] to buy net	69.77	8	12.82
Spent 400-599 kyats[a] to buy net	11.63	28	50
Spent over 600 kyats[a] to buy net	18.6	64	37.18
Prefer to pay cash down	32.56	76	57.69
Prefer to pay by instalments	67.44	24	42.31
Prepared to pay 90 kyats[a] per net treatment	48.84	100	76.92
Side effects not detected[b]	93.02	92	92.31

[a]$1 = 100 kyats approximately.
[b]Side effects complained of were sneezing and itching.

The results of the questionnaire are shown in Table 2.

DISCUSSION

While ITMN have been tried in many countries and found to be effective in controlling malaria, with the added advantage that they do not need a centralized malaria control service, the promotion of net use in the community has not been effectively answered. Subsidized schemes, such as amongst the Karen people (Aramrattana 1993; Somboon *et al*, 1998) who live on the Thai/Myanmar border are effective, but subsidising nets is generally too expensive for the health services to afford. In countries like China where there is a tradition of net use the task is made much easier. However there are in-between conditions, such as described above in Myanmar, where there is a good knowledge of bednet use, but either because of poverty or apathy nets are not regularly used. This small trial showed that using a very simple health education message, purchase of nets and regular use could be raised to over 60%. However account must be taken of less well off groups in the community, who in a few cases require assistance to purchase nets.

Treatment of nets was given free with donated insecticide during the course of the trial, but 100% of Chinese, 76.92% Shan and 48.84% Wa were prepared to pay for their nets to be treated even before any effect of the insecticide had been shown. Making insecticide available in suitable packaging and at a reasonable cost is a challenge for manufacturers.

One of the main advantages of this trial was that it used available resources and personnel with virtually no external input (except for the insecticide) so could be replicated in other areas. It was not the intention to show a significant reduction in malaria which probably would have been achieved if the trial had continued for another year. However the population were well aware of the benefits, not only in malaria reduction, but the decrease in biting insects of all kinds and as a consequence requested continued supply of insecticide. It was no accident that the village chosen was on the edge of an area with very difficult access in which it has been virtually impossible to control malaria, so it is hoped that local people will copy mosquito net use and their treatment with insecticides as a means of malaria control in these areas.

ACKNOWLEDGEMENTS

The Ministry of Health encouraged the study and rendered every assistance. We are most grateful to Zeneca Public Health, especially Dr Graham White, for the donation of lambda-cyhalothrin and to the UNDP program in Myanmar for the gift of mosquito nets. Dr Webber is a member of the DFID (formerly ODA) funded Malaria Program, whose assistance is gratefully acknowledged. This low cost project would not have been possible were it not for the assistance of midwives and malaria workers in Hopeik. The success of the project is due to them.

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