AN EMPOWERMENT PROGRAM TO ENHANCE WOMEN'S ABILITY TO PREVENT AND CONTROL MALARIA IN THE COMMUNITY, CHIANG MAI PROVINCE, THAILAND

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Abstract. Paulo Freire's theory was modified to empower a women's group in Chiang Mai Province, Thailand, to prevent and control malaria. This study conducted an intervention in Mueang Na Wan Village, Mueang Na Sub-district, Chiang Dao District, Chiang Mai Province, where 45 women were systematically recruited into the study cohort. Navail Village was selected as a control village because it resembled the intervention village. The empowerment program emphasized enhancement of malaria preventive levels, using insecticide-treated bed nets, self-esteem, and self confidence expectation to prevent and control malaria. Intensive training was conducted and activities performed among the women's group, with 10 participatory meetings in all. Data collection was conducted for the pre-test in month 1, and post-intervention in months 3, 6, 9, and 12. The qualitative methods used were focus-group discussions, non-participant observations, and in-depth interviews with housewives, their husbands, and youths at risk for malaria. The results showed that, post-intervention, there were significantly increased levels for malaria preventive behaviors, behaviors of using insecticide-treated nets, self-esteem, and self confidence expectations, in the intervention village compared with the control village. Insecticide-treated net usage and insecticide-treated net usage behaviors increased in the intervention village more than before and more than that in the control village. The women's group in the intervention village created the following plans, which were crucial to malaria prevention: (1) a family protection plan, (2) providing malaria education to community members, (3) a mosquito-control campaign, (4) scaling-up insecticide-impregnated bed nets, and (5) malaria control among foreign laborers. Finally, the empowered women's group performed sustainable activities. Between malaria-prevention activities, they conducted a joint program to raise income for their families.

INTRODUCTION

Malaria is a major public health problem along Thailand's borders, especially in the west along the Thai-Myanmar border. Mueang Na Wan Village is located near Thailand's western border. It is a friendly environment for *Anopheles* mosquitoes because it is surrounded by preserve forest and there are two low-running streams. The village is 2 km from the Shan State in Myanmar. Most people in this village are from Shan State who migrated from Myanmar. The Shan State is known as a malaria endemic area. Moreover, 92.5% of the population earns their living by agriculture, foraging, and border trade. All these make this village a malaria endemic area. The malaria incidence rate for the country in 2004 was 0.51 per 100,000 population, 0.89 in Chiang Mai

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province, 8.6 in Chiang Dao District, 55.6 in Mueang Na Wan Village and 10.8 in Navail Village (Bureau of Vector-Borne Disease, 2005).

Mueang Na Wan Village has always faced problems with malaria. Although the Bureau of Vector-Borne Disease has used many methods to prevent and control malaria, but a recrudescence of malaria, a growing lack of confidence in the ability of government agencies to control malaria through biological measures or vertically-administered environmental strategies, and a lack of community cooperation in control strategies that are perceived to be invasive (Hongvivatana *et al*, 1982, cited in Manderson, 1992) make it difficult for governments, particularly in developing countries, to provide health services for all their people. To reduce malaria incidence in this border community, the researcher used the empowerment theory as a tool for guiding research designed according to the empowerment as a social action process, which promotes an individual's, organization's and community's' ability to control the future of their community, and society (Wallenstein and Bernstein, 1988). These facts led to the concept of community participation, which is the process by which individuals and families assume responsibility for their own health. Research literature has shown that women are among those identified as playing a critical role in community participation health programs because of their importance as decision makers in the family and in health care. Furthermore, women's roles in housekeeping, cooking, nurturing children and the elderly, and taking care of sick people in the family are related to the prevention and control of malaria. Women in the area often do not have access to health care because of a lack of financial resources. Women were chosen to participate in the program to improve the health of their family and community. A women's time was perceived as being more flexible. The researcher was interested in preventing and controlling malaria by empowering women in the community. We believe the empowerment model we constructed may help women's groups to share their malaria experiences. The model will help the group to use their careers, culture, lifestyle and environment to discuss success and failure in preventing malaria. The empowering model should help the women's group create plans that: 1) relate to their lifestyle, 2) use community resources to solve the malaria problem, 3) empower women to meet the needs of the community, 4) sustain behavior to prevent and control malaria, and 5) reduce the cost and number of health care providers. Empowerment theory was used as a concept to empower community members to reduce health problems. It has been effective in increasing good health behavior (Pensirinapa, 1995; Borumtanarat, 1999; Gomez *et al*, 1999; Chotiyaputta, 2001; Khortwong , 2001; Sathirapanya, 2001; Duanchai, 2002).

Mueang Na Wan was selected as an intervention village. Navail was selected as a control village because it was similar in population, culture, tradition, religion, and location. Forty-five women in Mueang Na Wan were chosen as the women's group to be empowered. Forty-five women in Navail Village were chosen as the control group. The purpose of this research was to test the effect of the empowerment program on self-esteem, self confidence, expectations to prevent and control malaria, malaria preventive behaviors, and insecticide-treated net practices of the women's group in the intervention village compared with the women's group in the control village at pretest and post-test during months 3, 6, 9, and 12. The process of non-participant observations and a participation checklist were used to evaluate the program.

MATERIALS AND METHODS

The study design was a controlled pretest-post-test quasi-intervention study. Women

in the intervention group were requested to participate in the empowerment program that was modified from the empowerment theory for malaria prevention and control throughout the year shown in Fig 1. The intervention group was assigned to take a role in 1) creating a plan to prevent and control malaria, 2) changing self-esteem, 3) improving self confidence to prevent and control malaria, 4) changing behavior to prevent malaria and 5) changing behavior regarding using insecticide treated nets. Data were collected before, during and after program implementation (January 2005 -January 2006). Before intervention, the researcher collected baseline data for the target village by using Rapid Participatory Appraisals (RPA) to access malaria problems, community environments, culture and health needs.

Sample

A simple random sampling technique was used to select one woman for every ten households. There were 436 households consisting of 2,213 people. Forty-five women were selected as representatives of the women's group. The following criteria were used: age over 15 years old, understanding the Thai language, living in the village at least one year, having no plans to move out of the village in the next year, and volunteering to participate in the empowerment program. The same method was used to select sample size in the control village. The intervention consisted of 2 phases. The first phase was conducted with the women's group in the intervention village on 7-8 February 2005 to strengthen malarial knowledge (attitudes and practices), insecti-

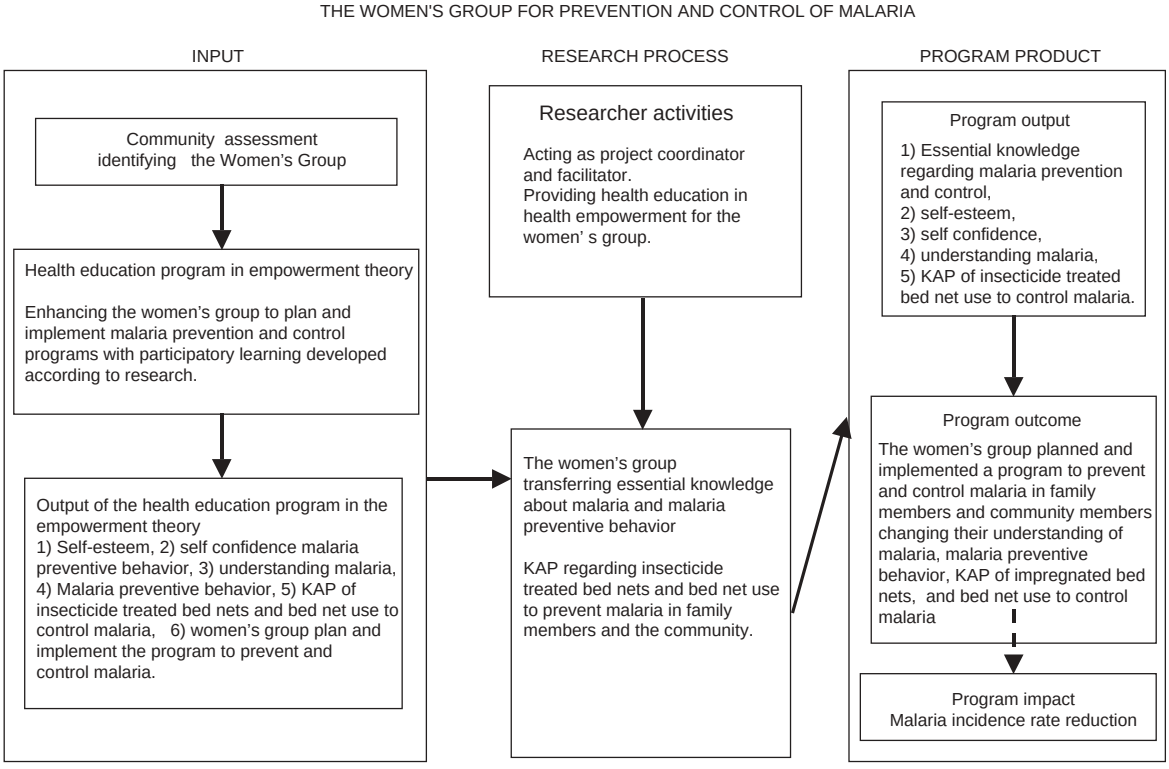

Fig 1–Conceptual framework.

cide-treated net knowledge (attitudes and practices), self esteem, self confidence expectation to prevent and control malaria and the creation of a plan to prevent and control malaria in their community. The second phase was the implementation by the women's group of their created plans to prevent and control malaria year round while the research team worked as supporters, facilitators and observers.

Protection of human subjects

The research proposal was approved by the Mahidol University Ethics Committee. The potential key participants in the designated unit were contacted to ask for voluntary participation in this research study. Informed consent was obtained from each of the participants who agreed to participate in the study. The research purposes and processes were explained to those participating and confidentiality of the data was maintained.

Instruments

There were two types of instruments: 1) the manual of the empowerment program, and 2) the instrument for data collection.

1) The manual of the empowerment program was used for guiding the intervention. It included the goals, materials, content, and strategies, and detailed guidelines for the women's group training. The manual was reviewed by two experts in empowerment theory, two experts in malaria, and one expert in adult training.

2) The instrument for data collection. The pre- and post-questionnaire evaluation tests consisted of four parts:

Part 1. The women's general characteristics and risk factors for malaria comprised of close-ended items.

Part 2. Self-esteem, comprised of items with a three-point rating scale (3 = all the time,- 2 = sometimes, 1 = never). Questions were modified from the self-esteem questionnaire of Bandure that is composed of 20 questions regarding self-value, ability, achievement, pride, and self-satisfaction. The Cronbach's alpha was 0.73.

Part 3. Concerning self confidence, comprised of 20 items with a three-point rating scale (3 = all the time, 2 = sometimes, 1 = never). Questions were asked about planning, implementing plans, developing materials, supervising, evaluation, behaviors, expectations of preventing mosquito bites inside and outside the house, blood checking, treatment, and control of mosquito breeding places in the household and community. The Cronbach's alpha was 0.91.

Part 4. Concerning malaria-preventing behaviors, comprised of 10 multiple choice items about malaria preventive behaviors, including individual level prevention, family level prevention and community level prevention. The questions were concerned with methods of preventing mosquito bites both inside and outside houses.

Researcher training

The researcher was trained by Associate Professor Nittaya Pensilinapa at an empowerment program for health care providers. Professor Pensilinapa is an expert in changing behavior through the empowerment of target groups, in the creation of plans to promote health, and in the prevention and control of disease. Research assistants were trained in areas relevant to the study and helped the researcher facilitate the empowerment program.

Main activities of the development process in the intervention village

The research procedures for empowerment were divided into seven steps.

Step1. Preparation for management. This stage aimed to develop organizational commitment and consensus. In the study villages, the Rapid Participatory Appraisals method was used for community assessment to obtain baseline data, which included the

strengths and challenges of Maeung Na Wan Village. This village is located in foothills surrounded by forest. Two streams pass nearby, one is the origin of the Ping River. The village is about 2 km from the Shan State, Myanmar, 50 km from Chiang Dao District, Thailand. Transportation to the city is convenient with asphalt roads. The roads in the village are concrete and the village is composed of three zones divided by roads. The name of the zones are Ban Natai, Lai Ping and Ban Nanur. Ban Natai is the most crowded zone. Navail Village was selected as the control village, because of similar residents, culture, tradition, welfare, religion, occupation, environment, characteristics, and risk factors for malaria.

Nearly all the villagers in both villages emigrated from Myanmar so these villages are bigger than other villages in population because the people in these villages are refugees. These people do not have Thai citizenship and cannot go outside the village without permission of the village headman. The nearest health center to Mueang Na Wan is about 20 km away, so the local health service is delivered to this community by a mobile clinic once a week on Thursday. Due to their location and environment, the village is a malaria endemic area with malaria incidence rates of 71, 65.2 and 56.6 per 1,000 population in 2002, 2003 and 2004, respectively (Bureau of Vector-Borne Disease, 2005). There are two malaria community clinics, located at Ban Natai and at Ban Nanur.

The community development organization was composed of a village headman and 2 assistants. In addition there was a village health volunteer group with 12 members, a community saving fund, and two men were selected from the local sub-district organization. There was one school for students from kindergarten to grade 8. There were three Buddhist temples, one in each zone. The strengths of this village were that most were related to and familiar with each other. Headman village assistants stayed in each zone of the village. The villagers still adhered to local customs and cultural practices that brought unity and co-operation. In this village on every Buddhist holiday the villagers stop working and go to the temple and spend time developing the community. The weaknesses of this community were that 1) they receive little information because they do not have TV or telephones, many people over age 35 cannot read or speak Thai, and few of the houses receive village voice broadcast, 2) this village is located near the border so illegal migration is a problem, and 3) the environment of this village is suitable for *Anopheles* mosquitoes due to climate, low running streams and malaria carriers who migrate from Myanmar.

Step 2. Identify needs. This step aimed to identify the training needs of the women's group to design an empowerment curriculum and develop a process map for organization, resource allocation, and selection of the process for empowerment, performance criteria, and performance measures.

Step 3. Construction of the empowerment curriculum. The purpose of the empowerment process management-training course was to facilitate and empower the women's group to plan and implement the program to prevent and control malaria in their community. At the same time, it was also to increase their 1) self-esteem. 2) self confidence in preventing and controlling malaria, 3) malaria knowledge, attitude and practice, 4) insecticide-treated net knowledge, attitudes and practices, and 5) increase-insecticide-treated net use in the community. This training course was conducted for 17 hours.

Step 4. The empowerment process of management training for the women's group. These techniques concentrated on empowering the women's group at both individual and group levels through their participation in training activities.

Step 5. The women's group made five

plans and implemented them to prevent and control malaria in the village throughout the year. The research team worked as facilitators, supporters and observers in the plan. A meeting between the women's group and the research team was set to follow the women's group plans.

Step 6. In this stage, the process and outcome of the program were evaluated.

Step 7. Sustainable developmental guidelines. A meeting between the women's group, key community stakeholders, the village headman, a community committee, teachers, health care providers, malaria health workers, and the sub-district organization was held to summarize the program.

Data collection

The data collection strategies used in this study included non-participant observations. Quantitative data were collected: pre-tests and post-tests were done both in the intervention and control groups. A pre-test and a post-test were performed every three months for a year at months 3, 6, 9 and 12. The researchers acted as facilitators and observers to collect qualitative data by using non- participatory observation checklists. Qualitative data included observations about the women's activities, interaction of the women's group, and discussion guidelines to explore the implementation process for the prevention and control of malaria.

Data analysis

Descriptive statistics (mean, frequency and standard deviation) were used to describe all of the study variables. A paired simple *t*-test was used to compare the differences between the mean scores of the variables in the intervention and control groups. ANOVA two factor analysis was used to compare malaria preventive behaviors, behaviors regarding the use of insecticide-treated bed nets, self-esteem and expectations to prevent and control malaria within and between groups before, during and after the training program. Trend analysis was carried out using a within-subject and between-subject repeated measure with ANOVA for significant changes in the women's group malaria preventive behaviors, behaviors using insecticide-treated bed nets, and self-esteem over time. The level of significance was set at $p < 0.05$. Qualitative data were used to evaluate the process of the empowerment model. The thematic analysis and triangulation technique were used for qualitative data analysis.

RESULTS

General finding

The characteristics of women in the intervention and control villages were often similar. Women in the intervention group were ages 16 to 50 years (mean = 33.20, SD = 9.423) and in the control group were 31 to 50 years (mean = 38.31, SD = 4.847). They were also dissimilar in education level. Sixty percent (27) of women in the intervention village had primary education while 40% (18) in the control village had no education. No other differences in demographic data were found between women in the intervention and control villages.

Risk factors, such as house location, house characteristics, time going to work, time returning home and bed time, in both the intervention and control villages were similar. House conditions of women in the intervention and control groups were similar. The number of permanent family members and the number of residents living in the houses of both the intervention and control villages were similar.

Family members of the women in the intervention village contracted malaria more often than women in the control village. Both were informed that they had malaria by the health personnel (Table 1).

Self-esteem

The independent sample *t*-test was used

Table 1
Numbers and percentages of women in the intervention and control villages.

Demographic characteristics of the women's group	Intervention village N = 45 (100%)	Control village N = 45 (100%)	p-value
Previously contracted malaria			0.097
Yes	21 (46.7%)	14 (31.1%)	
No	24 (53.3%)	31 (68.9%)	
Who told you that you had malaria? (Multiple answer)			0.097[a]
Public health personnel	3 (6.7%)	11 (24.4%)	
Malaria clinic	18 (40.0%)	3 (6.7%)	
Never contracted malaria	24 (53.3%)	31 (68.9%)	
Has a family member ever contracted malaria?			0.000
Yes	34 (75.6%)	12 (26.7%)	
No	11 (24.4%)	33 (73.3%)	
Had seen a patient die of malaria			0.258[a]
Yes	10 (22.2%)	5 (11.1%)	
No	33 (73.3%)	40 (88.9%)	
No answer	2 (4.4%)	0	

[a] Fisher's exact test

Table 2
Comparison of mean scores for self-esteem in the women's groups on pre-test and post-test during months 3, 6, 9 and 12 in the intervention and control villages.

Month	Intervention village (N = 45)		Control village (N = 45)		*t*-test	df	p-value
	Mean	SD	Mean	SD			
Self-esteem							
Pre-test	37.22	2.75	37.00	3.62	0.38	88	0.744
Post-test							
Month 3	40.02	2.37	37.00	4.05	4.325	88	<0.00
Month 6	39.02	2.04	36.31	4.56	3.711	88	<0.00
Month 9	38.60	2.84	34.80	2.84	6.284	88	<0.00
Month 12	39.97	2.05	36.68	2.42	6.956	88	<0.00

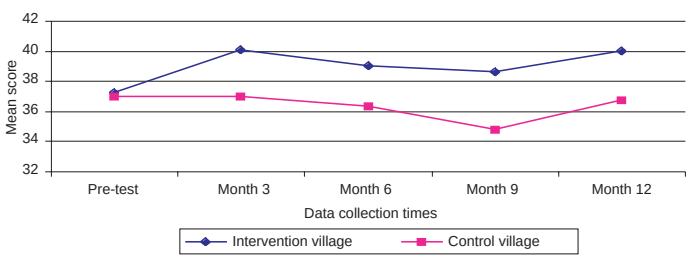

Fig 2–Self-esteem mean score for the women's groups.

to test the difference in mean scores for self-esteem in the intervention and control groups in relation to the five points of the time of study. It found the mean scores for self-esteem in the women's group was similar on the pre-test, but after training the mean scores for self-esteem between the two groups differed significantly ($p < 0.001$) (Table 2).

Table 3
Comparison of mean scores for self confidence in the women's group on pre-test, and post-test at 0, 3, 6, 9 and 12 months in the intervention and control villages.

Month	Intervention village (N = 45)		Control village (N = 45)		*t*-test	df	p-value
	Mean	SD	Mean	SD			
Self confidence							
Pre-test	36.73	3.46	37.95	3.58	-1.671	88	0.98
Post-test							
Month 3	42.82	3.05	38.82	3.14	6.130	88	<0.00
Month 6	41.02	1.80	38.71	2.35	5.233	88	<0.00
Month 9	42.55	2.35	40.82	3.48	2.766	88	<0.00
Month 12	48.57	2.66	45.80	4.16	4.014	88	<0.00

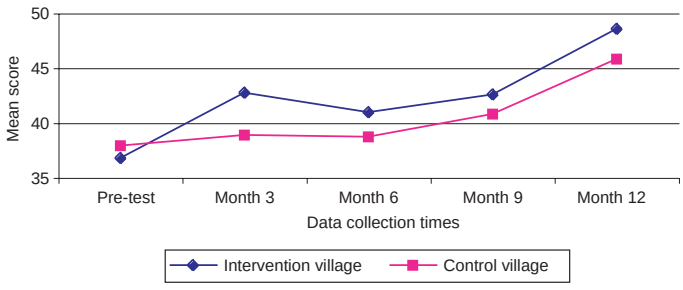

Fig 3–Self confidence mean score for the women's groups.

Comparison of differences in the mean scores for self-esteem in the intervention and control groups for each point of time. ANOVA of two factor analysis of the pre-tests and post-tests at months 3, 6, 9 and 12 was performed. They found the empowerment program increased the self-esteem of the intervention group significantly more than the control group ($F = 37385.958$, $p < 0.001$) (Fig 2).

A comparison of the differences in self-esteem mean scores in the intervention group found that there were statistically significantly different ($p < 0.001$) except during months 3 and 12 (Fig 2).

Self confidence expectations for prevention and control of malaria

The paired simple *t*-test was used to compare the differences for the means for self confidence expectations of preventing and controlling malaria in the intervention and control villages for each point of the study. We found the mean score for the intervention village was significantly higher than the control village (Table 3).

Repeated ANOVA two-factor analysis was used to test the difference in self confidence mean scores of the women's group in the intervention and control villages. We found the empowerment program increased the self confidence mean score for the women's intervention group significantly higher than the control group ($F = 72038.226$, $p < 0.001$) (Fig 3).

A comparison of the differences in the means for self confidence within the intervention group in relation to the five points in time of the study found a statistically significant difference ($p < 0.001$) except during months 3 and 6.

Malaria prevention behavior

A comparison of the mean scores for malaria preventive behavior between the intervention and the control groups, on pre-test and post-test during months 3, 6, 9, and 12, found the mean scores for malaria preventive behavior for the pre-test were not significantly different. After the training program, the means

Table 4
Comparison of the mean scores for malaria preventive behavior in the women's group on pre-test and post-test at months 3, 6, 9 and 12 for the intervention and control villages.

Month	Intervention village (N = 45)		Control village (N = 45)		*t*-test	df	p-value
	Mean	SD	Mean	SD			
Malaria preventive behavior							
Pre-test (month 0)	24.51	4.62	23.89	3.45	0.724	88	0.471
Post-test							
Month 3	22.96	2.91	20.80	4.49	2.705	88	0.008
Month 6	22.48	3.064	21.20	4.26	1.648	88	0.103
Month 9	23.82	3.02	21.56	3.25	3.428	88	0.001
Month 12	24.67	3.03	22.64	3.60	2.880	88	0.005

Computed using alpha=0.05

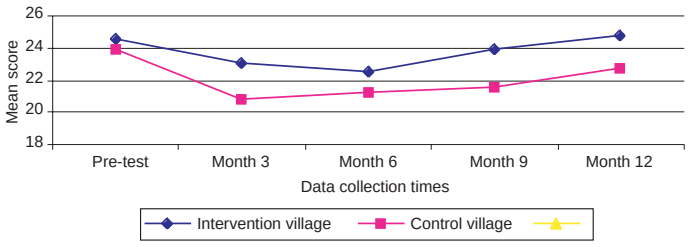

Fig 4–Malaria preventive mean score for the women's groups.

were lower for both the intervention and control groups. Nevertheless, the malaria preventive behaviors mean score in the intervention village was higher than in the control village ($p < 0.05$) during month 6 (Table 4).

In comparing the differences in the mean scores for malaria preventive behavior in the intervention and control villages on pre-test and post-test at months 3, 6, 9 and 12, ANOVA two factors analysis was used to test the effectiveness of the empowerment program. We found the empowerment program decreased the malaria preventive behavior mean score in the intervention village compared with the control village ($F = 327.868$, $p < 0.001$) (Fig 4).

Insecticide treated net use behavior

The empowerment program significantly increased the mean score for insecticide-treated net (ITNs) use behavior for the women's group in the intervention village. To prove this hypothesis, a paired simple *t*-test was used to compare the mean scores for insecticide-treated net use at each point in time of the study. We found the insecticide-treated net use mean score in the intervention village significantly increased compared to both before training and in the control group ($p<0.001$) (Table 5).

In comparing the difference in insecticide-treated net use behavior mean scores for the women's groups, ANOVA two factor analysis was used to test the effect of the empowerment program on mean scores for the intervention and control villages. We found the program increased the mean score for insecticide-treated nets use ($F = 37876.989$, $p < 0.001$) (Fig 5).

A qualitative methodology was used to assess the empowerment program February, 2005 - January, 2006. The women's group in the intervention community created five plans as follows:

Family: Families were taught to sleep under a bed net, wear long sleeve shirts or pants when going into the forest and carry bed nets

Table 5
Comparison of mean scores for insecticide-treated nets use (ITNs) in the women's group on pre-test (month 0) and post-test at months 3, 6, 9 and 12 in the intervention and control villages.

Month	Intervention village (N = 45)		Control village (N = 45)		*t*-test	df	p-value
	Mean	SD	Mean	SD			
ITN use							
Pre-test (month 0)	33.28	3.86	33.77	3.72	-0.611	88	0.54
Month 3	35.88	4.73	33.17	3.67	3.034	88	0.00
Month 6	38.60	3.25	34.68	3.49	5.497	88	0.00
Month 9	39.51	3.10	32.37	4.04	9.377	88	0.00
Month 12	42.51	1.70	36.62	4.37	8.414	88	0.00

Computed using alpha=0.05

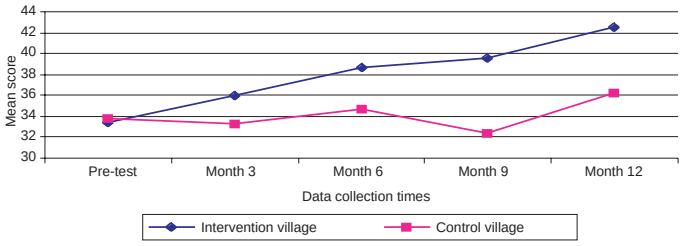

Fig 5–Insecticide treated-net use mean score for the women's groups.

if they stay overnight in the field. If a family member got sick after returning from the field, they were told to go to the community malaria clinic to check for malaria, take medication and follow up if they are infected with malaria. During the study period, none of the women's group family members got malaria, although three women in the women's group got malaria the previous year and one got malaria three times the previous year.

Health education. Health education regarding malaria was provided in the local dialect from 5.00 - 6.00 PM during each Buddhist holiday (twice a month) by local radio, which gave malaria information to community members and was announced often (once a week) during the endemic season. The women's group sent their children to give the malaria information because of being shy to broadcast themselves. Malaria knowledge in the community significantly increased after the training program and in the control group ($p < 0.001$) (Table 6).

Insecticide treated bed nets. An appointment was made to treat bed nets of the community members before the rainy season on April 5, and before the cold season on October 9, 2005. In this plan the women's group encouraged community members to use insecticide-treated nets in the community. The percent of insecticide-treated net use in the community is shown in Table 7.

Malaria campaign. This was aimed to make community members aware of malaria and destroy mosquito breeding places by increasing guppy fish in the low running streams, cutting weeds along canals, covering shallow areas, and arranging houses tidily. In this plan, the women's group cooperated with other groups, such as schools, village headmen, sub-district organizations, community malaria clinics and the Vector Borne Disease Control Unit in Chiang Dao (a local Thai government organization). This campaign was centered in Mueang Na Wan School where there were

Table 6
Comparison of the mean scores for malaria knowledge in the community on pre-test and post-test at months 3, 6, 9 and 12 in the intervention and control villages.

Month	Intervention village (N = 45)		Control village (N = 45)		*t*-test	df	p-value
	Mean	SD	Mean	SD			
Community member malaria knowledge							
Pre-test (month 0)	9.13	1.18	8.62	2.90	0.992	88	0.324
Post-test							
Month3	14.06	2.04	9.91	3.15	7.412	88	0.000
Month 6	12.77	2.37	11.93	3.46	1.348	88	0.000
Month 9	14.24	2.82	10.57	2.23	2.31	88	0.000
Month 12	13.31	2.68	9.62	2.15	7.183	88	0.000

Table 7
Percent of insecticide-treated bed nets used in the intervention and control villages.

Year	Intervention village		Control village	
	First time Percent of ITNs	Second time Percent of ITNs	First time Percent of ITNs	Second time Percent of ITNs
2003	73.56	78.01	62.67	88.50
2004	87.89	90.28	88.95	90.16
2005	87.87	92.50	84.68	78.58
2006	96.05		82.92	

many groups participating in the campaign. The campaign was composed of many activities, such as answering malaria questions for rewards, racing to use bed nets, and demonstrating how to destroy mosquito' breeding places. Each woman in the women's group cleaned their houses inside and outside to demonstrate to other community members how to prevent malaria. Most community members enjoyed this program because it was like a festival.

Control malaria carriers. Bed nets were given to visitors who came from malaria endemic areas. They were taken to the malaria clinic for malaria blood checks if they planned to stay for a long time in the village. Only one case was induced to check whether they had malaria or not.

By participation and observation, the researchers found, after training, the women's group had a better understanding of malaria and malaria preventive behavior than before training. The women's group had increased malaria knowledge compared to before empowerment. While implementing the program, the women's group acted responsibly. Most of the women participated in all activity planning; if they were absent, they sent their relative to participate instead. When the women worked in a group, they also earned some income for their family. The group is actively maintained by the researcher.

DISCUSSION

Efforts to control malaria have been

present for more than 30 years but success has been limited. This may be because the projects were not concerned with participation of the community. Most of the projects neglected local culture, tradition and socio-economics. The projects were led completely or in part by official workers. This is a common phenomenon in developing countries where people need guidance to improve their quality of life (Malaria Division, 1991). One cost-effective measure that provides effective disease control in the long run is involving persons who are responsible for creating or tolerating malaria in the local community in preventing and controlling malaria. They learn that it is in their best interest to participate with other members of their community to create a community ownership program. Women in two villages of Chiang Dao District in Chiang Mai Province that had the highest incidence of malaria were selected to assess the effectiveness of the empowerment program for prevention and control of malaria.

The project was a quasi-experimental design. The selected women in the intervention village needed to participate in the program throughout the year. This made many women in the intervention refuse to participate in the program. The researcher had to randomize again and again to select women to be members of women's group. This made the average women's group age and education level in the intervention village younger than in the control group. A primary school had been present for thirty years in the village but the population over age 35 years had no education. Significant differences were not found in other demographic data and dependent variables of the women's groups; in the intervention and control village, such as marital status, ethnic group, major occupation, and family income of less than 30,000 baht per year.

The output variables were self-esteem, self confidence in preventing and controlling malaria, malaria preventive behaviors, insecticide-treated bed net use and program planning to prevent and control malaria in the community. After training, the mean scores for all but one of the outcome variables in the intervention group were significantly higher than before the training and in the control group. The exception was the mean score for malaria preventive behavior, which was not significantly different than before the training, but was still better than the control group. Malaria in Asia is usually found in people who work outside or in the forest (Kamolratananukul *et al,* 2001), and malaria attacks men more than women. In Thai families, men are dominant, especially in rural areas, because they are responsible for working outside the house. They clean the environment and sleep overnight outside. This causes women to have a lower mean score for malaria preventive behavior because some behavior does not fit within the woman's role. After the training program, it was the hot season (April). In this season, fewer people in the village work outside. The same was true for the women's group. In the hot season there are fewer breeding places to destroy. This is the reason the malaria preventive behavior mean score in month 3 was lower than before the training program. However, the mean score of malaria preventive behavior in month 12 was higher than before the training program. The mean score for using insecticide-treated nets in the women's group increased significantly compared to before the training program and in the control group ($p < 0.001$). The bed net use was within the woman's role in the household. These findings correspond to a study of Rahman *et al* (1996) that stated that women were more concerned with aspects of management of family cases of malaria and health education programs. The women's group in the intervention village planned the projects to prevent and control malaria in the community throughout the year. Group meetings often addressed a wide variety of topics (for example, health and family problems) and activities (preparing food

and flowers for a Buddhist holiday). The result was an improvement in self-esteem, self confidence in preventing and controlling malaria, family health, and community health. These improvements were not found in the control village. The empowerment program that allowed the women's group to actively participate in planning and launching a project to prevent and control malaria caused these changes in the intervention group. Insecticide-treated net usage was one of the woman's roles, so it resulted in the highest changes for mean scores for of insecticide-treated net usage in the women group in the intervention village and differed significantly from the control group.

In the final part of the training program, the women's group created five projects to prevent and control malaria in the community. This shows the program was effective in stimulating the women's group's ability to set up programs to prevent and control malaria. Rahman *et al* (1996) stated that women were actively involved in the implementation of the ITN programs. A study by Peterson and Hughey (2004) suggested women may be more likely to achieve empowerment in a program that culturally connects. The women's group was useful for the families and community, which made them proud to participate in the program. Men, in rural areas were invited to participate in the plan to improve their community. This was the first time women had an opportunity to join in a program for the community's needs. They were recognized for their contribution in health care and prevention. The women's group was willing to do their projects even when they had limited resources and time. For example, releasing guppy fish into low running streams to biologically control mosquito larvae was hampered by a lack of fish, but the women tried to find other supplies of fish. If they were busy, they sent their relative to participate. The project was launched only one time per year plan except for ITNs, which was implemented twice a year. This showed the greatest success in implementation. The group used their first experience to improve the second dipping of bed nets in insecticide. At the second time, the group used only one day to treat the bed nets. The first time, there were many problems: 1) some refused to use ITN, 2) some did not prepare nets, and 3) some did not have enough insecticide. This is similar to the finding of Ford and Evans (2001), who pointed out process, offers an opportunity for management development and learning in organizations, and has a direct impact on organizational performance improvement through team work and strategic behavior.

In conclusion, an empowerment program enhanced women's ability to prevent and control malaria through participation in the activities which played a great role in program success. The women in the community were organized into groups. They developed plans to prevent and control malaria in their community. The program increased women's self-esteem, and self confidence in their ability to prevent and control malaria, and also increased the number of ITN use in the community. The malaria incidence rate in the study village decreased from 55.6 to 0.9 per 1,000 population in the study year 2005.

The group increased their family income by sewing bed nets, blankets and ethic clothing. Their products were sold at a government-sponsored local products' store in Mueang Na Sub-district. The study noted the success of the program to empower women to reduce health risk factors in the family and community. This empowerment program encouraged the target group to implement the plan at least two times. This confirms sustainability.

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