

CAPACITY BUILDING PROCESS IN ENVIRONMENTAL AND HEALTH IMPACT ASSESSMENT FOR A THAI COMMUNITY

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Abstract. This research aimed at exploring the development of the capacity-building process in environmental and health impact assessment, including the consideration of subsequent, capacity-building achievements. Data were gathered through questionnaires, participatory observations, in-depth interviews, focus group discussions, and capacity building checklist forms. These data were analyzed using content analysis, descriptive statistics, and inferential statistics. Our study used the components of the final draft for capacity-building processes consisting of ten steps that were formulated by synthesis from each respective process. Additionally, the evaluation of capacity building levels was performed using 10-item evaluation criteria for nine communities. The results indicated that the communities performed well under these criteria. Finally, exploration of the factors influencing capacity building in environmental and health impact assessment indicated that the learning of community members by knowledge exchange via activities and study visits were the most influential factors of the capacity building processes in environmental and health impact assessment. The final revised version of capacity-building process in environmental and health impact assessment could serve as a basis for the consideration of interventions in similar areas, so that they increased capacity in environmental and health impact assessments.

Keywords: capacity building, environmental and health impact assessment, Thailand

INTRODUCTION

A statutory requirement for Environmental Impact Assessment (EIA) is currently being adopted by many countries around the world (WHO, 2015). Thailand has enforced specific laws and regulations regarding what kinds of projects/construc-

tions have to conduct EIA and Health Impact Assessment (HIA) (Sithisarankul *et al*, 2015). Governmental and private sectors affect various kinds of benefits; however, the negative impacts of environmental problems are apparent, and they occur especially in the degeneration of natural resources and in the environmental toxins that directly result from these developments.

Potential environmental problems in the future may affect health care issues, including physical, mental, social, and

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spiritual wellbeing (WHO, 2015). Most concerning, however, are the negative impacts caused by policies, programs, and project developments that could affect vulnerable groups, including children, the elderly, and pregnant women (Hengpraprom and Sithisarankul, 2011).

Environmental impact assessment (EIA) has been undertaken for over 30 years in the USA and elsewhere. In Thailand, EIA has been used to identify the impacts of projects, as well as to establish the appropriate mitigation measure for preventing and mitigating environmental impacts for these projects or activities (ONEP, 2012).

Various projects or businesses of public service, state, or private enterprises are required by law to conduct EIA reports with an HIA component (Thailand Law Forum, 2015). An EIA report is mostly conducted by consultant enterprises including universities. However, many mega projects including those of electric power plants and new mine development exhibit negative impacts on many communities in the country. Stakeholders have been increasingly ignoring the EIA process, due to inadequate participation from the community (Phoolcharoen *et al*, 2003; Pengkam, 2012), as well as loopholes in the legislation regarding the appropriate use of the EIA (Pengkam, 2012). Moreover, community's crucial concerns were not included in impact assessment process.

When disagreements about project developments arise among project owners, government organizations, stakeholders, and community members, this has led to violent conflicts in many rural communities in Thailand, for examples, Map Ta Phut Industrial Estate, Rayong Province; Mae Moh Power Plant, Tak Province; Gold mining, Loei Province; Coal-fired power

plant, Chachoengsao Province; Chana Power Plant, Songkhla Province; and Pak Bara Port Construction, Satun Province (Pengkam, 2012).

Health Impact Assessment (HIA) has been recognized in Thailand as a tool to consider the ways that policies, programs, or projects have the potential to impact the health of people, including consideration of the distribution of those impacts (Hengpraprom and Sithisarankul, 2011). Policymaking should take into account the determinants of health by which any effects on impaired community health status could be attributable to policies, programs, or projects (Marmot, 2005). An HIA promotes health awareness, and in the long run contributes to the health of local people (Sithisarankul *et al*, 2015).

HIA legislation was included in section of rights and duties to health of the National Health Act and section of community rights of the Thai constitution 2007 (Pengkam, 2012). Their intention is to create a social learning process that will be used to analyze and forecast positive and negative impacts that may occur from policy decision resulting from implementation of projects or activities. To properly adhere to the amendments made to the National Health Act, the National Health Commission Office has attempted to build the capacity of the communities to conduct HIAs on their own that referred to as the Community Health Impact Assessment or CHIA. CHIAs are considered to be the fourth type of HIA which were announced in the rules and procedures for producing a HIA by National Health Commission.

Unfortunately, EIA and HIA implementation in Thai context indicate that the crucial weakness part of the process was monitoring and evaluation steps (M&E), a

lack of participation from the community, and a lack of knowledge and experience of how to assess the link between the environment and health issue for the community, because CHIA in Thailand mainly focused on health aspects rather than environment (Phoolcharoen *et al*, 2003; Sithisarankul and Hengpraprom, 2010; Hengpraprom and Sithisarankul, 2011).

In most cases, community members and stakeholders may not have enough knowledge to understand EIA and HIA to participate appropriately (Phoolcharoen *et al*, 2003; Inmuong, 2008; Sithisarankul and Hengpraprom, 2010). These studies found that the numbers of EIA-and-HIA knowledgeable communities in Thai context are limited. Despite several countries agreeing on the continued growth of EIA and HIA, there has been little research on HIA capacity building (Schuchter *et al*, 2015) and only few HIA case studies and training courses in Thailand (Phoolcharoen *et al*, 2003).

Moreover, concerned bodies should simplify guidelines and communicate widely to people, because their participation has been reported as essential to success (Sithisarankul and Hengpraprom, 2010). Additionally, the community should build capacity by several approaches, such as qualitative and quantitative assessment methods, project management, community engagement, framing recommendations, and evaluation (Cole and Fielding, 2008; Schuchter *et al*, 2015).

Capacity building is a process that involves and implies the reinforcement of human, institutional, or community performance skills, knowledge, and attitudes on a sustainable basis (UNHCR, 1999; Crisp *et al*, 2000; UNDP, 2009, 2010). The objectives of this research were to explore: 1) the development of the capacity-

building process in environmental and health impact assessment (EIA/HIA), 2) the capacity level of community in EIA/HIA, and 3) the factors influencing capacity in EIA/HIA.

Our research questions were how to empower the community for enhancing the capacity in EIA/HIA through respective capacity building process and how to assess the changes in capacity level of participants after attending the capacity building process.

MATERIALS AND METHODS

Research design

This case study research was a Community-based Participatory Action Research (CBPAR) (Burns *et al*, 2011) using mixed methods for collecting data in both qualitative and quantitative research. The authors used a 'community organizing approach' (Crisp *et al*, 2000) in which individual community members are selected to form new organizations or to join existing ones according to their information, tools, and related assets to improve the health of community members for capacity building among community leaders and community representatives. The community organizing approach provides community members to raise people's knowledge, awareness, and skills that helps them to better understand the decision making process. Four complementary approaches were undertaken to construct capacity building, as follows.

Establishment of a core group. The authors invited community representatives to work closely with the authors. The authors designated them 'community heads.'

Human resource development. The authors and community heads cooperatively

developed a capacity building process in EIA/HIA. It initially was constructed through a review of existing literature and the relevant documents. Contents included: 1) principles and concepts of EIA/HIA; 2) laws and regulations regarding EIA/HIA; 3) community participation in EIA/HIA; 4) applicable tools for EIA/HIA; 5) monitoring/evaluation procedure; 6) getting community members engaged in EIA/HIA; and 7) proposed essential contents of EIA/HIA.

Community management. Community heads analyzed their management structures of communities regarding infrastructures, human resources and finances.

Community development. Community heads and community representatives cooperatively implemented following the proposal of programs/projects.

Capacity-building process

The preliminary version of capacity building process in EIA/HIA consisted of 11 steps. It was presented to the research advisory committee for their recommendations. After that, the preliminary version was implemented in the first phase. The second draft version consisting of 10 steps was synthesized from this process and was then brought to the research advisory committee for their consideration and suggestions once more. Necessary changes were made. Finally, the revised version (Fig 1) was the final draft before the pretest in the second phase.

Study area

Study areas were nine communities governed by three local government organizations consisting of Prig municipality/ Prig Sub-district Administrative Organization (SAO); Sumnaktaeo Sub-district Administrative Organization (SAO); and Sumnakkham Municipality, Sadao

District, Songkla Province. These nine communities were purposively selected and located around various motorways, construction sites, mega hotels, and rubber industry projects. Additionally, these communities all face several developing projects requiring EIA reports upon regulation of ONEP. We began by communicating with all local government organizations in the target areas before initiating the field study. We also contacted community leaders and key persons to explain our objectives and discuss an appropriate way to approach communities.

Participants

For qualitative research, target populations for the key informants consisted of community leaders, village leaders, religious leaders, retired government official, local government authorities, health authorities, conservation groups, and chiefs of public health volunteers. We selected the key informants using selection criteria: who are leaders with a public-minded personality, who have time to attend, and who have lived in their communities for at least six months. The selected respondents were 31 community heads.

For quantitative research, the target population members consisted of three groups—village committee members, public health volunteers, and local residents. Village committee members and public health volunteers were enrolled using simple random sampling. Local residents were selected using selection criteria: all households that were within 0.5 km of the projects were chosen for the study, while those within 5 km of the projects were randomly selected using a simple random sampling technique. One adult was selected from each household.

The sample size was calculated using 95% confidence interval, $n = N/1+Ne^2$,

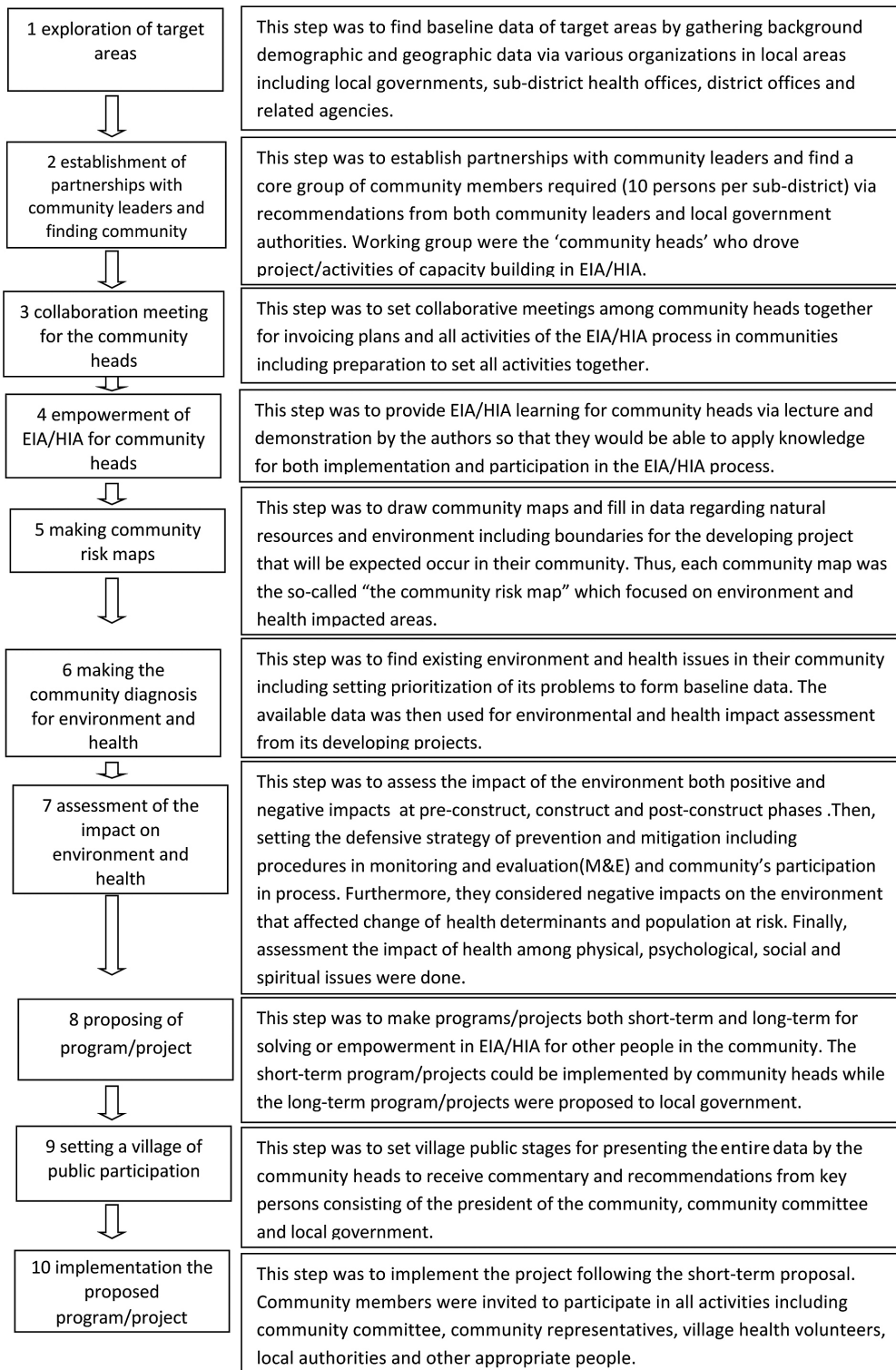


Fig 1–Diagram of capacity building processes in EIA/HIA.

where the population size was 6,960 and the random error was 0.05. The sample size was estimated to be 378 for the study by proportion to population size. Of 378 asked, 309 accepted to participate in the study.

Tools and data collection

Qualitative methods. For qualitative research, in-depth interviews were carried out, especially all community head participants using face-to-face interviews, which lasted about 60 minutes. These interviews supported the quantitative results, allowing for exchanges of ideas and reflections from the experiences of participants who had been involved in EIA/HIA at both community and individual levels.

The interviews, which were semi-structured using a list of open-ended questions, were done before the start of their training. These were audio-recorded and later transcribed. Their opinions and suggestions were included in focus-group discussions (FGDs).

There were 8-10 participants engaged in FGD activities. We held three group discussions in target areas (1 group/district) by face-to-face discussion lasting about 90 minutes. We gave a brief explanation of the purpose of discussion and using a list of open-ended questions. These were audio-recorded and later transcribed. Lastly, participatory observations were carried to observe the behaviors of the participants in all activities involving capacity-building processes using field notes.

Quantitative methods. For quantitative research, questionnaires were used with both community heads ($n=31$) and community members ($n=309$), which consisted of both evaluations of knowledge, awareness, and practice scores (KAP) in EIA/HIA as well as factors influencing capacity in EIA/HIA. Additionally, KAP questionnaires

were given to community-heads at 'Before' (Month 0), 'During' (Month 3), and 'After' (Month 6) attending the capacity building training. Community members were evaluated at 'Before' (pre-test) and 'After' (post-test) attending especially processes of implementation the proposed program/project (Step 10).

As a result, of the 378 participants approached, 309 participants accepted to participate in the proposed program/project (Step 10). Due to some loss follow-up, we obtained both pre-test and post-test questionnaires from only 190 persons (response rate 50.3%). Furthermore, the factors questionnaires were given to both community heads and community members during developing their process. As a result, 309 participants of community members and 28 community heads replied to the factors questionnaires. Therefore, we obtained 337 factors questionnaires (response rate 82.4%).

The capacity building in EIA/HIA for community in perspective of community heads participants and community members participants was also assessed by the authors using a capacity checklist form developed by the United Nations Development Programme framework (UNDP, 2009, 2010). The capacity checklist form had a 10-item evaluating tool. Details of this tool are shown in the results part of Table 4. Three experts in the field and a research advisory committee approved questionnaires and all qualitative approaches for their consistency. Moreover, these specific tools were explored in another area (Paching Sub-district, Chana District, Songkla Province) to determine test reliability by using Cronbach's alpha coefficient. As a result, reliability coefficients of KAP questionnaires and factors questionnaires were 0.719 and 0.851, respectively.

Data analysis

Data analysis of this study was performed using SPSS for Windows® (version 16; SPSS, Chicago, IL). The summary of data were presented as means and SDs (standard deviation) for continuous variables and as frequencies and percentages for discrete variables. Additionally, the mean scores of knowledge, awareness, and practices among before, during, and after attendance of the process were analyzed by paired *t*-test. The authors used the content analysis method for the qualitative approaches.

Ethical considerations

The research proposal and all of the research instruments were reviewed and approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (IRB Ref No. 060/56; 2013 Mar 5). We obtained informed consent from each participant prior to inclusion in the study for both qualitative and quantitative research.

RESULTS

Demographic data of community heads (*n*=31)

The mean age of the participants was 48 years (range, 27-65 years). Twenty-five were male, 28 were married and lived with their families, 15 had less than a bachelor's degree, and 14 were farmers. The mean monthly income of the participants was THB 22,307 (range THB 10,000-45,000). Eighteen of them had 'Fair' socio-economic status, 23 had lived in their community for more than 20 years, and 10 were village leaders. Other characteristics are presented in Table 1.

Demographic data of community members (*n*=309)

The mean age of the participants was

39 years (range 20-77 years). Most of the participants were local people (78.9%). The mean monthly income of the participants was THB 18,408. Other characteristics are presented in Table 2.

Capacity building processes

The authors have worked closely with community heads for development of the capacity building process in EIA/HIA. Most participants worked well in collaboration with us. However, due to incomplete attendance of some participants, the processes progressed slowly. The composition of the final draft for capacity building processes in EIA/HIA were formulated through synthesis from their processes, and consisted of 10 steps (Fig 1).

Most community heads knew that there would be a new project in their community through information from community leaders, neighbors, community speakers, and leaflets but did not know the details of the project. Most respondents felt that the developing project would have both a benefit and an impact for community but did not know how to relate between EIA/HIA and the developing projects due to lack of knowledge about EIA/HIA. Furthermore, all participants agreed that the capacity in EIA/HIA of the community leaders and local people should be enhanced in order to participate appropriately in EIA/HIA process.

The authors assessed capacity-building achievement in professional development, understanding, participation, and implement of EIA/HIA. Capacity level evaluation for community heads was presented as mean scores of knowledge, awareness, and practices. The results indicated that they had significantly higher scores when comparing After, During, and Before process attendance ($p < 0.05$) (Table 3).

Table 1
General characteristics of community heads (N=31).

Variable	No.
Gender	
Male	25
Female	6
Age (years)	
20 - 30	5
31 - 40	4
41 - 50	8
51 - 60	11
> 60	3
Marital status	
Single	3
Married	28
Divorced /Widow	0
Education level	
Primary school	1
High school	13
Vocational school	1
Bachelor's degree	13
Higher than bachelor degree	3
Occupation	
Farmer	14
Retired government official	2
Trading	4
Government official	10
Self-employment	1
Monthly income (THB)	
<10,000	18
10,000-20,000	8
20,001-30,000	4
>30,000	1
Socio-economic status	
Fair	18
Good	13
Time resided in the community (years)	
<10	4
10-20	4
21-30	10
> 30	13

While the capacity level for the community members suggested that they had significantly higher knowledge, awareness, and practices in EIA/HIA scores after process attendance compared to before

Table 2
General characteristics of community members (N=309).

Variable	No. (%)
Gender	
Male	133 (43.0)
Female	176 (57.0)
Age (years)	
20-30	86 (27.8)
31-40	83 (26.9)
41-50	94 (30.4)
51-60	32 (10.4)
>60	14 (4.5)
Marital status	
Single	84 (27.2)
Married	205 (66.3)
Divorced/Widow	20 (6.5)
Education level	
Primary school	71 (23.0)
High school	151 (48.9)
Vocational school	22 (7.1)
Bachelor's degree	61 (19.7)
Higher than bachelor degree	4 (1.3)
Occupation	
Farmer	95 (30.7)
Contractor	75 (24.3)
Trading	39 (12.6)
Government official	36 (11.7)
Housewife	15 (4.9)
Employee	13 (4.2)
Self-employment	7 (2.2)
Student	29 (9.4)
Monthly income (THB)	
<10,000	48 (15.6)
10,000-20,000	165 (53.4)
20,001-30,000	44 (14.2)
>30,000	52 (16.8)
Socio-economic status	
Fair	27 (8.7)
Good	276 (89.4)
No income	6 (1.9)
Time resided in the community (years)	
<10	64 (20.7)
10-20	72 (23.3)
21-30	65 (21.0)
Position in village community	
committee	37 (12.0)
Public health volunteers	28 (9.1)
Local residents	244 (78.9)

Table 3
Mean scores of knowledge, awareness, and practices in EIA/HIA for community heads (N=31).

Variable	Before (baseline)		During (Month 3)		After (Month 6)		Before vs During		After vs During	
	Mean/Median (Min,Max)	SD	Mean/Median (Min,Max)	SD	Mean/Median (Min,Max)	SD	t	p-value	t	p-value
Knowledge score (10 points)	4.87/4.0 (0,10)	2.45	6.61/7.00 (4,10)	1.48	7.68/8.00 (6,10)	0.98	5.54	<0.05	5.42	<0.05
Awareness score (10 points)	6.00/6.00 (2,9)	2.25	7.06/7.00 (5,10)	1.44	8.03/8.00 (6,10)	0.98	4.59	<0.05	5.3	<0.05
Practical score (10 points)	1.72/2.00 (0,4)	1.32	4.29/4.00 (2,8.5)	1.53	5.65/5.50 (4,7.5)	1.17	14.48	<0.05	Z=-4.38	<0.05
Total scores (30 points)	12.59/12.00 (5,22)	4.95	17.98/18.00 (12,27.5)	3.75	21.36/22.00 (16,26)	2.53	11.34	<0.05	7.23	<0.05

($p < 0.05$) (Table 4).

Furthermore, using a 10-item evaluation form, we evaluated the capacity building level for nine communities. The results suggested that the communities performed well. However, a few communities failed to achieve the criterion of sufficient participation of community representatives in the programs/projects and the criterion of setting the programs/projects into the development plan of communities or local government organizations (Table 5).

Most community heads agreed that the capacity building process could possibly use a variety of resources to undertake. However, most community heads felt that the community did not receive the essential resources from related organizations to provide capacity building processes in EIA/HIA. Additionally, most participants felt the unity of community leaders and community members should be improved to enhance collaboration and participation. Moreover, the community had suggestions about factors influencing capacity building process in EIA/HIA, such as the community leaders and key persons should use leadership skills to stimulate learning processes by extending empowerment to local people through training, learning-by-doing, study visits.

External institutions and local government organization should collaborate with the community leaders and key person to maintain the capacity of participants, and related organizations should support essential resources and infrastructures to empower the community for EIA/HIA to sustain its development. However, exploration of the factors influencing capacity in EIA/HIA indicated that the learning of community members by knowledge exchange via activities

Table 4
Mean scores of knowledge, awareness, and practice in EIA/HIA for community members (N=190).

Variable	Before attendance		After attendance		Before vs After	
	Mean /Median (Min,Max)	SD	Mean /Median (Min,Max)	SD	t	p-value
Knowledge score (10 points)	3.62/4.0 (0,8)	1.73	7.51/8.0 (2,10)	1.06	Z=-11.78	<0.05
Awareness score (10 points)	3.43/3.0 (0,8)	1.59	7.28/7.0 (3,10)	1.0	31.95	<0.05
Practical score (10 points)	1.09/0.5 (0,5)	1.30	5.10/5.0 (1,8.5)	1.34	32.05	<0.05
Total scores (30 points)	8.15/7.75 (0,19)	3.80	19.89/20.0 (10.5,24.5)	2.49	38.46	<0.05

and study visits was the most influential factor of the capacity-building processes in EIA/HIA for community, followed by assistance from local government organizations to solve environmental problems (Table 6).

DISCUSSION

In this study, the final draft of the capacity building process in EIA/HIA consisted of 10 steps, which were implemented by community heads and community representatives. These processes, known as micro strategies, aimed to empower and support competencies at an individual and community levels (Hughes and Kemp, 2007) and are similar to concept of the community organizing approach aims to community development that raises people's knowledge, awareness, and skills (Crisp *et al*, 2000). However, the authors found that the establishment of community heads is crucial for a successful capacity-building process. These leaders are considered an essential part for the community to develop, plan, implement, and evaluate their processes, which is similar to that reported among other local government authorities known as a 'Few Good People' (Sithisarankul *et al*, 2015).

Additionally, in order to encourage community heads to become reflective practitioners both individually and collectively, capacity building on skills, knowledge and competency methods and procedures need to be provided (Sithisarankul *et al*, 2015).

The authors realized that each step of capacity-building process should be flexible in implementing each step and may use a unique set of approaches and strategies (Hengpraprom and Sithisarankul, 2011). Therefore, they require different

Table 5
Results of evaluating of capacity building level of communities (N=9).

Evaluating criteria	Prig	Sumnaktaeo	Sumnakkham
	Sub-district	Sub-district	Sub-district
	Village 3,4,7	Village 2,3,7	Village 2,6,7
1 A mechanism for establishment community heads	✓	✓	✓
2 Community risk maps	✓	✓	✓
3 Datasets of situation for environment and health problems	✓	✓	✓
4 Datasets of environment and health impact assessment	✓	✓	✓
5 A mechanism for achieving their recommendations	✓	✓	✓
6 A proposed program / projects for solving problems	✓	✓	✓
7 A mechanism for implementation of proposed program / projects	✓	✓	✓
8 KAP mean scores increase significantly for community's representative	✓	✓	✓
9 Sufficient community representatives to attend following their program / projects implementation	✓	×	×
10 Proposing program / projects for develop plans of communities / local government organizations	✓	×	×

✓, accepted; ×, not accepted.

Table 6
Mean of factors influencing capacity building process in EIA / HIA (N=337).

Variable	Mean (SD)
The learning of community members by knowledge exchange via activities and study visits.	4.12 (0.742)
The assistance from local government organizations to solve environmental problems.	4.11 (0.773)
Community leaders having high performance for solving problems.	4.08 (0.787)
Community leaders having leadership to solve environmental problems.	4.06 (0.730)
Community members having enhanced knowledge and skill of environmental health.	4.04 (0.824)

and specific indicators and evaluation methods of capacity building levels.

The authors suggest that other communities could explore these capacity-building processes by utilizing all steps or selecting some appropriate components for implementation. Moreover, any given community could have preliminary implementation of these capacity-building processes before all impact assessment (IA) processes are implemented and full participation in their community occurs.

The learning of community members by knowledge exchange through activities and study visits was the most influential factor of the capacity building processes in EIA/HIA. Similar to previous studies, we found that the learning and knowledge management process of people within the community was the most influential factor that can increase high efficiency in the development of capacity building (Yodborplub, 2007). Additionally, assistance from local government organizations to solve environmental problems was the second influential factor of their respective processes.

Similar to previous studies, we found that local government organizations were the leadership to establish collaborations with communities and stakeholders for participation in EIA/HIA processes (Sithisarankul *et al*, 2015). Collaboration between the local government and public health authority is important for impact assessment processes (Mathias and Harris-Roxas, 2009). Integration of HIA into structure of institutions is important for supporting the success of HIA processes (Ahmad *et al*, 2008). However, the cultures of decision-making and the lacking of real participation by the people within the community were also threat factors in the EIA/HIA process (Ison and

Griffiths, 2000).

The strength of this research lies with the selection of robust capacity-building processes in EIA/HIA. They can be used to support any other tools or processes such as the development of a community health impact assessment (CHIA). However, one research limitation is that we lacked participation from key persons, such as district leaders, village leaders, religious leaders and heads of local government organizations. Limited activities in the capacity building processes resulted in not fully completing set goals of each process. Therefore, the authors suggest that local government organizations could coordinate and integrate with other organizations, including key persons, to promote more sustainable participation in their respective EIA/HIA processes. Additionally, the learning content of EIA/HIA was difficult to understand among respondents, which led to lower accuracy and achievement of questionnaires and was referred to as Non-Response Bias.

The authors suggest that enhancement of the community regarding EIA and HIA processes take place by expanding the capacity building process to all community members. Additionally, local government organizations should coordinate with key community heads by providing critical support, essential resources and infrastructures to the community.

The final draft of the capacity building process in EIA and HIA for Thai community has been described in this study. Our findings might not be applicable for use to all communities in Thailand, especially in severely impacted areas. Therefore, this capacity-building process may be only applicable to similar areas. Respondents should understand the difficulty about EIA and HIA learning, and how it could

pose as a barrier to the development of a successful capacity-building process.

Finally, the authors conducted this research to explore an appropriate and applicable process to develop capacity building in EIA/HIA. The study included applicable capacity evaluation, adaptation, and application to other similar areas. Therefore, the authors expected that the capacity building process in EIA and HIA might solve existing problems of environmental toxins and violent conflicts in the community. The authors expected that the capacity-building process carried out in this study could help establish resistance in respective communities for protection and surveillance from threatening health hazards.

ACKNOWLEDGEMENTS

We would like to thank Dr Puttapong Kessomboon, Khon Kaen University, Dr Pongthep Sutheravut, Princes of Songkla University; and Mr Sanchi Sutipanaw-wiham of Mahidol University who performed as our expert panel. We would also like to thank Dr Pornchai Sithisarakul, Dr Sarunya Hengpraprom, Dr Narin Hirunsithikul and Dr Soontorn Supapong of Chulalongkorn University; Dr Surat Bualert, Kasetsart University; and Dr Chantana Padungtod, Ministry of Public Health who served as our research advisory committee. This research was financially supported by the National Health Commission Office and Graduate School, Chulalongkorn University. Additionally, this research was presented in part at the 35th Annual Conference of the International Association for Impact Assessment, 20-23 April 2015, Florence, Italy and was undertaken as partial fulfillment of the first author's Doctor of Philosophy Degree in Health Research

and Management Program, Department of Preventive and Social Medicine, Faculty of Medicine, Chulalongkorn University. We would also like to express gratitude to all Prig municipality/Prig SAO communities, Sumnaktao SAO communities, Sumnakkham municipality communities, community leaders, the SAO administrators, SAO council members, SAO officers and Health Officers for their involvement and participation in this research.

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