



EDUCATION FOR HEALTH

ORIGINAL RESEARCH PAPER

Process and Outcome Evaluation of a Diabetes Prevention Education Program for Community Healthcare Workers in Thailand

K Sranacharoenpong¹, RM Hanning¹, PP Sirichakwal², U Chittchang²

¹University of Waterloo, Department of Health Studies and Gerontology, Waterloo, Ontario, Canada

²Institute of Nutrition, Mahidol University, Nakhon Pathom, Thailand

Published: December 2009

Sranacharoenpong K, Hanning RM, Sirichakwal PP, Chittchang U

Process and Outcome Evaluation of a Diabetes Prevention Education Program for Community Healthcare Workers in Thailand

Education for Health, Volume 22, Issue 3, 2009

Available from: <http://www.educationforhealth.net/>

A B S T R A C T

Objective: To describe the development, process and outcome evaluation of a culturally tailored diabetes prevention education program for community healthcare workers (CHCWs) in Thailand.

Methods: A tailored diabetes prevention education program was designed based on formative research and implemented with 35 CHCWs in semi-urban areas in Chiang Mai province, Thailand. Modules were delivered over eight group classes and eight self-directed E-learning sessions (www.FitThai.org). The program incorporated problem-based learning, discussion, reflection, community-based application, self-evaluation and on-line support. The frequency that students accessed on-line materials, including videotaped lectures, readings, monthly newsletters and community resources, was documented. Participant satisfaction was assessed through three questionnaires. Knowledge was assessed through pre-post testing.

Results: Three-quarters of participants attended all eight classes and no participant attended fewer than six. On-line support and materials were accessed 3 to 38 times (median 13). Participants reported that program information and activities were fun, useful, culturally-relevant and applicable to diabetes prevention in their specific communities. Participants also appreciated the innovative technology support for their work. Comfort with E-learning varied among participants. Scores on pre-post knowledge test increased from a mean (sd) of 56.5% (6.26) to 75.5% (6.01) ($p < .001$).



Conclusions: An innovative diabetes prevention education program was developed for CHCWs in Thailand. Interactive classroom modules and self-directed E-learning were generally well-received and supported better knowledge scores. Ongoing access to web-based materials and expert support may help sustain learning.

Keywords: Diabetes prevention education program, community healthcare worker, community-based application, Thailand

Introduction

Type 2 diabetes and impaired fasting glucose (IFG) have increasingly become a public health concern for Thailand (Aekplakorn et al., 2007). Recognizing the growing burden and related risk factors, the Ministry of Public Health launched a nationwide program, *Healthy Thailand*, in 2004. This program included media to promote healthier lifestyles (physical activity and diet) and set a target for 60% of Thai people aged 40 years and over to be screened for body mass index (BMI), IFG and diabetes every year (Wibulpolprasert & Pengpaibon, 2000; Wibulpolprasert, 2002; Aekplakorn et al., 2007). The monitoring at the community level is ongoing. However, there has been minimal continuing education from the Ministry of Public Health (MOPH) to help community healthcare workers (CHCWs) to prevent diabetes and chronic diseases in their communities. The prevalence of diabetes has not been decreasing in either rural or urban areas. Moreover, the distribution of health resources, such as medical doctors, nurses and budgets has not risen as much as has demand (Wibulpolprasert, 2002; Aekplakorn et al., 2007).

Type 2 diabetes and obesity have mainly been treated at the individual level and the success of such interventions has been poor (Glenny et al., 1997). Prevention is more effective than intervention for those who are already obese or have diabetes (Schulz et al., 2005; Swinburn & Egger, 2002). Moreover, the need for preventive action at community, interpersonal, family, organizational, regional and societal levels has never been greater as countries - like Thailand - face the near epidemic rise of these conditions. Intervention must include these population levels. One approach to alleviating the chronic disease burden is to expand the knowledge at the grassroots level. Sustained community education by CHCWs can be instrumental in this regard.

Health promotion in Thailand has benefitted from CHCWs who serve as “bridges” between healthcare providers and the community members they serve, especially in rural communities (Kauffman & Mayers, 1997; Roe & Thomas, 2002; Satterfield et al., 2002). Although CHCWs have established roles in aspects of community health promotion, such as prenatal and breastfeeding support, they have been less involved in chronic disease prevention. Moreover, their access to formal education on chronic disease prevention has been limited, especially in underserved communities (Brown et al., 2002; Rhee et al., 2005). Studies which have supported the effectiveness of CHCWs in health promotion emphasized the importance of training (Lewin et al., 2005). Formative research with health promotion workers in Thailand identified their desire for further CHCW training in chronic disease prevention (Chongsuvivatwong et al., 1996; Senarak et al., 2006).

Therefore, the objectives of this study were: 1) to briefly describe the development of a culturally-tailored diabetes prevention education program for CHCWs in Thailand; 2) to document the process evaluation by CHCWs over the four-month implementation of the program; and 3) to assess pre-post program changes in CHCWs' knowledge.



Methods

Development of course curriculum

Course objectives: The diabetes training course was designed to facilitate learning about prevention of type 2 diabetes as well as skill development to support activities aimed at primary prevention of diabetes at the community level. This training course served as a basis of health education for CHCWs; however, it also encompassed key health messages for the population about diet, physical activities and risk factors related to type 2 diabetes.

Curriculum: The training course was developed based on formative research that was conducted by one of the authors in Chiang Mai province in 2007 and involved stakeholders representing such doctors, nurses, CHCWs, as well as at-risk community people in Chiang Mai province. The curriculum targeted CHCWs who worked in their communities with populations at-risk with diabetes and those who had a public health background (Love et al., 1997; Lorig et al., 1999). The formative research pointed to the need for an effective, sustainable program for knowledge translation to CHCWs and at-risk populations in the communities they served, and provided input into content and preferred approaches. The curriculum was also developed initially for CHCWs in Chiang Mai province, Thailand. It was to facilitate the learning and skill development of CHCWs about community-based prevention of type 2 diabetes. This training course served as a basis of health education for workers; however, it also encompassed key health messages for the population about diet, physical activity and risk factors of type 2 diabetes.

Course content: The main principles and content of the initial program were designed based on the literature and the Thai research team's experiences in training various health providers at the Institute of Nutrition, Mahidol University in Thailand. The key components of the proposed program content were diabetes and lifestyle, nutrition and fitness (Sirichakwal & Sranacharoenpong, 2008). The topics and focus of the eight learning modules are presented in Table 1.

Table 1: Diabetes Prevention Education Program for Community Healthcare Workers (CHCWs)

Module	Topics	Focus
1	Introduction and overview of the training program and pre-test	Objectives of training, benefits and expectations
2	Risk factors related to diabetes	Importance of factors related to diabetes including importance of prevention
3/4	The role of the CHCWs to prevent diabetes, community awareness and promotion and evaluation	Role, expectation, support and teamwork at the community level
5/6	Eat right, find the way	Importance of food and nutrition for healthy people based on Thai Food-Based Dietary Guidelines (Thai-FBDGs)
7	Food products/supplements, nutritional labeling and party/ social foods and exercise	- Advantages and disadvantages of food products- - Benefits of nutritional labeling - Importance of exercise
8	What next, challenge yourself and post-test	Ongoing support and challenges for CHCWs



The eight modules were designed to complement each other. CHCWs also chose to work through the modules in a fragmented fashion. Each part of a module had a clear introduction and closure, allowing learners to divide each module into several shorter lessons, or to incorporate the content of different modules in a given learning session.

Course process: The theoretical foundation on which the learning program for CHCWs was based was the T5 instructional design model of the University of Waterloo, Canada (Salter et al., 2004). The T5 model draws from constructivism, socially-shared cognition and distributed-learning theory (Salter et al., 2004). The underlying premise was that students learn better through opportunities for interaction, feedback, reflection and active application of concepts. By extension, CHCWs applied adult learning principles to help their communities and community members to integrate new information - e.g., regarding food labeling, dietary guidelines and risk factors related to diabetes. Implementation of the learning benefited from CHCWs links to their specific communities and culture (Tregonning et al., 2001) and drew on their experiences in other aspects of community health promotion.

In designing the modules, creativity, fun and experiential learning were incorporated. The eight modules might traditionally have been delivered over 16 class sessions of 2.5 hours each. However, a mix of classroom and E-learning approaches was used, based on the formative evaluation. The teaching and learning strategies incorporated in both the classroom sessions and E-learning activities included discussions, problem-based learning, community-based application assignments, self-evaluations and on-line support.

An E-learning website was developed by using Moodle software, a course management system for learning and effective environments (Dougiamas, 2009). Moodle is a free web application that E-learning developers can use to create effective on-line learning websites. Instructors can also track student responses to quizzes and access to the on-line materials. The content on the website (www.FitThai.org) included lecture materials, quizzes, assignments, newsletters and community resources. Videotaped lectures were provided in the Thai language. All lectures were developed in PowerPoint with added voice-over narration. For example, a videotaped lecture on fat was posted on the "youtube" website for CHCW access. In addition, classroom lectures were copied on CD-ROM for each CHCW. The length of each video and PowerPoint was 6 to 17 minutes. Quizzes were integrated into the on-line materials to ensure that learners were focusing on the key concepts, and guided CHCWs through some problem-based questions before they attended the classroom sections. Newsletters were provided on-line monthly. Each registered CHCW had his/her account and password to access the E-learning website anytime and from anywhere. The frequency with which each learner accessed the website or downloaded any materials was automatically recorded.

Study sample

Chiang Mai province consists of 24 districts that are semi-urban or rural. Criteria for district selection to participate in the study were: 1) districts within 40 kilometers of Chiang Mai city and 2) districts having less than 50% agricultural households. Eight districts were eligible for the study. Five districts were randomly selected. The CHCWs who participated in the training program were recruited from five districts in Chiang Mai province. The implementation and evaluation of the CHCWs' training program was randomized and controlled. The unit of randomization was the healthcare center in Chiang Mai province. Each healthcare center has one CHCW who takes responsibility for chronic disease prevention and health promotion. The total eligible 69 CHCWs were from 69 healthcare centers at the community level. We randomly selected 35 of 69 CHCWs to participate in the training program and 34 CHCWs to participate in the control group with stratification at the district level and the education level (< and > Bachelor's degree). We were in contact and planned for study implementation with the Head of the Chronic Disease Prevention section in each district. The participants were contacted with an invitation letter.



We introduced the training objectives and potential benefits that CHCWs might gain from participation in the training program. The training schedule was planned with CHCWs and agreed upon by CHCWs in each district. The in-class discussions took place in five districts and were held twice a month. The participants were not paid for training and their time. However, three awards were provided for the students whose knowledge improved the most after the training. We also presented a certificate to all successful participants. The Office of Research Ethics at the University of Waterloo, Ontario, Canada, Mahidol University, Nakhon Pathom province, Thailand and the office of Disease Prevention and Control, Ministry of Public Health, Thailand granted permission to conduct the study.

Implementation

The 35 CHCWs selected to participate in the diabetes education prevention training did so over a four-month period. The program was delivered over eight in-classroom discussions and eight on-line learning sessions. CHCWs met for classes in small groups of five to nine participants in each district at the healthcare office. The classroom discussion took 2.5 to 3 hours each time. One of the authors was the facilitator and organized informal discussions and motivated participants. In addition, the facilitator provided support by telephone or e-mail, as participants needed it during the four-month training program. Peer support was also an important component in the classes.

On-line learning materials were posted and updated at least once a week. On-line quizzes were completed at the end of each module. The answers to each on-line quiz were discussed in class. All CHCWs had to finish assignments on schedule before they attended the classroom discussions.

Evaluation

All CHCWs were tested for knowledge before the start of the training program and at the end of four months by questionnaire. The knowledge questionnaire consisted of four parts: understanding of nutritional terms; understanding of nutritional recommendations; knowledge of food sources related to the recommendations and nutrition knowledge; and general risk factors related to diabetes. There were 27 questions, with a total score of 100.

Content validity and reliability of the pre-post test questionnaire were assessed.

Content validity was reviewed by two Thai experts at the Institute of Nutrition, Mahidol University. The experts provided comments on the clarity and appropriateness of the contents and style of each question. Reliability of the knowledge questionnaire was tested with CHCW volunteer responses by how consistently the questions within each section corresponded to overall knowledge scores measured, using Cronbach's alpha statistic. The acceptable score is generally 0.7 or above (Hair et al., 1998). A sample of 30 CHCWs was needed to ensure that appropriate test confidence limits could be generated (Baumgartner & Chung, 2001).

Thirty-two CHCWs volunteered to complete the questionnaire for the reliability test. They were from one district in Chiang Mai province that did not participate in the training program. Cronbach's alpha coefficients for the knowledge questionnaire averaged 0.775 (range 0.727 to 0.786). Therefore, all questions were retained. The quizzes were completed in class.



Participant satisfaction was assessed through three different short questionnaires (Griffin et al., 1999). The questionnaires were completed after the in-class training session. They consisted of both ranking of satisfaction with various aspects of the program and open-ended questions.

Data analysis

Our study used a pre-post design. Data from participants were entered into and analyzed using SPSS Version 13.0 for Windows (Levesque, 2007). Descriptive statistics were used to summarize participants’ characteristics and Student’s Paired t-test, two-tailed, was used for comparing knowledge scores. The correlation among post-knowledge score and frequency of accessing the website was performed using a Pearson’s correlation coefficient, two-tailed. Significance was set at $p < 0.05$. Participants’ responses to satisfaction and open-ended questions for the process evaluation were also examined.

Results

General information

The characteristics of CHCWs randomized to intervention and control groups were similar (see Table 2). Thirty-five CHCWs attended the diabetes prevention education training program. CHCWs worked at the healthcare centers in semi-urban communities in Chiang Mai province. The mean (sd) age of CHCWs was 39.5 (4.77) years. Eighty-nine percent had graduated with a Bachelor’s degree in Nursing (78%) or Public Health (11%). They had worked in public health for an average of 18.4 (4.97) years.

Table 2: Participating Community Healthcare Workers’ Background and Demographic Information

	Intervention	Control
Total participants:	35	34
Gender, n (%):		
Female	34 (97)	30 (88)
Male	1 (3)	4 (12)
Age (years), n (%):		
25-34	6 (17)	4 (12)
35-44	22 (63)	16 (47)
45-54	7 (20)	14 (41)
Work experience (years), n (%):		
< 10	1 (3)	1 (3)
11-15	13 (37)	6 (18)
16-20	7 (20)	8 (23)
> 20	14 (40)	19 (56)
Mean ± SD	18.4 ± 4.97	20.7±5.69
Educational background, n (%):		
Diploma	2 (5.7)	1 (3)
Bachelor’s degree	1 (88.6)	30 (88)
Master’s degree	2 (5.7)	3 (9)



The eight classroom-based sessions were held at the healthcare office in each of five districts over the four-month study period. Sixty-six percent of CHCWs (n = 23) attended all eight times, and 31% (n = 11) attended seven sessions. The main reason given by CHCWs who were absent from class was their workload and multiple responsibilities.

The frequency of accessing on-line materials was recorded during the program, from August 13 to November 20, 2008. The median frequency of access to the website was 13 (range 3 to 38 times).

Learning outcomes

When pre-post scores were compared within group, the overall score and each topic score were significantly different for the intervention group. A significant knowledge gain in all four topics was observed from baseline to after training (p < .001) (see Table 3). Understanding of nutritional recommendations at baseline scored lowest compared to the other topics, but significantly improved after the four-month training. Additionally, total knowledge score significantly improved for the intervention group from a pre-test score of 56.5 to 75.5 post-test (p < .001), and was significantly higher than the post-test score of the control group.

The passing score was set at > 70%. At baseline, no one could pass this criterion, while 77% of all CHCWs (n = 27) passed the criterion after the training. The overall scores of the control group were not significantly different between baseline and after four months.

Table 3: Pre- and Post-test Scores for Intervention and Control Groups of Community Healthcare Workers

	Intervention mean (sd)		Control mean (sd)	
	Pre-test	Post-test	Pre-test	Post-test
Understanding of nutritional terms (total score = 18) (% of total score of each topic)	9.4 (2.87) (52)	11.6 (2.24) (64)	8.5 (2.25) (47)	8.9 (2.12) (49)
Understanding of nutritional recommendations (total score = 25) (% of total score of each topic)	7.1 (3.25) (28)	17.1 (3.60) (68)	7.5 (4.71) (30)	8.6 (2.85) (34)
Knowledge of food sources (total score = 36) (% of total score of each topic)	26.3 (3.19) (73)	29.4 (1.94) (82)	25.8 (3.33) (72)	26.7 (2.44) (74)
Knowledge of diet-disease associations (total score = 21) (% of total score of each topic)	13.8 (1.44) (66)	16.4 (1.96) (78)	13.1 (1.64) (62)	13.2 (2.71) (63)
Total (total score = 100) (% of total score)	56.5 (6.26) (56.5)	75.5 (6.01) (75.5)	54.9 (6.98) (54.9)	57.4 (5.59) (57.4)

p < .001.

In terms of accessing the website, there was no statistically significant association between frequency of access and post-test scores (r = .313; n = 35; p < .068).



Process evaluation

Evaluation of CHCW satisfaction showed a high level of approval of the training. Eighty-three percent of participants liked the methods of classroom discussion and E-learning (Q1) (see Table 4). Moreover, 54% of the CHCWs felt computer skills were easy to learn (Q9). The length of a training program was 2.5 to 3 hours per session, over four months, and more than 70% indicated the program was not too long (Q10). The motivations of participants for attending the training were: learned new content (68%: Q2); could apply the program content to their jobs (97%: Q3); and materials provided in this training were helpful (80%: Q7). In addition, assignments were viewed as useful (91%: Q4) and the participants liked to do them (77%: Q5). Upon completion of the training program, the CHCWs thought they could adapt the program knowledge to their communities (91%: Q6). They also felt more confident to teach at-risk populations about diabetes prevention (54%: Q8).

Table 4: Process Evaluation of the Community Healthcare Worker Training Program (n = 35)

Question	Response (% of respondents)			
	Disagree	Agree	Strongly agree	Average* (0 to 10) (sd)
Q1. You liked the methods of this training program.	0	17	83	8.7 (1.36)
Q2. You learned new content from this training.	3	29	68	8.1 (1.82)
Q3. Program content was useful for your job.	0	3	97	9.3 (0.89)
Q4. Assignments were useful.	0	9	91	9.0 (1.14)
Q5. You liked to do assignments.	3	20	77	8.3 (1.53)
Q6. You could adapt program knowledge to your community work with at-risk members.	0	9	91	9.1 (1.01)
Q7. All materials (e.g., CD-ROM, E-learning, Newsletters) helped you to learn.	0	20	80	8.6 (1.21)
Q8. You felt more confident to teach at-risk populations in your community about preventing diabetes after you completed this training program.	6	40	54	7.7 (1.69)
Q9. Computer skills were easy to learn.**	29	17	54	6.7 (3.31)
Q10. The length of the training program was not too long.**	11	17	72	8.0 (2.65)

* Responses on a 10-point Likert scale: < 4 = Disagree; 5-7 = Agree; 8-10 = Strongly Agree.

**Response values to original questions have been changed to make the scales similar for all questions.

Responses to the open-ended questions indicated specific barriers to transferring knowledge gained through the training program to at-risk populations. CHCWs mentioned that their heavy workload and lack of time were limitations to starting health promotion activity with at-risk populations. However, some of the CHCWs were able to start activities, for example home visiting of at-risk community members, distribution of newsletters and information and nutrition counseling of at-risk individuals at their healthcare centers. CHCWs needed ongoing support after the training and they suggested some health topics that they wanted to learn more about, such as supplementary food, herbs, benefits of local food and prevention of diseases, best ways to reduce weight and childhood obesity.



Discussion

CHCWs have become part of effective strategies for health prevention and health promotion with hard-to-reach populations (Altpeter et al., 1999; Baker et al., 1997; O'Hara et al., 1996; Satterfield et al., 2002; Swider, 2002). Our research was designed to evaluate a training program for CHCWs in Chiang Mai province. Formative evaluation had indicated the need for the program. Formative input also assisted in developing a uniquely tailored program, consistent with recommended practices for program development (Green & Lewis, 1986). The current training program was feasible, enjoyable and improved diabetes knowledge. Although the structure of the training (e.g., interactive versus didactic) was different from participants' former training experiences, process evaluation indicated their positive responses to the approach, including that it was fun, culturally-relevant and applicable to diabetes prevention in their communities. Testimony to the success of the program was 100% recruitment and near perfect attendance of CHCWs, in spite of receiving no payment for participation.

The improvement of CHCWs' knowledge from baseline to the end of the four months of training met a priori criteria for success. The results, however, did not show a significant impact of class attendance and the frequency of website access on post-test knowledge scores. It is likely that the sample had insufficient power to determine which strategies or materials had the most impact on knowledge improvement.

A follow-up evaluation at six months is planned to identify long-term knowledge retention of CHCWs' application of knowledge through community programs and continuing support needs. In addition, changes in awareness of key messages relating to diabetes prevention will be tested in at-risk (obese) community members.

The current study demonstrates the benefits of the CHCWs' training program with respect to short-term satisfaction and knowledge gain. The program developed through this initiative has the potential to be adapted in different geographical locations and cultures, and benefit other CHCWs (Cameron et al., 2001). Overall, the program could not have been initiated without the support of decision-makers. The long-term sustainability of the program and participation of CHCWs in health promotion depends on the cooperation of district, provincial and national levels of government, and their commitment to include disease prevention within healthcare strategies.

Competing interests

The authors declare that they have no competing interests.

Acknowledgements

This research was supported by grants from the Nestlé Foundation, Switzerland. The authors acknowledge the team staff of the healthcare offices at six Chiang Mai province districts: Hangdong; Maetang; Sankampang; Sanpatong; Sansai; and Saraphe. The authors particularly thank Dr. Saowanee Wiboonsanti, Nittaya Rawungpan and the team staff of The Office of Disease Prevention and Control, 10 Chiang Mai province, Ministry of Public Health, for their facilities and hospitality.



References

- Aekplakorn, W., Chongsuvivatwong, V., Abbott, K.J., Suwanprapisa, T., Premgamone, B., Tiptarado, S., Chaikittipon, C., & Lim S.S. (2007). Prevalence and management of diabetes and associated risk factors by regions of Thailand. *Diabetes Care*, 30(8), 2007-2012.
- Altpeter, M., Earp, J.A.L., Bishop, C., & Eng, E. (1999). Lay health advisor activity levels: Definitions from the field. *Health Education and Behavior*, 26(4), 495-512.
- Baker, E.A., Bouldin, N., Durham, M., Lowell, M.E., Gonzalez, M., Jodaitis, N., Cruz, L.N., Torres, I., Torres, M., & Adams, S.T. (1997). The Latino health advocacy program: A collaborative lay health advisor approach. *Health Education and Behavior*, 24(4), 495-509.
- Baumgartner, T.A., & Chung, H. (2001). Confidence limits for intraclass reliability coefficients. *Measurement in Physical Education and Exercise Science*, 5, 179-188.
- Brown, S., Garcia, A., Kouzekanani, K., & Hanis, C. (2002). Culturally competent diabetes self-management education for Mexican Americans. *The Diabetes Educator*, 25, 259-268.
- Cameron, R., Jolin, M., Walker, R., McDermott, N., & Gough, M. (2001). Linking science and practice: Toward a system for enabling communities to adopt best practices for chronic disease prevention. *Health Promotion Practice*, 2, 35-42.
- Chongsuvivatwong, V., Mo-Suwan, L., Tayakkanonta, K., Vitsupakorn, K., & McNeil, R. (1996). Impacts of training of village health volunteers in reduction of morbidity from acute respiratory infections in childhood in Southern Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health*, 27(2), 333-338.
- Dougiamas, M. (2009). *Moodle: Old Stable Build, version 1.8.8+*. Perth, Western, Australia. Last modified on 27 February, 2009, from <http://moodle.org>.
- Glenny, A.M., O'Meara, S., Melville, A., Sheldon, T.A., & Wilson, C. (1997). The treatment and prevention of obesity: A systematic review of the literature. *International Journal of Obesity and Related Metabolic Disorders*, 21(9), 715-737.
- Green, L.W., & Lewis, F.M. (1986). Formative evaluation and measures of quality. In L.W. Green & F.M. Lewis (Eds.). *Measurement and Evaluation in Health Education and Health Promotion* (pp. 27-53). Mountain View, CA: Mayfield.
- Griffin, J.A., Gilliland, S.S., Perez, G., Helitzer, D., & Carter, J.S. (1999). Participant satisfaction with culturally appropriate diabetes education program: The Native American Diabetes Project. *The Diabetes Educator*, 25, 351-363.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis, 5th edition*. London: Prentice Hall International Inc.
- Kauffman, K.S., & Myers, D.H. (1997). The changing role of village health volunteers in Northeast Thailand: An ethnographic field study. *International Journal of Nursing Studies*, 34, 294-355.
- Levesque, R. (2007). *SPSS Programming and Data Management: A Guide for SPSS and SAS Users*, Fourth Edition. SPSS Inc., Chicago, Illinois.
- © K Sranacharoenpong, RM Hanning, PP Sirichakwal, U Chittchang, 2009. A licence to publish this material has been given to Education for Health: <http://www.educationforhealth.net/>



- Lewin, S.A., Babigumira, S.M., Bosch-Capblanch, X., Aja, G., van Wyk, B., Glenton, C., Scheel, I., Zwarenstein, M., & Daniels, K. (2005). Lay health workers in primary and community health care. *Cochrane Database System Reviews*, 25, CD004015.
- Lorig, K., Sobel, D.S., Stewart, A.L., Brown, B.W., Bandura, A., Ritter, P., Gonzalez, V.M., Laurent, D.D., & Holman, H.R. (1999). Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: A randomized trial. *Medical Care*, 37, 5-14.
- Love, M.B., Gardner, K., & Legion, V. (1997). Community health workers: Who they are and what they do. *Health Education and Behavior*, 24, 510-522.
- O'Hara, P., Messick, B.J., Fichtner, R.R., & Parris, D. (1996). A peer-led AIDS prevention program for students in an alternative school. *Journal of School Health*, 66(5), 176-182.
- Rhee, M.K., Cook, C.B., El-Kebbi, I., Lyles, R.H., Dunbar, V.G., Panayito, R.M., Berkowitz, K.J., Boyd, B., Broussard, S., & George, C.D. (2005). Barriers to diabetes education in urban patients' perceptions, patterns, and associated factors. *The Diabetes Educator*, 31, 410-417.
- Roe, K., & Thomas, S. (2002). Acknowledgements. *Health Promotion Practice*, 3(2), 106-107.
- Salter, D., Richards, L., & Carey, T. (2004). The 'T5' design model: An instructional model and learning environment to support the integration of online and campus-based course. *Educational Media International*, 41(3), 207-218.
- Satterfield, D.W., Burd, C., Valdez, H.G., & Eagle, S.J. (2002). The in-between people: Participation of community health representatives in diabetes prevention and care in American Indian and Alaskan Native communities. *Health Promotion Practice* 3(2), 166-175.
- Schulz, A.J., Zenk, S., Odoms-Young, A., Hollis-Neely, T., Nwankwo, R., Lockett, M., Ridella, W., & Kannan, S. (2005). Healthy eating and exercising to reduce diabetes: Exploring the potential of social determinants of health frameworks with the context of community-based participatory diabetes prevention. *American Journal of Public Health*, 95(4), 645-651.
- Senarak, W., Chirawatkul, S., & Markovic, M. (2006). Health promotion for middle-aged Isan women, Thailand: A participatory approach. *Asian Pacific Journal of Cancer Prevention*, 7, 55-59.
- Sirichakwal, P.P., & Sranachoenpong, K. (2008). Practical experience in development and promotion of food-based dietary guidelines in Thailand. *Asia Pacific Journal of Clinical Nutrition*, 17 Suppl (1), 63-65.
- Swider, S.M. (2002). Outcome effectiveness of community health workers: An integrative literature review. *Public Health Nursing*, 19(1), 11-20.
- Swinburn, B., & Egger, G. (2002). Preventive strategies against weight gain and obesity. *Obesity Reviews*, 3, 289-301.
- Tregonning, P.B., Simmons, D., & Fleming, C. (2001). A community diabetes educator course for the unemployed in South Auckland, New Zealand. *The Diabetes Educator*, 27(1), 94-100.



Wibulpolprasert, S., & Pengpaibon, P. (2000). Integrated strategies to tackle the inequitable distribution of doctors in Thailand: four decades of experience. *Human Resources for Health*, 25, 12.

Wibulpolprasert, S. (2002). *Thailand Health Profile 1999-2000*. Bureau of Policy and Strategy, Ministry of Public Health, Thailand.
