

EFFECT OF INSTITUTION-BASED MANAGEMENT FOR ELDERLY HEALTH PROMOTION PROGRAM IN NORTHEASTERN THAILAND

Kemika Sombateyotha¹, Natchaporn Pichainarong¹, Frank-Peter Schelp²
and Pissamai Homchampa³

¹Faculty of Public Health, Mahasarakham University, Kantarawichai District; ²Faculty of Public Health, Khon Kaen University, Mueang District, Khon Kaen; ³Faculty of Medicine, Mahasarakham University, Mueang District, Maha Sarakham, Thailand

Abstract. The increasingly aging population raises a major challenge for health care in Thailand and worldwide. Health promotion has been considered a strategy for improving elderly quality of life. There are a small number of elderly people living in government elderly services in Thailand, and little is known about their health promotion behaviors and how these behaviors have been shaped in an institution-based setting. This study aimed to examine the current situation and effectiveness of the Institution-based Management for Elderly Health Promotion (IBM-EHP) program in enhancing the health and health promotion behaviors of the elderly living in two out of five government elderly home service institutes (GEHSI) in northeastern Thailand. The elderly participants in one GEHSI were assigned into the management group and received the IBM-EHP program ($n=60$), and those in another GEHSI were in the control group and received the usual care provided by the institution ($n=55$). Before and after (six months) the program implementation, assessments of knowledge, self-efficacy, received social support, health promotion behaviors, and health status depicted by fasting plasma glucose level and lipid profile of the participants in both groups were performed. Data collection used an interview guide, and clinical and diagnostic measurement methods. Data analysis used frequency, mean, standard deviation, paired simple *t*-test, independent *t*-test, and multiple regression. Results indicated that the management group, compared to the control group, demonstrated improvements in perceived self-efficacy, received social support, health promotion behaviors, and HDL-C level ($p<0.05$). Perceived self-efficacy and received social support were predictive factors, which contributed to explain 50.6% of the health promotion behaviors of the institutionalized elderly participants in the management group. Modification solutions for suitable health promotion behaviors of the institutionalized elderly persons should emphasize on enhancing their self-efficacy and social support from the elderly home service institute and their peers.

Keywords: elderly persons, health promotion behaviors, institution-based health management program, self-efficacy, social support, northeastern Thailand

Correspondence: Pissamai Homchampa, Faculty of Medicine, Mahasarakham University, 269 Nakornsawan Road, Mueang District, Maha Sarakham 44000, Thailand.
E-mail: pissamaih@hotmail.com

INTRODUCTION

An expanding elderly population in Thailand over the last fifteen years and the start of becoming an aged population has raised a major concern for the entire society about effective means for the provision of long-term care and support to this age group. After starting to become an aged population in 2001 with 7% of people aged 65 years and over, Thailand is expected to be a completely aged population in 2023, with 14% of the population in this group (Knodel and Chayovan, 2008; NSO, 2014). These transitions (year of starting to become an aged population; year of becoming a completely aged population) are in line with some countries in Asia, for example, South Korea (1999; 2016); China with the exception of Hong Kong (2001; 2026); and Southeast Asia, for example, Singapore (1999; 2016) (United Nations, 2009).

Taking people aged 60 years and over into account, Thailand has a current elderly population of 14.9% (10.0 million) in 2014, which is an increase from 12.2% (8.2 million) in 2007 (NSO, 2014). The increased elderly population in Thailand is seen as a result of a declining fertility rate, from 4.0 in 1997 to 1.7 in 2005 and 1.6 in 2011 (NESDB, 2012, 2013), in conjunction with the improved health care system and living conditions leading to lower mortality and increased longevity of the population, thereby extending the period of living in old age with accumulative demands for assistance from others as their age increases (Knodel and Chayovan, 2012; Foundation of Thai Gerontology Research Development Institute, 2013, 2014).

Family members traditionally provide elderly care giving in Thailand (Srithamrongsawat and Bundhamcharoen, 2010; Knodel *et al.*, 2013). This cul-

tural practice was noted as a prominent and powerful force for elderly care in the northeast region, or *Isan*, where children of the elderly person, either a daughter or a son, provide care and support for their parents as filial obligations when they were old (Caffrey, 1992). However, nowadays many changes in Thailand hinder such societal norms in elderly care giving in many families. Changes such as smaller family size resulting from a declining fertility rate leading to a changed social structural context, and an out-migration of working-age family members have served as important factors leading to a large number of elderly people living with their grandchildren as a major care taker. Otherwise, they could live alone, for which they would need to be more reliant on self-care or on support from others.

These needs include increased demands for social and government support for elderly long-term assistance, particularly institution-based services (Srithamrongsawat *et al.*, 2009; Sasat *et al.*, 2011). In addition, the strong emphasis of the World Health Organization (2015) on long-term care is to ensure that elderly persons in any stage of life, including those with a significant loss of capacity, can still lead fulfilling lives. This emphasis can be achieved by optimizing the elderly's intrinsic capacity and providing a supportive environmental, and the care necessary for them to prolong their abilities and have a good quality of life.

Elderly living conditions and their health promotion related issues have been extensively studied in general and in communities in Thailand (Kuhirunyaratn *et al.*, 2007; Ekachampaka and Wattanamano, 2008; Knodel and Chayovan, 2012; Gray *et al.*, 2015). However, there is very little published evidence on elderly residents in an institution-based setting (TGRI, 2009,

2013; Sasat and Bower, 2013). An emphasis of the 2nd National Plan for Older Persons 2002-2021 of Thailand has raised a positive view towards the elderly population as valuable assets to the society.

Such a view has also led the government to call for the collaboration of all social sectors to establish a supportive atmosphere and comprehensive security system for the elderly population to live a good life. This current national plan stresses four important means for achieving elderly security: 1) having an active aging population capable of self-care practices; 2) having a caring family; 3) having supportive community and suitable environment; and 4) having supportive local leaders and government with appropriate plans and solutions for provision of care and services (Ministry of Social Development and Human Security, 2015).

The perspective of policy makers towards elderly long-term care as a primary responsibility of their families is highly prioritized in Thailand. Consequently, there are only a limited number of 25 government institutions and residential homes or centers established with approximately 4,000 elderly residents under services (NSO, 2008, 2014). There are two categories of government elderly home service institutions (EHSIs). First, the national government managed public elderly home, which comprises 12 social welfare development centers for older persons in all regions across the country, which are operated by the Department of Social Development and Welfare under the MSDHS. Second, the local government managed public elderly homes, which comprise 13 elderly social welfare home service institutions located in Bangkok and several provinces across the country, which are operated by Provincial Admin-

istrative Organizations (PAO) under the Ministry of the Interior. Both categories of service institutions offer a long-term residential home for older persons and provide health care and rehabilitation services for the underprivileged and low-income elderly population.

Other available governmental care services for elderly people are sub-district health promoting hospitals (SHPH), which offer home health care services for the elderly (for example, home visits) along with support for the Senior Citizens' Club of each sub-district in the entire country. Senior Citizens' Clubs are under the Friends-help-Friends project of the Ministry of Public Health. For elderly long-term care service, aside from support from the 25 government EHSI, approximately half of the 143 non-profit organization homes and shelters formally registered in Thailand provide their services for elderly people and less privileged groups, such as children, people with disabilities, people living with HIV/AIDS, and some chronic diseases, nationwide.

Slightly less than 1.0% of the aged population currently live in the government elderly welfare services in Thailand, based on the national survey of older persons from 2007 (NSO, 2008). Although capacity development opportunities were identified to provide for all people in the country, the educational quality for all age groups, child intelligence, risk behaviors of certain population groups, and limited number of skilled labors have been addressed as important issues that need to be further strengthened at a policy level (NESDB, 2012).

Common facilities and services provided by the government EHSI include lodging and food, clothing, personal and therapeutic activities for physical rehabili-

tation, recreational activities, traditional festival activities, social work services, and traditional funeral services. Recent reports showed that for the elderly in long-term care institutes in Thailand there were slightly more women (61.3%) than men, and elderly persons of both genders manifested chronic health problems, such as hypertension, cerebral vascular disease, diabetes mellitus, heart disease, respiratory diseases, and cancer (Ekachampaka and Wattanamano, 2008; Sasat, 2011; TGRI, 2013).

Institutionalized elders are prone to manifest social restriction and psychological distress. An exploratory study to investigate the intrapersonal perspective regarding the effects of institutionalization and loneliness on depression in 50 institutionalized elders in Romania found that most elderly residents experienced mild to severe depression (Runcan, 2012). The studied elderly residents indicated that they did not have only feelings of sadness, guilty, and failure in life but also had pessimistic worldviews, shifted self-image, sleeping disorders, feelings of tiredness, problems associated with anorexia, and weight lost. The same study also indicated that the provisioning of sustainable official long term support by the care institution was an important means to assist the elderly residents to cope with loneliness and lost they experienced in this stage of life.

A study using a nursing diagnosis to assess the health conditions of 74 elderly residents, aged 60 years and over, currently living in a nursing home in Turkey indicated there were 165 nursing diagnoses, with an average \pm SD of 16.8 ± 7.7 per elderly person. Of which, ineffective role performance (86.5%), ineffective health maintenance (81.2%), risk of falls (77.0%),

impaired physical mobility (73.0%), lack of diverse activities (67.6%), self-care deficit, and impaired social interaction (60.8%) were mostly found among the institutionalized residents (Güler *et al*, 2012).

The literature reviewed also indicated problems for staff involving with elderly care in an institutional setting. The investigation of care giving in a home service institution for adults and elders with mental disabilities by 20 caregivers in Romania indicated that the majority of these staff reported having a lack of appreciation for work (85.0%), manifestation of unpleasant symptoms and aggressiveness of the residents underservice (80.0%), and limited capabilities in caring for persons with mental disabilities (70.0%) as the major difficulties in their work (Margari-toiu and Eftimie, 2013). The same study suggested the need to enhance caregivers with motivation and capacity building in provisioning care for special adults and elders in a service institution setting.

Health promotion has long been recognized as a tool and strategy for preventing functional decline and improving the health and quality of life of elderly people (Santos *et al*, 2008). It also serves as an important means to increase the self-efficacy of elderly persons to engage in social activities, to be able to perform self-care practices, and eventually to live a more independent life (Anderson-Bill *et al*, 2006; Jaiyungyuen *et al*, 2012). The long-term effect of intervention using health promotion (for example, preventive home visits) and disease prevention strategies (for example, senior meetings) among 459 urban home living elders with no cognitive impairment aged 80 years and over in Sweden in a three-armed randomized, single-blind, and controlled trial based on the multi-dimensional and

the multi-professional approach indicated positive health outcomes. Results showed a delay in deteriorated health conditions in the very old-age persons who were at risk of frailty, particularly occurrence of disease morbidity, and prolonged health satisfaction for up to two years in both intervention groups; and, higher scores for the self-rated health conditions for up to one year in the senior meeting group (Behm *et al*, 2014).

A quasi-experimental study with pre-test-post-test on the effect of 12 weeks of Pilates exercises on depression and balance associated with falling in 30 elderly women aged 62-80 years when visiting the geriatric rehabilitation center in Iran found decreased depression and improved balance related to falling among the participants in the experimental group (Mokhtari *et al*, 2013). Another prospective quasi-experimental with pre-test and post-test study using a community-based health promotion program (CBHP) and multidisciplinary approach on changing lifestyle, considered physiological indicators and depression scores among 520 elderly people in two groups of rural villages with specific interveners: Group 1 with nursing students and Group 2 with community peer supporters. Results indicated significant effects on the elderly health behaviors and health status in the elderly participants in Group 1 who had higher self-protection behaviors, while those in Group 2 had more appropriate blood pressure levels. The study also indicated a healthier lifestyle and improvement of physical (for example, fasting blood glucose level and blood pressure level) and psychological (for example, depression score) conditions among elderly participants in both groups (Wang *et al*, 2014).

Such a study stresses the importance

of social support and a multidisciplinary approach in health promotion for elderly dwellers in a rural setting. A literature review on the use of participatory evaluation research in health promotion involving three different stakeholders, namely evaluators, program staff, and beneficiaries, indicated three dimensions of participation and roles of each stakeholder. For example, decision power was a task largely held by the program staff; deliberation wills were possessed by the beneficiaries, and action processes were tasks carried out by the evaluators (Nitsch *et al*, 2013).

A cross sectional research study involving hypertensive older adults aged 60-88 years who utilized the health services at a district hospital located in central Thailand ($n=100$) indicated moderate to high levels of health promotion behaviors among this population group, particularly nutrition related practices. Education, family income, perceived family support, and perceived self-efficacy were factors positively related to their health promotion behaviors. Both perceived self-efficacy and social support from family could explain 38.0% of the variance of health promotion behaviors for this population group ($p<0.05$).

Health Promotion Model

This research study was grounded from four theoretical concepts. First, the Health Promotion Model (HPM), developed by Nola J Pender, a prominent nursing professional from the United States of America (USA), in 1987, and later revised in 1996, used a competence-based approach emphasizing motivation as an important force for an individual's behavioral modification. The revised model suggested three interrelated elements leading the individuals to change their own health promotion behaviors.

These three elements included personal characteristics and experiences, perceptions and feelings about health promotion behaviors, as well as health promotion behavior outcomes (Pender, 1987, 1996; Pender *et al*, 2011). This theoretical concept suggested six groups of health promotion practices, including self-care practices, healthy eating, exercising, social relation engagement, stress management, and spiritual enhancement.

Self-efficacy Theory

Second, Self-efficacy Theory (SET) is both a theoretical concept and a construct of Social Cognitive Theory (Hayden, 2009). SET was initially developed by Alberta Bandura, a psychologist and professor emeritus of social science in psychology in the USA, in 1977, and later modified in 1994 and 1996 (Bandura, 1998). Bandura's cognitive model explained that human behaviors, personal cognitive factors, and environmental conditions were inter-related. An individual changed his/her health behavior based on observational learning, reinforcement, self-control and self-efficacy, of which the latter served as the most important personal cognitive factor by 'precontemplating' an individual to engage in behavioral changes.

Bandura (1998) defined self-efficacy as one's own ability to persistently perform particular behaviors despite obstacles or challenges. An individual developed and maintained self-efficacy from: (1) past personal accomplishment experience; (2) experiences deriving from observing others as the models; (3) perceived social persuasion or encouragement from others to strengthen one own beliefs about having possessed capabilities leading to success; and (4) derived emotional and physiological arousal state resulting from perception and interpretation about obsta-

cles, either being as a challenge or dissolution for behavioral changes. In addition, self-efficacy in this current study served as a key element reflecting the judgment of the elderly participants about their capabilities to perform the targeted health promotion behaviors. An individual with high-perceived self-efficacy to perform particular behavior was more likely to take an action and actually perform such a behavior (Anderson-Bill *et al*, 2006).

Social Support Theory

Third, Social Support Theory (SST) was revitalized in the 1970s with the recognition of positive impacts of exchanging assistance through meaningful social relationships among people. Social support enhanced individual ability to cope with stressful life events. In 1981, House and colleagues proposed four types of support, namely, emotional, instrumental, informational, and appraisal (House *et al*, 1988).

Emotional support involved the sharing of life experiences, which included the provision of empathy, love, trust, and caring. Instrumental support involved the provisioning of assistance and services by significant persons, such as family members, close friends, colleagues, and related persons directly assisting an individual to cope with life and living. Informational support included the provisioning of assistance through advice, suggestions, and information for addressing problems and behavioral changes. Appraisal support involved the provisioning of feedback information that was useful for self-evaluation purposes, such as affirmation and social comparison. Linkages between people through social networking may provide not only social support but also empower an individual to have increased control over factors that might affect one's own

health (Glanz *et al*, 2002). Consequently, in this study, instrumental support (for example, providing assistance in setting up the environment and equipment), informational support (for example, providing health education and a reminder to perform health promotion practices), and appraisal support (for example giving feedback and evaluation messages after performing activities) from elderly peers and institution staff were taken into account for enhancing health promotion behaviors, specifically self-care practices, corrective exercising, and healthy eating, thereby increasing the health and quality of life of the elderly residents.

Organization Management Concept

Fourth, the Organization Management Concept (OMC) is a part of the Classical Theory of Organization Management that emphasizes the importance of scientific method in organizational development, particularly for the analysis of organization performances and problems (Liebler, 2008). The concepts stressed are conformed to the organization's command as one of the desirable characteristics of its members. The Classical Theory defined four major domains of an organization: principle of management; line and staff; committees; and functions of management. Specifically, the functions of management domain included: 1) planning and decision making, which comprised the setting of organizational objectives and goals, determining the current and future state of an organization, and decision making on informed conscious choice and commitment; 2) organizing, which involved the organization chart development enacted with role and responsibility of the personnel, job descriptions, and work flow suitable for coordinating and organizing; 3) staffing,

comprising determination of personnel needs, recruitment strategy, provision of orientation and training, and continually evaluation; 4) directing, involving provision of guidance and leadership, including teaching, coaching, and motivating workers to achieve organizational goal; and 5) controlling, involving determination of accomplishments towards the organizational goal, performance improvement, and total quality management. This study built on OMC to help an elderly institution to set up policies and planning, organizing, staffing, directing, and controlling for enhancing elderly health promotion behaviors, specifically in the aspects of self-care practices, healthy eating, and corrective exercising.

There were limitations of long-term care institutions for the elderly population in Thailand (Sasat *et al*, 2011), such as, a limited number of public and private nursing home facilities to respond to the need for moderate to high levels of care, lack of consensus to regulate institutional long-term care, no standard of care in long-term care, and no competency requirement for care providers along with limited information about living conditions and health promotion of the elderly residents in a government institution (TGRI, 2013). These limitations also included being prone to disease morbidity and health impairment among the elderly population as their age increased (Bucur *et al*, 2013). The health status of the elders was positively correlated with their health promotion behaviors (Chantarangsriworakul, 2010).

Given the above limitations, coupled with the restricted social contacts of an institutionalized elder, particularly from their own family in this stage of life (Runcan, 2012), this made an institution-based

management for promoting health and well-being of the elderly residents a potential and active form of health care delivery. In addition, this current study viewed the government EHSI as a unique organization moving towards its goal of being the specialized elderly long-term care giving unit in Thailand.

The selected government EHSI in this study had gone through the reorientation and had partly modified its organization management, particularly planning, organizing, staffing, directing, and controlling to accomplish elderly health promotion goals. Results from this trial of an institution-based multicomponent health management program will serve to suggest a model that could be useful for enhancing the health and quality of life of elderly residents in an institutional setting in Thailand.

The main objective of this study was to assess the effects of the Institution-based Management for Elderly Health Promotion program (IBM-EHP program) on health promotion behaviors and the health status of the elderly participants who were residing in two government EHSIs in northeastern Thailand. Indicators of the program's effectiveness include improvement in the elderly health status, comprising fasting plasma glucose levels (FPG) and lipid profile, including high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), total cholesterol (TC), and triglyceride (TG); health promotion behaviors, namely, self-care practices, corrective exercising, and healthy eating; health promotion knowledge and perceptions and perceived self-efficacy to perform health promotion behaviors; and received social support from the institution's staff, care givers, and elderly peers.

MATERIALS AND METHODS

Study setting

The study was conducted in one of the four main regions of Thailand, the *Isan* (northeastern) region, which comprises 20 provinces with a total population of approximately 21.6 million (Public Health Statistics, 2012) making up one-third of the country's total population. Elderly residents in two ($N=170$) out of five GEHSIs ($N=550$) located in the northeast region, namely, the Buri Ram Social Welfare Development Center for Older Persons (BSWDCOP) and the Maha Sarakham Social Welfare Residential Home for Older Persons (MSWRHOP) were included in the study as the management and the comparison groups, respectively.

The BSWDCOP, located in Buri Ram Province, had 93 elderly residents (men=41, women=52) and was under the supervision of the MSDHS, and its aim was to serve the population in several adjacent provinces in the south of the region. Meanwhile, the MSWRHOP, located in Maha Sarakham Province, had 77 current elderly residents (men=35, women=42) and was the responsibility of the Provincial Administration Organization (PAO) under the supervision of the Ministry of Interior, and its aim was to serve the population in Maha Sarakham and several adjacent provinces located in the central part of the region. These two research sites were 165 km from each another.

Procedures

Following the construction of policy and organization management for elderly health promotion enhancement in an initial phase in the BSWDCOP with a management group, this quasi-experimental with pre-test-post-test study took place for 24 weeks after orally informed consent

was explained to the participants and their agreement was obtained to participate in the research project. The project investigated health promotion knowledge, perceptions (perceived self-efficacy in corrective exercising, healthy eating, and self-care practices) and received social support (from institution staff, caregivers, and elderly peers), as well as health promotion behaviors (corrective exercising, healthy eating, and self-care practices) of the elderly participants in the management group compared to those in the comparison group at the beginning (Week 1) and the end of the project (Week 24). Meanwhile, the elderly health status based on clinical and diagnostic measurement methods, such as health condition (determined by the Barthel's Index), FPG, and the lipid profile of the elderly participants in both groups, was also assessed and compared between groups.

The number of participants in the intervention and comparison groups was determined by a sample size calculation that indicated a minimum of 55 participants per group (Cohen *et al*, 2003), which includes a 10.0% dropout rate for each group. The inclusion criteria comprised elderly residents who were 1) aged ≥ 60 and who were currently living in one of the five government EHSIs for at least three months, 2) without mental impairment and were able to communicate in either the Thai language or *Isan* dialect, 3) able to walk either with or without the assistance of a cane, 4) able to help one-self independently (Grade A) or with partial assistant (Grade B) based on the Barthel's Index, and 5) willing to participate in the project. Consequently, two government EHSIs were eligible, and all possible current elderly residents who met the inclusion criteria were included in each selected site. There were 60 BSWDCOP

residents (the management group) and 55 MSWRHOP residents (the comparison group) included in the study.

The major activities of the intervention aspect of the project, the IBM-EHP program, are listed in Table 1. While the residents in the management group received health promotion education, along with building self-efficacy and gaining social support from the stakeholders, specifically the elderly peers and the respective staff and caregivers in regards to health promotion behavior enhancement, the comparison group received the usual care provided by the institution. Such usual care services include routine health education, voluntary exercise along with the provisioning of recreational spaces and three regular daily meals. This study was conducted from August 2011 through April 2012.

Data collection methods

The data on health promotion knowledge and perceptions, health promotion behaviors, and functional health status of the elderly participants were collected using an interview guide. The data on objective health status, specifically FPG and blood lipid profile, were collected using the clinical and diagnostic measurement tools. Meanwhile, the health status indicators were also used to determine the effectiveness of the IBM-EHP program. The interview guide was constructed by the researchers based on the reviewed literature and incorporated the constructs within the four theoretical concepts, namely, HPM, SET, SST, and OMC, as well as the results of the in-depth interviews with 20 elderly representatives and several meetings with 13 out of 23 staff from the management group.

The staff included the administrator and social welfare staff ($n=2$), nutrition

Table 1
Stakeholders in the institution-based management for elderly health promotion program.

Health promotion activities	Elderly participants	Elderly peers	Staff		
			Admin, social welfare	Nutrition	Nurse Caregivers
Policy					
1. Setting up goals and allocating budget for elderly health promotion enhancement: preparation phase (one month prior to the program implementation).	0	0	+, 0	0	0
Organization management					
2. Modifying organization and assigning tasks for staff to support for elderly health promotion: Weeks 1-24.	0	0	+, +	0	+
2.1 Self-care practices on daily basis.				0	+
2.2 Corrective exercising session (30 minutes): twice a week.				0	+
2.3 Healthy eating: daily consumption: Germinal rice High fiber diet Low fat food				+	+
				+	+
				+	+
Health promotion behavior					
3. Health education promotion:					
3.1 Two sessions of one-hour health promotion education training: twice in Week 1. Two 30-minute elderly health promotion education sessions to enhance the elderly knowledge and skills in Weeks 2-24.	0	0	0, +	+	+
3.2a Two sessions of one-hour intensive health promotion education in Week 1.	+	+	0, +	0	0
3.2b Participation in two sessions of 30-minute corrective exercising rigorously ^a in Weeks 2-24.					
4. Building the elderly's self-efficacy on and expected outcome of health promotion for 30 minutes in Weeks 1-24.	+	+	0, 0	0	+
5. Social support for health promotion:	+	+	0, +	+	+
5.1 Building social support skills for elderly health promotion for 30 minutes in Week 1.	0	0	0, +	0	+
5.2 Provision of social support for health promotion to elderly participants on daily basis in Weeks 2-24.	0	+	0, 0	0	+
6. Monthly meeting to exchange experiences in managing elderly health promotion task.	0	+	+, +	+	+
7. Health status measurement: Weeks 1 and 24.	+	+	0, 0	0	+
8. Baseline (pre-test) and post-test in Weeks 1 and 24.	+	+	+, +	+	+

+, do activity; 0, no activity. ^aRam maipilauing or Boonmee Long-stick Exercise Dance with selective *Isim* classical songs as background music (Janmookkda and Dajpratham, 2008; Konghan, 2010).

staff ($n=2$), nurse and nursing staff ($n=2$), as well as caregivers ($n=7$) who were currently working at the BSWDCOP at the time of the program intervention. The agreed upon health promotion behavior questions in this research project included three elements: corrective exercising, healthy eating, and self-care practices on a daily basis.

The health promotion knowledge, perceptions, and behavior interview guide

The health promotion knowledge, perceptions, and behavior interview guide comprised seven parts.

Part I included personal information on age, sex, education, marital status, monthly income, relationship with staff and other elderly peers, and present illnesses.

Part II included policy and organization management information comprised of 31 rating scale questions, from Least Agree (1 point) to Highly Agree (5 points). Perceived policy existence had eight questions. With a total maximum score of 40 points, the perceived policy existence was divided into three levels: Low (≤ 19 points), Moderate (20-29 points), and High (≥ 30 points). Organization management existence comprised 23 questions reflecting the opinions of the elderly participants on organization task and assignment (five questions); administration and management towards staff performance (eight questions); availability of resources (five questions); and control measures and evaluation (five questions). With a possible score of 23-115 points, the perceived organization and management existence was divided into three levels: Low (≤ 53 points), Moderate (54-84 points), and High (≥ 85 points).

Part III about health status information comprised of 22 questions. The ques-

tions were modified from the Barthel's Index (Mahoney and Barthel, 1965 cited in Katz, 2003) to evaluate three categories of functional independence and need for assistance: perceive five sensations (10 questions), eating well and digestive condition (five questions), as well as bodily movement and sleeping pattern (seven questions). With a modified three-point scale, instead of 0-10 points from its original scoring, each question was given a score from one-to-three points indicating elderly general functional health status from "Unable to Need Some Help," and Independent stages. The scores were reversed for negative questions; therefore, lower scores indicating an increased disability condition of the elderly participant. With a total possible score of 22-66 points, the overall health status scores were divided into three levels: Complete Dependence on Others (22-40 points = Grade C), Transition from Complete Dependence to Assisted Independence (41-53 points = Grade B), and Independence with Minor Assistance (54-66 points = Grade A). This study used Barthel's Index to include the elderly participants under Grade A and Grade B categories in the initial phase, given the project requirement to have the elderly participants in the management group actively engage in the program activities.

Part IV, knowledge of health and health promotion behaviors, was divided into three subcategories, namely, knowledge in corrective exercising (10 questions), healthy eating (10 questions), and self-care practices (8 questions). The question with a correct answer was given a score of '1.' With a total maximum score of 10 points, knowledge in corrective exercising and healthy eating, were each divided into three levels: low (≤ 4 points), moderate (5-7 points), and high (≥ 8 points). For the self-care practices, with

a total maximum score of eight points, it was divided into three levels: low (≤ 3 points), moderate (4-6 points), and high (≥ 7 points). For the overall knowledge in health and health promotion behaviors, with a possible total score of 0-28 points, it was divided into three levels: low (≤ 11 points), moderate (14-22 points), and high (≥ 23 points).

Part V, perceived self-efficacy to perform health promotion behaviors and expectation on the outcome of such behaviors, comprised 40 questions. Perceived self-efficacy was divided into three categories, including perceived self-efficacy on corrective exercising and expected outcome (17 questions), perceived self-efficacy on healthy eating and expected outcome (15 questions), and perceived self-efficacy on self-care practices and expected outcome (8 questions). Each question was given a score from one to three points: 'No,' 'Not Sure,' and 'Yes.' With a total maximum score of 51 points, perceived self-efficacy on corrective exercising was divided into three levels: Low (≤ 28 points), Moderate (29-40 points), and High (≥ 41 points). For perceived self-efficacy on healthy eating, with a total maximum score of 30 points, it was divided into three levels: Low (≤ 16 points), Moderate (17-23 points), and High (≥ 24 points). For the perceived self-efficacy on self-care practices, with a total maximum score of 24 points, it was divided into three levels: Low (≤ 12 points), Moderate (13-18 points), and High (≥ 19 points). With a total maximum score of the overall perceived self-efficacy to perform health promotion behaviors of 120 points, it was divided into three levels: Low (40-67 points), Moderate (68-93 points), and High (94 points and over).

Part VI, received social support, comprised 28 rating scale questions, includ-

ing received social support on corrective exercising (10 questions), healthy eating (10 questions), and self-care practices (8 questions). Each category of health promotion behaviors comprised a mixture of four types of social support, namely informational, instrumental, emotional, and appraisal, in each subcategory of the health promotion behaviors. Scores for each question ranged from one-to-three points: 'Disagree,' 'Somewhat Disagree,' and 'Agree.' Received social support on corrective exercising and healthy eating had a maximum total score of 30 points and was divided into three levels: Low (≤ 16 points), Moderate (17-24 points), and High (≥ 25 points). Received social support on self-care practices, with a total maximum score of 24 points, was divided into three levels: Low (≤ 12 points), Moderate (13-18 points), and High (≥ 19 points). With a total maximum score of 84 points, overall received social support was divided into Low (≤ 44 points), Moderate (47-66 points), and High (≥ 67 points).

Part VII, health promotion behaviors, comprised 32 questions divided into three categories, namely, Corrective Exercising (9 questions), Healthy Eating (13 questions), and Self-Care Practices at Time of Illness (10 questions). Each question was given a score from one to three points: 'Never,' 'Sometimes,' and 'Regularly.' Health promotion behaviors related to corrective exercising had a total score of 27 points and was divided into three levels: Low (≤ 15 points), Moderate (16-21 points), and High (≥ 22 points). Health promotion behaviors related to healthy eating, with a total maximum score of 39 points was divided into three levels: Low (≤ 21 points), Moderate (22-30 points), and High (≥ 31 points). For health promotion behaviors related to self-care practices with a total maximum score of

30 points, it was divided into three levels: Low (≤ 16 points), Moderate (17-24 points), and High (≥ 25 points). The total score of overall health promotion behaviors of 96 points was divided into three levels: Low (≤ 53 points), Moderate (54-75 points), and High (≥ 76 points).

Clinical and diagnostic measurement tools

Clinical and diagnostic measurement tools were used to determine the health status of the elderly participants, including FPG and blood lipid profile (Diabetes Association of Thailand, 2014). Serum samples determining the FPG and lipid profile were collected in the morning after 12 hours of fasting. FPG was assessed using the enzymatic method performed by the laboratory service division of the government general hospital in Maha Sarakham Province, with the cut off point of >126 mg/dl being used to diagnose having diabetes mellitus (80-100 mg/dl = normal range, 110-125 mg/dl = at risk of diabetes mellitus). The lipid profile investigated as dyslipidemia was based on the Guidelines for Management of Dyslipidemia and was considered as having exceeding the normal range as in the following: TC <200 mg/dl, TG <150 mg/dl, HDL-C ≥ 40 mg/dl, and LDL-C <100 mg/dl.

Data analysis

Data analysis used the statistical software SPSS® (version 19; IBM, Armonk, NY). Personal characteristics of the elderly participants were analyzed using frequency, mean, and standard deviation. Statistically significant differences between the management and the comparison groups for knowledge, perceived self-efficacy and received social support on health promotion behaviors, and health promotion behaviors (for example, corrective exercising, healthy eating, and self-care practices), as well

as health status including FPG and lipid profile, which included TC, TG, HDL-C, and LDL-C used the mean and standard deviation with the independent sample *t*-test and chi-square test.

Additionally, for those in the management group (at baseline and post-test), the paired sample *t*-test was applied. Factors affecting the health promotion behaviors and health status of the elderly participants were determined using multiple regressions analysis. Data analysis was based on the 95.0% confidence level ($p < 0.05$).

Ethical considerations

The study was approved by the Ethics Committee of Mahasarakham University (Ref N° 0237/2011; 2011 Dec 30). Results of the individual interviews and the clinical and diagnostic tests were kept confidential with assigned codes and pseudo names, and the consent to participate in the study of all participants was voluntary.

RESULTS

The baseline information from the study (Table 2) showed that personal characteristics of the institutionalized elderly participants in the management group (women = 50.0%, mean age \pm SD = 73.4 + 6.7 years, married and ever married = 85.0%, received primary level of education = 86.7%, mean duration of stay = 11.5 \pm 5.8 years) did not significantly differ from those in the comparison group (women = 47.3%, mean age = 75.4 \pm 9.1 years, married and ever married = 92.7%, primary level of education = 83.6%, mean duration of stay = 13.4 \pm 7.7 years), with the data not significant at $p > 0.05$.

Analysis of management and comparison groups at baseline

The comparative baseline of mean scores indicated that the elderly par-

Table 2
Socio-demographic factors of elderly participants in management and comparison groups.

Variables	Total (N=115) n (%)	Management (n=60) n (%)	Comparison (n=55) n (%)	p-value
Gender				
Male	59 (51.3)	30 (50.0)	29 (52.7)	0.770 ^a
Female	56 (48.7)	30 (50.0)	26 (47.3)	
Age (years)				
60-70	46 (40.0)	22 (36.7)	24 (43.6)	0.181 ^b
71-80	39 (33.9)	28 (46.7)	11 (20.0)	
≥81	30 (26.1)	10 (16.6)	20 (36.4)	
Mean (±SD)	74.4 (±7.96)	73.4 (±6.73)	75.4 (±9.07)	
Min-Max	60-90	60-87	62-90	
Marital status				
Single	13 (11.4)	9 (15.0)	4 (7.3)	0.191 ^a
Married (and ever married)	102 (88.6)	51 (85.0)	51 (92.7)	
Education				
Primary	98 (85.2)	52 (86.7)	46 (83.6)	0.647 ^a
Junior/senior high and higher	17 (14.8)	8 (13.3)	9 (16.4)	
Duration of stay (years)				
≤5	19 (16.5)	7 (11.7)	12 (21.8)	0.075 ^b
6-10	40 (34.8)	24 (40.0)	16 (29.1)	
≥11	56 (48.7)	29 (48.3)	27 (49.1)	
Mean(±SD)	12.4 (±6.85)	11.5 (±5.84)	13.4 (7.74)	
Min-Max	1-29	1-27	1-29	

^aChi-square test, ^bt-test.

Participants in both the management and the comparison groups were not significantly different in health promotion knowledge, perceived self-efficacy on health promotion behaviors, and health promotion behaviors in all subcategories, including corrective exercising, healthy eating, and self-care practices, with the data not significant at $p > 0.05$ (Table 3).

For the received social support on health promotion behaviors, we found that both management and comparison groups were not different in their received social support on corrective exercising and healthy eating, with the data not significant at $p > 0.05$. However, it was notable

that received social support, particularly on self-care practices (mean±SD), among those in the management group (15.3±2.2) significantly differed from those in the comparison group (15.0±1.8), with the data significant at $p < 0.05$.

At baseline, health promotion behaviors, particularly practices related to corrective exercising, healthy eating, and self-care practices, of those in the management groups were not significantly different from those in the comparison group, with the data not significant at $p > 0.05$.

In addition, the elderly participants in both the management and comparison groups did not have different perceptions

Table 3

Comparison of baseline information on mean score of health promotion knowledge and perceptions, received social support, and health promotion behaviors, as well as proportion of the deviated health status between management and comparison groups.

Variables	Management (n=60)	Comparison (n=55)	t or χ^2	Df	p-value
Health promotion knowledge and perceptions	Mean±SD	Mean±SD			
Health promotion knowledge					
Corrective exercising	6.75±0.86	6.84±0.96	-0.511 ^b	113	0.611
Healthy eating	6.31±0.83	6.40±0.99	-0.588 ^b	113	0.558
Self-care practices	6.30±0.62	6.31±0.69	-0.074 ^b	113	0.941
Perceived self-efficacy					
Corrective exercising	33.48±4.53	32.05±4.68	1.663 ^b	113	0.099
Healthy eating	31.65±3.82	31.31±3.73	0.484 ^b	113	0.629
Self-care practices	17.18±2.21	16.98±2.06	2.007 ^b	113	0.470
Perceived policy and organization management existence					
Perceived policy existence	22.72±4.83	22.85±4.87	-0.152 ^b	113	0.879
Organization management existence	73.70±8.99	72.98±8.78	0.433 ^b	113	0.666
Received social support	Mean±SD	Mean±SD			
Corrective exercising	19.48±3.26	19.38±3.21	0.168 ^b	113	0.867
Healthy eating	20.78±2.73	20.71±2.78	0.144 ^b	113	0.885
Self-care practices	15.32±2.18	15.02±1.78	0.799 ^b	113	0.019 ^d
Health promotion behavior	Mean±SD	Mean±SD			
Corrective exercising	17.58±2.28	18.00±2.47	-0.978 ^b	113	0.330
Healthy eating	21.57±2.79	21.82±2.68	-0.492 ^b	113	0.624
Self-care practices	20.22±2.52	20.27±2.47	-0.120 ^b	113	0.904
Health status	n (%)	n (%)			
FPG					
Normal plasma glucose	55 (91.7)	52 (94.5)	1.576 ^c	1	0.058
Deviated plasma glucose	5 (8.3)	3 (5.5)			
TC					
Normal TC	23 (38.3)	21 (38.2)	0.010 ^a	1	0.987
Deviated TC	37 (61.7)	34 (61.8)			
TG					
Normal TG	33 (55.0)	41 (74.5)	4.778 ^a	1	0.029 ^d
Deviated TG	27 (45.0)	14 (25.5)			
HDL-C					
Normal HDL-C	52 (86.7)	47 (85.5)	0.035 ^a	1	0.851
Deviated HDL-C	8 (13.3)	8 (14.5)			
LDL-C					
Normal LDL-C	16 (26.7)	19 (34.5)	0.841 ^a	1	0.359
Deviated LDL-C	44 (73.3)	36 (65.5)			

^aChi-square test, ^bt-test, ^cFisher's exact test; ^dData is significant at $p < 0.05$.

on the existence of the policy and the organization management on elderly health promotion enhancement within an institution, with the data not significant at $p > 0.05$.

The health status of the elderly participants depicted by the deviated FPG and HDL-C in both the management group (8.3% and 13.3%) and comparison group (5.5% and 14.5%) showed the lesser proportion. There were larger proportions of elderly participants with deviated lipid profiles (management group *vs* comparison group) such as LDL-C (73.3% *vs* 65.5%), TC (61.7% *vs* 61.8%), and TG (45.5% *vs* 25.5%). Of which, the comparative baseline of proportions for the elderly with deviated health status depicting by FPG, TC, HDL-C, and LDL-C of both management and comparison groups were not significantly different at $p > 0.05$. However, it was notable that both groups differed significantly in their TG levels at baseline ($p < 0.05$), and supportive data showed the higher TG level among the management group (Table 3).

Comparison of changes in post-test from baseline after IBM-EHP program implementation

The study results shown in Table 4 indicated that the elderly participants in the management group significantly improved in their perceived policy existence ($p < 0.01$); organization management existence ($p < 0.01$); health promotion knowledge in corrective exercising, healthy eating, and self-care practices ($p < 0.01$); perceived self-efficacy on corrective exercising, healthy eating, and self-care practices ($p < 0.01$); and received social support on corrective exercising, healthy eating, and self-care practices ($p < 0.01$). However, it was notable that the elderly participants in the comparison

group had significantly improved in their health promotion knowledge in corrective exercising and self-care practices ($p < 0.05$).

A comparison between the groups indicated that the elderly participants in both groups differed significantly in their changes after the program implementation, particularly in perceived policy existence ($p < 0.05$); perceived organization management existence ($p < 0.05$); perceived self-efficacy on corrective exercising, healthy eating, and self-care practices ($p < 0.01$); and received social support on self-care practices ($p < 0.01$), corrective exercising, and healthy eating ($p < 0.05$).

For the changes in the health promotion behaviors and health status after the program implementation (Table 5), the results showed that the elderly participants in the management group significantly improved in all aspects of their health promotion behaviors, including corrective exercising, healthy eating, and self-care practices ($p < 0.01$). They also improved significantly in their health status (mean \pm SD): TG from 165.58 \pm 69.93 to 162.93 \pm 76.33 mg/dl ($p < 0.01$), which was still higher than its cutoff point of <150 mg/dl both at baseline and post-test; HDL-C from 49.85 \pm 10.49 to 57.37 \pm 15.37 ($p < 0.01$), which was an increase from lower than the cutoff point to the normal range of >50 mg/dl in the post-test; and TC from 215.43 \pm 39.31 to 211.47 \pm 39.79 mg/dl ($p < 0.05$), which was still higher than the cutoff point of <200 mg/dl.

The comparison between groups indicated that the elderly participants in both groups only differed significantly in their changes after the program implementation (mean difference for the management group *vs* the comparison group) in HDL-C (-7.52 *vs* -2.31 mg/dl) ($p < 0.05$). Supportive data showed that the HDL-C

Table 4
 Comparison of mean score at baseline and post-test after program implementation of health promotion knowledge and perceptions, and received social support between management and comparison groups.

Variables	Measuring point	Management Mean±SD	Comparison Mean±SD	Difference: management to comparison group	p-value
Health promotion knowledge and perceptions					
Health promotion knowledge					
-Corrective exercising	Baseline	6.75±0.86	6.84±0.96	-0.09	0.611
	Post-test	7.03±1.06	6.96±1.07	0.07	0.726
	Difference: baseline to post-test	-0.28	-0.12		
	p-value	0.001 ^b	0.034 ^a		
-Healthy eating	Baseline	6.35±0.91	6.40±0.99	-0.05	0.558
	Post-test	6.56±0.89	6.45±1.05	0.11	0.241
	Difference: baseline to post-test	-0.21	-0.05		
	p-value	0.001 ^b	0.083		
-Self-care practices	Baseline	6.30±0.65	6.31±0.69	-0.01	0.558
	Post-test	6.45±0.78	6.42±0.76	0.03	0.655
	Difference: baseline to post-test	-0.15	-0.11		
	p-value	0.001 ^b	0.013 ^a		
Perceived self-efficacy					
-Corrective exercising					
	Baseline	32.48±4.53	32.05±4.68	0.43	0.099
	Post-test	34.72±4.86	32.02±4.61	2.70	0.003 ^b
	Difference: baseline to post-test	-2.24	0.03		
	p-value	0.001 ^b	0.622		
-Healthy eating	Baseline	31.65±3.82	31.31±3.73	0.34	0.629
	Post-test	34.95±4.00	31.20±3.53	3.75	0.001 ^b
	Difference: baseline to post-test	-3.30	0.11		
	p-value	0.001 ^b	0.308		
-Self-care practices	Baseline	17.78±2.21	16.98±2.06	0.80	0.047
	Post-test	19.57±2.98	17.13±1.82	2.44	0.001 ^b
	Difference: baseline to post-test	-1.79	-0.15		
	p-value	0.001 ^b	0.118		

Perceived policy and organization management existence	Baseline	22.72±4.83	22.85±4.87	-0.13	1.962
	Post-test	25.17±4.86	23.36±4.99	1.81	0.041 ^a
	Difference: baseline to post-test	-2.45	-0.51		
	<i>p</i> -value	0.001 ^b	0.013		
-Perceived organization management existence	Baseline	73.70±8.99	72.98±8.78	0.72	0.666
	Post-test	75.13±8.61	73.22±8.87	1.91	0.040 ^a
	Difference: baseline to post-test	-1.43	-0.24		
	<i>p</i> -value	0.001 ^b	0.252		
Received social support	Baseline	19.48±3.26	19.38±3.21	0.10	0.867
	Post-test	20.87±3.15	19.40±3.15	1.47	0.014 ^a
	Difference: baseline to post-test	-1.38	-0.02		
	<i>p</i> -value	0.001 ^b	0.844		
-Healthy eating	Baseline	20.78±2.73	20.71±2.78	0.07	0.885
	Post-test	21.73±2.31	20.87±2.52	0.86	0.040 ^a
	Difference: baseline to post-test	-0.95	-0.16		
	<i>p</i> -value	0.001 ^b	0.161		
-Self-care practices	Baseline	15.32±2.18	15.02±1.78	0.30	0.426
	Post test	17.00±1.84	15.11±1.52	1.89	0.001 ^b
	Difference: baseline to post test	-1.68	-0.09		
	<i>p</i> -value	0.001 ^b	0.256		

^aData is significant at $p < 0.05$; ^bData is significant at $p < 0.01$.

of the elderly participants in the management group increased from 49.85±10.49 to 57.37±15.37 mg/dl compared to an increase from 49.25±16.83 to 51.56±12.18 mg/dl. It was notable that the post-test results of the mean HDL-C in both groups were moving towards the normal range with its cutoff point of >50 mg/dl.

Factors affecting health promotion behaviors of elderly participants

From the simple regression analysis, the findings indicated that there were no impacts of gender, age, education, and duration of stay on health promotion behaviors of the institutionalized elderly participants in the management group, with the data not significant at $p > 0.05$. However, perceived policy existence, perceived organization management existence, perceived self-efficacy, and received social support in all subcategories of health promotion behaviors, namely corrective exercising, healthy eating, and self-care practices, impacted on the health promotion behaviors of the elderly population group ($p < 0.05$) (Table 6).

From the multiple regression analysis (Table 7), the predicting factors

on the success of the IBM-EHP program on health promotion behaviors of the elderly participants in the management group were both perceived self-efficacy (X1) and received social support (X2) on health promotion behaviors. Such factors contributed to explain 50.6% of the health promotion behaviors of the elderly participants. The prediction was as in the following formula: $Y=0.952+0.230(X1) + 0.268(X2)$.

DISCUSSION

The overall health promotion behaviors of the institutionalized elderly participants in the selected government EHSIs in northeastern Thailand in this current study were at a moderate level. However, variations were recognized: while they had self-care practices at a high level, their corrective exercising and healthy eating were at a moderate and low level, respectively. Compared to the hypertensive elderly persons aged 60-88 years utilizing the health service at the outpatient department of a district hospital in central Thailand, the institutionalized elderly participants in this current study had overall health promotion behaviors that were slightly less than the hypertensive elderly group whose health promotion behaviors were at a moderate to high level (Jaiyungyuen *et al*, 2012).

However, both institutionalized and hypertensive elderly groups had perceived self-efficacy to perform health promotion behaviors, particularly in nutrition and eating related issues at a high level. It was also observed that while the institutionalized elderly participants in this study from both the management and comparison groups had highly perceived self-efficacy in healthy eating, they exhibited low levels of such health promotion practices.

Prior to the implementation of the institution-based health management program, the institutionalized elderly participants in both groups in this study had a moderate level of perceptions on the existence of policy and organization management towards health promotion enhancement in the institution. Their knowledge and received social support in health promotion were also at a moderate level. For the perceived self-efficacy in health promotion, they had moderately perceived self-efficacy in corrective exercising and self-care practices, but highly in healthy eating. It was also notable that there was a high proportion that had a deviated lipid profile (mean range±SD, range of % deviated), especially LDL-C (121.12±35.27-124.29±44.68 mg/dl, 65.5-73.3%), TC (211.47±39.31-215.04±48.24 mg/dl, 61.7-61.8%), and TG (165.58±69.93-143.36±79.34 mg/dl, 25.5-45.0%), respectively.

While the institutionalized elderly persons largely exhibited comparable health promotion behaviors and related information in both groups (management *vs* comparison), there were significant differences only for the mean score of received social support, particularly for self-care practices (17.00±1.84 *vs* 15.11±1.52, $p<0.05$) and proportion of those with deviated TG of 150 mg/dl and higher (45.0% *vs* 25.5%, $p<0.05$). The institutionalized elderly residents with a deviated TG level in the management group (45.0%) was larger than that of the elderly participants from all regions of Thailand, $n=8,228$, based on the 4th National Health Survey based on Physical Examination in the year 2008-2009 (34.6-44.2%) (Aekplakorn *et al*, 2009).

This study investigated the effect of the institution-based health management program in enhancing the health status and health promotion behaviors of the institu-

Table 5
 Comparison of mean score at baseline and post-test after the IBM-EHP program implementation of health promotion behaviors and health status between management and comparison groups.

Variables	Measuring point	Management Mean±SD	Comparison Mean±SD	Difference: management to comparison	p-value
Health status					
FPG (mg/dl)	Baseline	102.30±15.37	100.29±16.78	2.01	0.504
	Post-test	101.63±15.63	102.13±17.02	-0.50	0.871
	Difference: baseline to post-test	0.67	-1.84		
	p-value	0.354	0.360		
TC (mg/dl)	Baseline	215.43±39.31	214.87±48.39	0.56	0.257
	Post-test	211.47±39.79	215.04±48.24	-3.57	0.665
	Difference: baseline to post-test	3.96	-0.17		
	p-value	0.049 ^a	0.102		
TG (mg/dl)	Baseline	165.58±69.93	143.36±79.34	22.22	0.113
	Post-test	162.93±76.33	143.93±78.75	19.00	0.192
	Difference: baseline to post-test	2.65	-0.57		
	p-value	0.001 ^b	0.107		
HDL- C (mg/dl)	Baseline	49.85±10.49	49.25±16.83	0.6	0.898
	Post-test	57.37±15.37	51.56±12.18	5.81	0.027 ^a
	Difference: baseline to post-test	-7.52	-2.31		
	p-value	0.002 ^b	0.188		
LDL-C (mg/dl)	Baseline	121.12±35.27	124.29±44.68	-3.17	0.672
	Post-test	121.13±32.30	124.42±44.92	-3.29	0.337
	Difference: baseline to post-test	-0.01	-0.13		
	p-value	0.110	0.496		
Health promotion behaviors					
Corrective exercising	Baseline	17.57±2.28	18.00±2.47	-0.43	0.330
	Post-test	20.40±2.59	18.18±2.20	2.22	0.040 ^a
	Difference: baseline to post-test	-2.83	-0.18		
	p-value	0.001 ^b	0.067		
Healthy eating	Baseline	21.57±2.79	21.82±2.68	-0.25	0.624
	Post-test	27.80±3.48	22.09±2.18	5.71	0.001 ^b
	Difference: baseline to post-test	-6.23	-0.27		
	p-value	0.001 ^b	0.092		
Self-care practices	Baseline	20.22±2.52	20.27±2.47	-0.05	0.904
	Post-test	23.07±2.78	20.45±2.25	2.62	0.001 ^b
	Difference: baseline to post-test	-2.85	-0.18		
	p-value	0.001 ^b	0.124		

^aData is significant at $p < 0.05$; ^bData is significant at $p < 0.01$.

tionalized elderly residents in northeastern Thailand. Performing the defined activities during the 24-week intervention program resulted in a significant improvement in

the institutionalized elderly residents in the management group (baseline *vs* post-test) in regards to health status, including TC (215.43±39.31 *vs* 211.47±39.79 mg/dl),

Table 6
Regression analysis of influential factors on health promotion behaviors of elderly participants in the management group ($n=60$).

Variables	B	β	T	p-value
Gender				
Female				
Male	-0.001	-0.001	-0.001	0.916
Age (years)				
60-70				
≥ 71	0.229	-0.268	-1.607	0.114
Education				
Secondary school and higher				
No education and primary school	0.389	0.321	1.966	0.055
Duration of stay (years)				
<6				
≥ 6	0.023	0.018	0.119	0.906
Policy				
Low and moderate level				
High level	0.139	0.121	2.17	0.041 ^a
Organization				
Low and moderate level				
High level	0.051	0.248	2.36	0.038 ^a
Perceived self-efficacy				
Low and moderate level				
High level	0.119	0.281	2.95	0.024 ^a
Received social support				
Low and moderate level				
High level	0.233	0.258	3.18	0.020 ^a
R-square=0.059-0.565, SE _{est} =0.291-0.417				

^aData is significant at $p < 0.05$.

Table 7
Factors predicting health promotion behaviors of elderly participants in the management group.

Variables	R	R ²	b	Beta	t
Perceived self-efficacy (X1)	0.617	0.376	0.23	0.317	2.547 ^a
Received social support (X2)	0.723	0.522	0.268	0.389	3.051 ^a
R-square (adj)=0.506, SE _{est} =0.291, Constant b=0.952					

^aData is significant at $p < 0.05$.

HDL-C (49.85 ± 10.49 vs 57.37 ± 15.37 mg/dl), and TG ($165.5869.93$ vs 162.93 ± 76.33 mg/dl), and health promotion behaviors, including corrective exercising (17.57 ± 2.28

vs 20.40 ± 2.59), healthy eating (21.57 ± 2.79 vs 27.80 ± 3.48), and self-care practices (20.22 ± 2.52 vs 23.07 ± 2.78). In addition, their health promotion knowledge, which

included corrective exercising (6.75 ± 0.86 vs 7.03 ± 1.06), healthy eating (6.35 ± 0.91 vs 6.56 ± 0.89), and self-care practices (6.30 ± 0.65 vs 6.45 ± 0.78), along with their perceived policy existence (22.72 ± 4.83 vs 25.17 ± 4.86) and perceived organization management (73.70 ± 8.99 vs 75.13 ± 8.61) existence, increased significantly.

The institutionalized elderly participants in the management group also increased significantly in their perceived self-efficacy in health promotion, particularly in corrective exercising (32.48 ± 4.53 vs 34.72 ± 4.86), healthy eating (31.65 ± 3.82 vs 34.95 ± 4.00), and self-care practices (17.78 ± 2.21 vs 19.57 ± 2.98), and received social support, particularly on corrective exercising (19.48 ± 3.26 vs 20.87 ± 3.15), healthy eating (20.78 ± 2.73 vs 21.73 ± 2.31), and self-care practices (15.32 ± 2.18 vs 17.00 ± 1.84).

While the institutionalized elderly participants in the control group improved significantly ($p < 0.05$) in two aspects, including their health promotion knowledge, specifically in corrective exercising (6.84 ± 0.96 vs 6.96 ± 1.07) and self-care practices (6.31 ± 0.69 vs 6.42 ± 0.76), and their perceived policy existence (22.85 ± 4.87 vs 23.36 ± 4.99). The physical health status, particularly a decrease in total cholesterol level (TC) and an increase in HDL-C, of the institutionalized elderly participants after receiving the IBM-EHP program in the management group was seen as beneficial for the elderly residents in delimiting their lipidemia conditions and lessening their risk of heart disease and stroke (Wannamethee *et al*, 2000; Athyros *et al* 2003; Curb *et al*, 2004).

After reviewing the literature, the significant increase in mean TC by 3.9 points among the institutionalized elderly participants after receiving a 24-week institution-based health management

program in this study was not confirmed by an improvement in the mean TC by 1.0 point [baseline to 12-wk= 177 - 178 mg/dl with mean difference and 95% CI of 1 and -7 - 8 ($p > 0.05$)] in frail institutionalized older adults ($n=91$) in Malaysia who received a 12-week intervention with oral nutritional supplementation (daily intake of two 200-ml bottles of an oral nutritional supplement, each bottle containing 30 kcal, 20 g protein, 3 g fiber, 500 IU vitamin D, and 480 mg calcium) plus physical exercise (standardized physical exercise training consisting of flexibility, balance, and strengthening exercises for arms and legs five days per week, in which the Pilates exercise improves depression and increases dynamic and static balance) (Abizanda *et al*, 2015).

By incorporating intensive health promotion education and skill training sessions in Weeks 1 and 12, we found improvements in the health promotion knowledge and health promotion behaviors of the institutionalized elderly residents in the management group after the program implementation. In addition, incorporating individualized corrective exercise by using a 30-minute *Boonmee* Long-stick Exercise Dance, comprising flexibility, balance, and strengthening exercises and emphasizing natural breathing for three days-per-week for 24 weeks, we found improved physical performance in corrective exercising and self-care practices, which needed general mental effort, such as cognition in performing eight different forms of long-stick integrative physical movement with multiple repetitions and physical effort in bodily movement to perform daily routine tasks.

A large body of literature supports that physical activity impacts elderly health and quality of life, for example, *Tai Ji Quan* was found to improve cognitive

function and physical function (Li *et al*, 2014); a standardized physical exercise incorporating nutrition supplements was able to improve physical function, nutritional status, and quality of life (Abizanda *et al*, 2015); and aerobic exercise (Baker *et al*, 2010) and walking (Lautenschlager *et al*, 2008; Maki *et al*, 2012) preserved cognitive function.

The individualized corrective exercising in this current study was found to be beneficial to the institutionalized elderly residents, and this was supported by Cohen-Mansfield and colleagues (2010) who indicated that individualized exercise is suitable for institutionalized older people and provides more effective results than 'blanket' programs or control program (Suhonen *et al*, 2008). It is also able to reduce anxiety in activity participation (Sung *et al*, 2010) and helps to enhance feelings of success (Holthe *et al*, 2007). Factors affecting the improvement of health promotion behaviors of the institutionalized elderly residents in the management group after the IBM-EHP program implementation included perceived policy existence, perceived organization management existence, and perceived self-efficacy in- and perceived social support on health promotion behaviors ($p < 0.05$).

While perceived self-efficacy and received social support served as significant predicting factors of 50.6% of the overall health promotion behaviors of the institutionalized elderly participants in the management group ($p < 0.05$), factors such as having occupation, health promotion knowledge, having a month span of current illness, and received social support from health personnel and family members were key predicting factors for 42.1% of the overall health promotion behaviors of the elderly persons under the

universal coverage program in the same province ($n=341$) (Chamroonsawasdi *et al*, 2010). The key success factors of this institution-based elderly health promotion program were strengthening self-efficacy of an elderly individual to perform health promotion behaviors through various means, particularly provision of health promotion knowledge sessions and skill training activities, as well as enhancing social support from their institution staff, caregivers, and peers.

In a prospective quasi-experimental pre-test and post-test study using a community-based health promotion program (CBHP) and multidisciplinary approach on changes in lifestyle, physiological indicators, and depression score among 520 elderly people in two groups of rural villages (Group 1 had nursing students and Group 2 had community peers as supporters) showed significant effects on the elderly health behaviors and health conditions. Supportive information showed that the elderly participants in Group 1 had higher self-protection behaviors, while those in Group 2 had more appropriate blood pressure levels (Wang *et al*, 2014).

Such a study, therefore, indicated the importance of social support and a multidisciplinary approach in health promotion in rural community elderly dwellers. The elderly in both groups in such a study also had a healthier lifestyle and improvement of fasting plasma glucose level, blood pressure level, and depression score, which were contrary to the results of this study in that after the institution-based health management program, the institutionalized elderly residents in the management group had not significantly decreased their FPG level, baseline to post-test = 102.30-101.63 mg/dl with mean difference, and 95%CI of 0.67 and -0.759-2.093 ($p > 0.05$).

The present study suggested that an institution-based health management program improved the knowledge, perceived self-efficacy, received social support, health promotion behaviors, and health status of the elderly residents in the context of a home service institute in Thailand. Improvements in health status after the program implementation, as depicted by TC, TG, and LDL-C levels, are seen as beneficial outcomes to the health of the institutionalized elderly residents.

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