

THE ASIAN CENTER OF INTERNATIONAL PARASITE CONTROL (ACIPAC): FIVE YEARS OF ACHIEVEMENT

III. SCHOOL HEALTH FOR PARASITE CONTROL IN THAILAND: A REVIEW AND CURRENT MODEL ACTIVITIES

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INTRODUCTION

The prevalence of parasitic infections is particularly high among low-income countries in the tropical world. These infections have a serious impact, not only on human health, but also on economic growth and development. The Asian Center of International Parasite Control (ACIPAC) was established under the Hashimoto Initiative (Takeuchi *et al*, 2003). It was designated as a Japan International Cooperation Agency (JICA) Technical Cooperation Project in collaboration with the Faculty of Tropical Medicine, Mahidol University; and the Department of Communicable Disease Control, Ministry of Public Health, Thailand. The mission of ACIPAC is to develop human resources to promote parasite control in the Southeast Asian region: expecting that the prevalence of parasitic infections in this region will be reduced to the level of non-significant public health problems. The Center's activities include human resource development through international training courses, operational research, establishing human and information networking, and filling a supportive role in partnership formulation (Jimba *et al*, 2005).

In order to promote parasite control in the Southeast Asian countries, ACIPAC has been proposing a parasite control program through

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schools. In the course subjects, school-based field practice of malaria and soil-transmitted helminthiasis control activities are included, and ACIPAC has prepared field sites for model control programs in Thailand. We will next review the current situation of parasitic disease and school health in Thailand and then subsequently report ACIPAC's model activities in Thailand.

GENERAL REVIEW: CURRENT SITUATION OF PARASITIC DISEASES IN THAILAND

Soil-transmitted helminthiasis (STH) and malaria have been major health problems in Thailand for more than 50 years. The Department of Communicable Disease Control, the Ministry of Public Health, has been conducting STH and malaria control programs.

Soil-transmitted helminthiasis

Soil-transmitted helminthiasis is almost ubiquitous over large areas of the tropics and the subtropics, and it persists in its high prevalence. It has been recognized as a major public health problem in Thailand for a long period of time. The most common helminths are hookworm, *Trichuris*, *Ascaris*, and *Enterobius*. Their prevalence varies considerably with geography, sanitation level, and human behaviors. Thus, helminthiasis control programs have been operated in certain provinces since 1968 to eradicate STH in the sanitariously improved villages. Later, this program was

integrated into other health programs, and finally it was integrated into the Five-year National Health Development Plan. From 1980 to 2000, the main target groups of the STH control program were primary schoolchildren (school-based approach) and the general population living in high-risk areas in southern Thailand (community approach) (Preuksaraj *et al*, 1982; Jongsuksuntigul *et al*, 1992). At present, STH control activities are implemented in remote areas under the project initiated by the Princess Maha Chakri Sirindhorn.

Controlling STH control depends on three interrelated strategies. The first is to minimize human host reservoirs and infection intensity through substantial parasite treatment. The second is to prevent parasitic infection through sustainable hygienic health behaviors among risk population in each community. The third is to interrupt helminth transmission through hygienic use of a sanitary latrine in parasite-infected populations.

Over the past four decades, various surveys have been conducted in Thailand that have indicated a declining trend for intestinal helminths (Fig 1). However, the prevalence of hookworm, which is the most prevalent, is still high in the southern region of Thailand and in other remote areas, such as the highland and border areas (Fig 2) (Jeeradit *et al*, 1996 unpublished research report; Jongsuksuntigul *et al*, 2003).

Malaria

In Thailand, malaria control programs have been implemented since 1949. At present, the program remains vertical; however, at the beginning, some activities were partially integrated into the general health services. The current Thai malaria control program follows WHO's Global Malaria Control Strategy with some modifications to suit the country's situation. It is comprised of two major strategic components. The first component is disease management. This includes diagnosis, treatment, referral system, and case follow-up. The second component is malaria prevention that includes vector control and personal protection, especially through health education and public relations (PR).

After 50 years of intensive malaria control

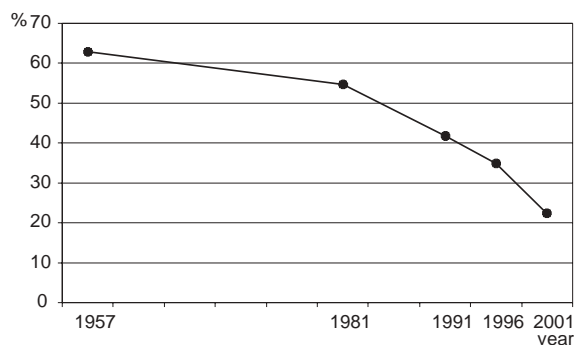


Fig 1—Prevalence of intestinal helminths in Thailand.

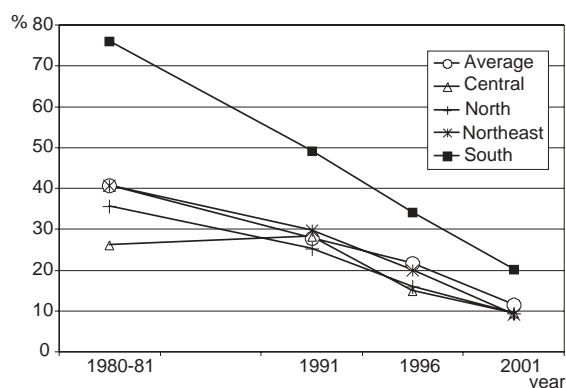


Fig 2—Prevalence of hookworm infection in Thailand classified by region.

programs, the malaria mortality rate has been reduced from 205.5/100,000 in 1949 to 0.58/100,000 in 2002 (Bureau of Vector Borne Disease, 2004). The annual parasite incidence has shown a similar trend, with several epidemics having occurred in some years. The number of malaria cases of both Thai and foreigners living at the Thai borders has been decreasing over the past five years (Figs 3-4). Currently, almost all malaria cases are limited to the border areas between Thailand and neighboring countries. Malaria transmission is especially intense in the forest and plantation areas. This is due to the presence of highly efficient vectors and intensive population movement between Thailand and the neighboring countries (Bureau of Vector Borne Disease, 2004).

School health in Thailand

In 1980, the Ministry of Education and the Ministry of Public Health formulated the national policy for school health. Before the policy was

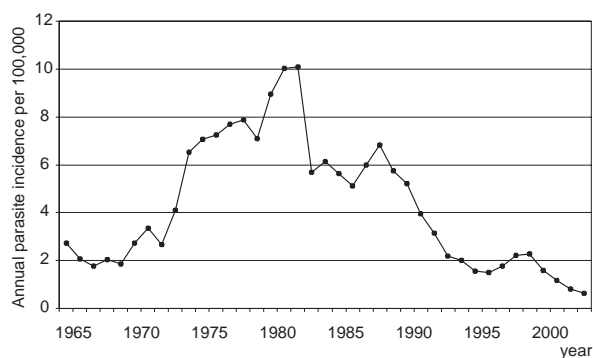


Fig 3—Malaria annual parasite incidence from 1965 to 2003 in Thailand.

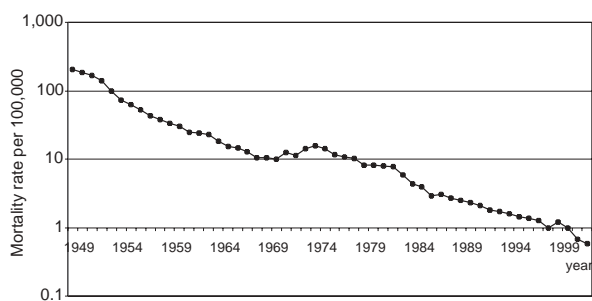


Fig 4—Malaria mortality rate from 1949 to 2002 in Thailand.

formulated, health education had been already included in the curriculum, but each of these ministries had been working vertically for schoolchildren's health. In the new policy, it was stated that health and education were basic rights, based on the Constitution, and that they were important matters to improve the quality of life of the Thai people. This is because they lead to the sustainable development of Thai society towards an intelligent society and a common vision of the society, by saying "A happy life is learning to be." The policy also emphasized that all the people in the society should be responsible for collaborating to develop education for the public interest, and schoolchildren should grow up healthy, by all means, namely, physically, emotionally, socially and intellectually. In 1988, the two ministries issued a declaration: "Thai children's health image." It stated that, "All the Thai children and adolescents are healthy, physically and mentally. They grow up healthfully for their ages with appropriate behaviors and life

skills to enable them to adapt themselves to various situations. Then, they can live happily together in the society."

The two ministries set up objectives for schoolchildren's health as follows: 1) schoolchildren, teachers, and parents have proper knowledge, and they pay attention to health care and taking good health behaviors; 2) all schoolchildren have health insurance, and they can access proper health service wherever they stay; 3) families, schools, temples, and communities can take care of schoolchildren's health responsibly, and they can arrange the environment for good health. Both ministries have continuously collaborated technically in implementing school health programs.

The school health programs are implemented in collaboration with both ministries at each level, namely, central, provincial, and school levels. At the central level, they make policy and determine the directions, prepare the budget, and develop materials. At the provincial level, they receive the policy and directions, and then they disseminate these to the schools, and organize workshops and training for schoolteachers. They follow up and supervise the schools' activities and then report outcomes back to the central level. At the school level, each school makes an annual plan and its own curriculum. They organize in-school training and start teaching and learning activities. Schools have activities to link school with community in collaboration with health personnel (Ministry of Education and Ministry of Public Health, Thailand, 1998).

The roles of the Ministry of Public Health and the Ministry of Education in school-based soil-transmitted helminthiasis and malaria control program

The Ministry of Public Health is responsible for 1) epidemiological study of diseases; 2) provision and supply of anthelmintic or antimalarial drugs; 3) training public health personnel, teachers, and community leaders; 4) production and distribution of health educational materials; and 5) monitoring, supervision, and evaluation. The Ministry of Education is responsible for 1) curriculum development, 2) teacher training, 3) production of teacher manuals and textbooks, 4)

annual operational planning, 5) implementation of planned activities, and 6) monitoring and evaluation.

ACIPAC'S MODEL ACTIVITIES IN THAILAND

Model areas

ACIPAC set the criteria for selecting provinces and model schools for ACIPAC's field practices as follows: 1) high soil-transmitted helminths prevalence or high malaria incidence, 2) convenient and safe travel, 3) ready to be developed as a model school, and 4) welcome for ACIPAC's trainees. As a result, ACIPAC selected two provinces, Nakhon Si Thammarat Province for STH and Ratchaburi Province for malaria (Fig 5).



Fig 5—Map of Thailand.

Nakhon Si Thammarat is located in the south of Thailand. Its soil-transmitted helminths prevalence is higher than those of the other areas in Thailand. In 2001, ACIPAC established the first model school, Wat Thang Phung School, as a model school of the school-based STH control program. In 2003, ACIPAC introduced the program to another two schools, Ban Chum Khling School and Ban Nai Thung School. Ban Chum Khling School was designated as a model of "Health Promoting School," including STH control activities. It obtained the first prize of Health Promoting School Program in the region, which is composed of seven provinces. Ban Nai Thung School was designated as a model in a minority group area. Most of the people around Ban Nai Thung School are Muslims, whereas the majority of the population of the province is Buddhist. Therefore, a total of three model schools were selected from the different districts.

Ratchaburi Province is located in the western part of Thailand, and some districts of the province are located on the border between Thailand and Myanmar. ACIPAC selected its target area in Suan Phung district, which was located on the border. The Vector Borne Disease Control Unit 2 in Suan Phueng district reported that the malaria incidence of the district was 58.2/1,000 in 2001, whereas that of Thailand was 1.41/1,000 for the same year. In 2001, ACIPAC established the first model school, Rujirapat School, as a model school for the school-based malaria control program. In 2002, ACIPAC introduced the program to other three schools in the same district. ACIPAC then selected one of them as a model school to demonstrate various activities to the trainees during the field practice of ACIPAC's international training course. In 2003, ACIPAC introduced the school-based malaria control program to the other 20 schools and conducted research to describe its effectiveness in the same district. In total, ACIPAC established two model schools and applied them to all the 24 schools in Suan Phung district. The number of the teachers and schoolchildren of the model schools are shown in Table 1.

Model activities support

ACIPAC supported model activities in the following ways. First, ACIPAC developed mate-

Table 1
Number of teachers and schoolchildren of model schools in 2004.

School	Province	No. of teachers	No. of schoolchildren
Wat Thang Phoon	Nakhon Si Thammarat	26	455
Ban Chum Khling	Nakhon Si Thammarat	12	197
Ban Nai Thung	Nakhon Si Thammarat	34	732
Rujirapat	Ratchaburi	26	811
Ban Borwee	Ratchaburi	6	267

rials for STH and malaria education. Second, it held teacher training using the materials it developed. ACIPAC left planning and implementing 'teaching and learning' activities to each school, but periodically supervised school activities.

Teaching materials development

Teaching materials are essential for education. Before the ACIPAC project started, the Ministry of Public Health had developed some materials to educate on STH or malaria. But they were not exclusively made for primary schoolchildren. Especially for malaria, it was a little difficult for teachers to teach malaria to schoolchildren using those materials. Moreover, those materials explained only knowledge of STH or malaria. It did not explain how teachers should teach STH or malaria to schoolchildren.

ACIPAC thus developed both teaching manuals for teachers and textbooks for schoolchildren on STH and malaria (Fig 6). The teaching manual explains, not only knowledge of STH or malaria, but also explains how teachers should teach STH or malaria to schoolchildren. It contains lesson plans by grades, methods to integrate STH or malaria education with other subjects, and examples of activities and examinations. The textbook contains knowledge about STH or malaria-causes, symptoms, treatments and prevention methods - in easy words with cartoons. The manuals were distributed to all teachers, and the textbooks were distributed to all the schoolchildren.

Teacher training

ACIPAC held teacher training twice, in 2001 and 2002, in Nakhon Si Tahmmarat Province (Fig

7); and three times, in 2001, 2002 and 2003, in Ratchaburi Province. The first training was held for all the teachers of the first model schools to be established as models. The second and third training courses were conducted for all or some teachers of the new model schools or target schools; however, some teachers of the first schools also participated in the subsequent training. A total of 69 teachers in Nakhon Si Thammarat Province and 81 teachers in Ratchaburi Province were trained.

The contents of the training were basic knowledge of STH or malaria, how to make lesson plans of STH or malaria education, how to integrate STH or malaria education with other subjects, how to make information, education and communication (IEC) materials, and how to link schools with community for STH or malaria prevention.

Activities of STH and malaria education in schools

After the training, the target schools started to implement their own activities. At first, all the teachers discussed STH or malaria education. The schools set up a committee for STH or malaria education. The committee members then made their own annual plan and curriculum for STH or malaria education. They also held meetings to discuss STH or malaria education in schools with parents, community leaders, and health personnel (Fig 8).

The activities varied school by school; but basically were categorized as follows: 1) lectures on knowledge about STH or malaria (Fig 9); 2) integration of STH or malaria education with other subjects, such as writing an essay about



Fig 6–Teaching materials; teaching manual of malaria (left) and textbook of STH (right).



Fig 9–Lecture on the knowledge; a teacher gives a lecture of STH (Nakhon Si Thammarat).



Fig 7–Teacher training; teachers practice to make lesson plans of STH (Nakhon Si Thammarat).



Fig 10–Integration of STH and malaria education with other subjects (1); schoolchildren draw pictures of STH (Nakhon Si Thammarat).



Fig 8–Meeting with parents; a health worker explains STH to parents (Nakhon Si Thammarat).



Fig 11–Integration of STH and malaria education with other subjects (2); pictures drawn by schoolchildren (Ratchaburi).

STH or malaria in a Thai class, drawing a picture (Figs 10,11) and singing a song about STH or malaria in an art class 3) extracurricular activities, such as school-broadcasts about STH or malaria by health volunteer students, and cleaning school facilities by schoolchildren; 4) outdoor activities, such as mosquito surveys (Fig 12), destroying breeding sites of mosquitoes, and interviewing villagers about STH or malaria; 5) delivering messages about STH or malaria prevention from schoolchildren to villagers by taking schoolchildren-made IEC materials to their homes, issuing newsletters, and setting billboards in the villages (Fig 13); 6) holding village events for STH or malaria prevention by involving parents and villagers (Figs 14,15), and 7) others, such as constructing sanitary facilities. Some schools carried out all of these activities and some schools only selected some of them.

OUTCOMES AND IMPACTS OF THE MODEL ACTIVITIES

The model activities were originally started as a model field practice of the ACIPAC's international training course. However, the model activities resulted in various outcomes and impacts.

Outcomes and impacts of the STH program in Nakhon Si Thammarat Province

ACIPAC conducted a baseline survey in 2001, and the results were published in two sci-



Fig 13—Sending messages to community; schoolchildren put their drawings about malaria on the billboard in the village (Ratchaburi).



Fig 14—Event involving community people (1); a school holds an event to appeal for STH prevention in collaboration with community people (Nakhon Si Thammarat).



Fig 12—Outdoor lesson; schoolchildren look for mosquito larvae in the stream in the community (mosquito survey) (Ratchaburi).



Fig 15—Event involving community people (2); schoolchildren walk around the village appealing for malaria prevention with community people (Ratchaburi).

Table 2

Change of teaching activities of soil-transmitted helminthiasis (Before : before distributing the materials and the training; After : after distributing the materials and the training).

Teaching activities		Yes No. (%)	A little No. (%)	Little No. (%)	Not at all No. (%)
Can design a lesson plan of STH	Before (n=62)	23 (37.1)	21 (33.9)	17 (27.4)	1 (1.6)
	After (n=56)	54 (96.4)	2 (3.6)	0 (0.0)	0 (0.0)
Have taught STH	Before (n=60)	15 (25.0)	22 (36.7)	13 (21.7)	10 (16.7)
	After (n=59)	53 (59.8)	4 (6.8)	2 (3.4)	0 (0.0)
Have integrated STH education with other subjects	Before (n=52)	3 (5.8)	30 (57.7)	11 (21.2)	8 (15.4)
	After (n=49)	21 (42.9)	24 (49.0)	4 (8.2)	0 (0.0)
Have sent messages for STH prevention to communities through schoolchildren	Before (n=50)	5 (10.0)	7 (14.0)	18 (36.0)	20 (40.0)
	After (n=46)	11 (23.9)	20 (43.5)	11 (23.9)	4 (8.7)

Table 3

Change of schoolchildren's knowledge, attitudes and practices toward soil-transmitted helminthiasis prevention (Before : January 2004; After : September 2004).

Knowledge, Attitudes, Practices		Good ¹ No. (%)	Moderate ² No. (%)	Poor ³ No. (%)
Knowledge	Before (n=216)	48 (22.2)	147 (68.1)	21 (9.7)
	After (n=144)	116 (80.6)	25 (17.3)	3 (2.1)
Attitudes	Before (n=224)	67 (29.9)	148 (66.1)	9 (4.0)
	After (n=155)	143 (92.3)	12 (7.7)	0 (0.0)
Practices	Before (n=219)	53 (24.2)	140 (6.9)	26 (11.9)
	After (n=152)	138 (90.8)	10 (6.6)	4 (2.6)

¹ score 0-10 for knowledge, 0-17 for attitudes and practices

² score 10-15 for knowledge, 18-23 for attitudes and practices

³ score 16-19 for knowledge, 24-30 for attitudes and practices

entific papers. One of them (Anantaphruti *et al*, 2002) was about the results of stool examination for soil-transmitted helminths infections and the results of KAP survey on STH. We reported that about half of the schoolchildren wore shoes and washed hands before eating only occasionally or not at all. We pointed out the importance of health education in the schools. The other one (Tomono *et al*, 2003a,b) was about the relations between soil-transmitted helminths prevalence and schoolchildren's behaviors. We reported that the schoolchildren with less knowledge on STH tended to get infected with hookworm, and that boys, who did not wear shoes, tended to have a higher intensity of hookworm infection than girls. We emphasized that it would be important to

encourage schoolchildren to save themselves from soil-transmitted helminths infection by adopting preventive methods through proper health education.

ACIPAC monitored the effects of the training and teaching materials for all the teachers of the three model schools in December 2003 by using retrospective questionnaires. Almost 90% of the teachers recognized that their teaching skills of STH were improved. The number of teachers who could design a lesson plan for STH and who taught STH also increased. The number of teachers who integrated STH education with other subjects and who sent messages for STH prevention to communities through schoolchildren also increased (Table 2).

Table 4
Prevalence of soil-transmitted helminthes of model schools.

Year	No. examined	No. positive (% positive)				
		STH	<i>Ascaris</i>	Hookworm	<i>Trichuris</i>	<i>Enterobius</i>
Wat Thang Phung School						
2001 Feb	312	77 (24.7)	-	61 (19.6)	27 (8.7)	-
2002 Aug	254	48 (18.9)	1 (0.4)	32 (12.6)	19 (7.5)	1 (0.4)
2003 Aug	225	35 (15.6)	-	29 (12.9)	7 (3.1)	1 (0.4)
2004 Jul	212	48 (22.6)	-	37 (17.4)	15 (7.1)	1 (0.5)
Ban Chum Khling School						
2003 Aug	109	21 (19.3)	-	19 (17.4)	2 (1.8)	2 (1.8)
2004 Jul	136	26 (19.1)	-	20 (14.7)	6 (4.4)	1 (0.7)
Ban Nai Thung School						
2003 Aug	333	218 (65.5)	93 (27.9)	52 (15.6)	182 (54.6)	-
2004 Mar	470	266 (56.6)	86 (18.3)	62 (13.2)	229 (48.7)	-

The Provincial Health Office conducted a study to describe the effectiveness of the school-based STH control program, in collaboration with the educational sector of the provincial level. The first survey was conducted in January 2004, and the second in September 2004 at the three model schools by questionnaire. Almost all the schoolchildren of Grades 4-6 joined the first survey. For the second survey, only the schoolchildren of Grades 4 and 5 joined because the schoolchildren of Grade 6 had left the schools. The survey questionnaires included 19 questions on knowledge about STH, ten questions on the attitudes toward and practices of STH prevention, respectively. Answers on the attitudes and practices were converted into scores. All the results were classified into three groups, respectively. When the first survey was conducted, the schools had started STH education already. However, positive changes in knowledge, attitudes and practices were observed (Table 3). Concerning de-worming, ACIPAC conducted a selective treatment for the model schools once every year. The prevalence of soil-transmitted helminths is shown in Table 4.

Outcomes and impacts of the malaria program in Ratchaburi Province

ACIPAC started a school-based malaria control program in one model school in 2001

and expanded it to another three schools in 2002. As a result, the program achieved successful results. The school-based malaria control program was rather a new concept, and its effectiveness had not been reported in the Mekong region. Therefore, we expanded our activities and conducted a study to describe the effectiveness of the school-based malaria control program.

In 2003, we expanded our activities to 14 school, and they were selected as the targets of the study. We made before-after intervention studies. The pre- and post-survey were conducted in November 2003 and August 2004 by using self-administered questionnaires. Fourteen school principals, 93 teachers, and 631 schoolchildren of Grades 3-5 joined the survey.

Before introducing the school-based malaria control program, all the teachers had considered malaria to be an important issue. However, they had not taught malaria very extensively. The main reasons for not teaching malaria were that the context for malaria education, such as curriculum and materials, had not been prepared.

After ACIPAC introduced the program, the schools set up a curriculum for malaria education and the teachers came to teach malaria actively using ACIPAC's teaching materials. As

a result, the schoolchildren came to take care of mosquito bites, and positive changes were observed in schoolchildren's practices toward malaria prevention. ACIPAC provided only the teaching materials and the training to the schools. The teachers conducted malaria education using their own ordinary budget. Such a school-based malaria control program, by only providing materials and trainings, might be a cost-effective approach for behavior change and to strengthen current malaria control programs in Thailand (manuscript in contribution).

Beyond health education

As a result of these school-based programs, teachers observed that the schoolchildren had learned a great deal more than what they would learn from their ordinary health education programs. They learned how to collaborate with their friends and found their strength through group work, such as cooperating together to make one storybook by several schoolchildren. Some schoolchildren found that they were good at creating stories, and some schoolchildren found that they were good at drawing. They learned how to think more creatively and systematically, and how to link what they learned with their life. The teachers reported that they had improved their own teaching skills beyond health education, too. They learned to integrate some topics with the other subjects and how to teach more attractively and effectively by using various teaching methods. They also learned how to collaborate more closely with other teachers, the community people, and health personnel.

Impacts to Thailand and the other countries

Thailand has had an effective school health system, and the schools had already conducted many activities for health other than STH and malaria, before ACIPAC introduced the school-based STH and malaria control programs. However, the curriculum was already full and it was difficult for teachers to teach additional subjects, unless the schools made their own curriculum or lesson plans, because they did not have nationwide guidelines for STH and malaria education. ACIPAC introduced the new activities, namely the school-based STH and malaria control programs, by showing how the schools

should integrate these new activities into the existing activities. As a result, the school-based STH and malaria control programs could be accepted by many schools as one of their health education activities.

Both the Ministry of Public Health and the Ministry of Education recognized that this ACIPAC's approach was useful and it could be a model for Thailand. The Ministry of Public Health is planning to use ACIPAC's teaching materials of STH for their own project 'Helminthiasis Control Project for the Development of Children and Youth in Remote Areas of HRH Princess Maha Chakri Sirindhorn.' This project covers 560 schools in remote areas and minority group areas all over Thailand. The Ministry of Education is also planning to use ACIPAC's teaching materials for STH in all primary schools in Nakhon Si Thammarat Province. They are also planning to implement the school-based malaria control program using ACIPAC's teaching materials for malaria in some malaria endemic districts in Ratchaburi Province.

ACIPAC's teaching materials were translated into English and were distributed to the neighboring countries of Thailand and some countries around the world, such as Kenya, Ghana, and East Timor. They were also uploaded onto the ACIPAC Website and introduced to all over the world. Some organizations were interested in ACIPAC's teaching materials and requested ACIPAC to provide them. It is expected that ACIPAC's teaching materials will be introduced for their projects in their own countries in future.

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