CHAPTER 2

LITERATURE REVIEW

The chapter presents a review of the selected literature that is relevant to the present study and the conceptual framework of the study. The literature is divided into four sections as follows:

1. Eating and health of the elderly:
    1.1 Food and health
    1.2 Eating behaviors
    1.3 Healthy eating
    1.4 Factors affecting eating behaviors of the elderly
2. Eating culture of Thai northeast elderly
3. Promoting healthy eating in the elderly:
    3.1 Interventions approaches
    3.2 Health education methods for promoting healthy eating in the elderly
    3.3 Programs for promoting healthy eating among the elderly
4. Conceptual framework

Eating and Health of the Elderly

Food and Health

Food is a basic need of human beings. Basically, food contains sufficient nutrients that human bodies can use for maintenance of body functions throughout our life. Food provides human with the energy and nourishment which they need to enjoy a full and healthy life (D'Cruz & Collings, 2002). The food consumed each day has a profound and sustained impact on overall health, aging processes, and longevity (Maville & Huerta, 2002). Furthermore, food has a strong influence on the risk and progression of the most common chronic, age-related diseases. Therefore, food consumption is one of key factors influencing morbidity and mortality in all population group, particularly the elderly (Morris & Rorrie, 1997).

Nutrient Requirements of the Elderly

Aging is thought to alter nutrient requirements for calories, protein, and other nutrients as a result of changes in lean body mass, physical activity, and intestinal absorption. Many elderly skip meals and exclude whole categories of food from their diet because of reduced appetite, infrequent grocery shopping, lack of energy to cook, and difficulties in chewing and swallowing (Pender et al., 2002). So, nutrient requirements of the elderly should be considered. They are described as follows:

Energy. Decreased metabolic rate and reduced levels of physical activity in the elderly result in reduced caloric need and often in decreased intake. This reduction in intake also may result in a decreased consumption of essential nutrients. The U.S.

Recommended Dietary Allowance (RDA) for men and women who are older than 50 years of age are 2,300 and 1,900 calories/day, or 30 cal/kg of body weight (Food and Nutrition Board, National Research Council, 1989b). The Thai RDA for the elderly who are 50-71 years old and more than 71 years of ages are: 2,100 and 1,750 calories/day for men; and 1,750 and 1,550 calories/day for women, respectively (Nutrition Division, Ministry of Public Health of Thailand, 2003).

Protein. Protein provides the essential components for new tissue growth in the human body. Researchers have identified certain age-related changes that may influence protein requirements including (1) decreased lean body mass, (2) decreased plasma albumin and total body albumin levels, and (3) decreased glomerular filtration rates with a concomitant decrease in protein tolerance (Miller, 1999). A protein intake of 1 g/kg body weight is recommended in healthy elderly to maintain nitrogen balance (Campbell, Crim, Young, Joseph, & Evans, 1995), or 12% to 15% of the daily caloric intake is derived from protein (Miller, 1999). For Thai elderly, 1 g/kg body weight for daily protein intake and 12-15% of total caloric intake for daily protein intake are also recommended (Nutrition Division, Ministry of Public Health of Thailand, 2003). Protein deficiency contributes to edema, chronic eczema, fatigue, muscle weakness, and tissue wasting. The presence of acute or chronic diseases further increases protein requirements. Adequate protein intake is particularly important in wound healing, in which inadequate protein intake adversely affects outcome (Keller & Fleury, 2000).

Carbohydrate. A diversity of carbohydrates is essential to health in the elderly. Grains, vegetables, and fruits are superior sources of carbohydrate because they supply not only calories but other necessary nutrients, minerals, and vitamins.

Carbohydrates supply most of the fiber contents of the diet, which is critical in the elderly who are prone to forms of immobility and altered gastrointestinal motility. A reduced glucose tolerance renders the elderly more susceptible to temporary hypoglycemia or hyperglycemia (Keller & Fleury, 2000). Current recommendations favor an increase in complex carbohydrate to at least 55% of calories, which improves intake of vitamins, minerals, and fiber (Keller & Fleury, 2000). For Thai elderly, 45-65% of total caloric intake is recommended for daily carbohydrate intake (Nutrition Division, Ministry of Public Health of Thailand, 2003).

Fat. The primary functions of fat are to assist in temperature regulation, to provide a reserve source of energy, to facilitate the absorption of fat-soluble vitamins, and to reduce acid secretion and muscular activity of the stomach. Fats are also useful for providing a feeling of satiety and improving the taste of foods. Saturated fats are derived from animals, whereas unsaturated fats are found in vegetables (Miller, 1999). Food and Nutrition Board, National Research Council (1989b) recommended that fat calories should be no more than 30% of total daily calories, with less than 10% supplied by saturated fat. For Thai elderly, Nutrition Division, Ministry of Public Health of Thailand (2003) recommended that fat intake should be 20-35% of total daily calories. Reducing total dietary fat, especially in the amount of saturated fat and cholesterol in the diet, can lower blood cholesterol levels and subsequent risk of heart disease (Keller & Fleury, 2000).

Fiber. Fiber has been classified in two categories based on its solubility in water. Soluble fibers are found primarily in oat bran, fresh fruits, and beans. Insoluble fibers are found primarily in wheat bran and in vegetables including carrots and broccoli (Keller & Fleury, 2000). Soluble fibers are beneficial for lowering serum

cholesterol levels and improving glucose tolerance in diabetics. Insoluble fibers are important for maintaining good bowel function and preventing constipation. Dietary guidelines suggest a daily intake of five or more servings of fruits and vegetables (Miller, 1999). Recommended fiber intake for the elderly is 25-35 g/day (Ripsin et al., 1992). For Thai elderly, 25 g/day of fiber intake is recommended (Nutrition Division, Ministry of Public Health of Thailand, 2003).

Vitamins. Vitamins are essential for almost all metabolic processes. The elderly are more likely to have vitamin deficiencies because of other conditions, such as medication dose and alcohol use, that interfere with absorption and utilization. The vitamins most commonly found to be deficient in the elderly are niacin, thiamine, riboflavin, and vitamin B6, A, C, and D (Chandra, 1997; Miller, 1999). The health benefit of supplementing the daily diet with certain vitamins that demonstrate antioxidant properties has been widely studied for the effects that these vitamins can exert at the cellular level.

The bio-physiological processes of aerobic metabolism generate certain unstable biochemical by products, known as "free radicals". The majority of free radicals that affect cellular health are oxygen compounds. These molecules can have toxic effects on body tissues by causing damage to biological macromolecules such as DNA, carbohydrates, and proteins (Stahl & Sies, 1997). The process, oxidation, has been related to the pathological processes of various diseases, such as diabetes, cancer, and heart disease (Keller & Fleury, 2000).

Vitamin C is one of the most powerful natural antioxidants and plays an important role in the maintenance of connective tissues and wound healing. Although there is little evidence that recommended intakes of vitamin C need to be increased in

the elderly, a study on healthy European adults suggested that, with increasing age, there is some impairment of vitamin C absorption (Heseker & Schneider, 1994). The diet should, therefore include good sources of vitamin C, such as citrus fruit juice, fruits or vegetables. The minimum dosage found to be effective were 90 mg/day for men and 75 mg/day for women. The maximum dosage was 2,000 mg/day obtained either through diet or through supplements (Nutrition Division, Ministry of Public Health of Thailand, 2003). Furthermore, research on the Norfolk (UK) cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC) found that people with a higher plasma level of ascorbic acid (vitamin C) had a lower mortality from all causes, and cardiovascular disease.

There is accumulating evidence that the elderly may have greater needs for vitamins B12, B6 and folate owing to the prevalence of disorders that reduce absorption (e.g. as a result of atrophic gastritis). Deficiencies in these vitamins may impair cognitive function, immunity and strength, and may also contribute to increased risk of megaloblastic anemia and heart disease through elevated homocystein levels (Roubenoff, Scrimshaw, Shetty, & Woo, 2000). The Adequate Reference Intake (AI) recommended the dosage of B6 is 1.7 mg/day for men and 1.5 mg/day for women. The B12 and folate recommended by RDA are 2.4 mcq/day and 400 cq/day (Food and Nutrition Board, National Research Council, 1989b; Nutrition Division, Ministry of Public Health of Thailand, 2003).

The elderly may also have increased requirements for vitamin D, which is necessary for absorption of calcium and is important for bone health. Deficiency of vitamin D and calcium are associated with osteoporosis and osteomalacia in the elderly that are significant risk factors for hip fractures. The elderly's declining

kidney function may result in impaired synthesis of active metabolites of vitamin D. Sunshine appears to be primary source of vitamin D and an important factor in maintaining appropriate vitamin D status in the elderly, while diet is a secondary source of vitamin D as only few foods such as oily fish, meat and fortified margarines and spreads contain substantial amounts of vitamin D. Thus, for some of the elderly with declining kidney function and having less exposure to the sun, vitamin D intake may be inadequate and below the recommended level. To ensure adequate vitamin D status, the elderly are encouraged to expose their skin to some sunlight (Department of Health, 1998). Vitamin D intake recommended by AI is 10-15 mg/day in the absence of sunlight exposure, as cholecalciferol, 1 mcq = 40 IU of vitamin D (Food and Nutrition Board, 1989a; Nutrition Division, Ministry of Public Health of Thailand, 2003).

Vitamin A (retinol) plays an important role in growth and cell differentiation, vision, and maintenance of immune function. Vitamin A and beta carotene (provitamin A compound) have been suggested as exerting a protective effect against the development of neoplasm (Keller & Fleury, 2000) and a potential anti-carcinogenic effect (Diplock, 1991). The richest dietary sources of preformed vitamin A are liver and the liver oils of marine fish; other good dietary sources are milk products and whole eggs. Beta-carotene is found in large amounts mainly in carrots and dark-green, leafy vegetables (Chernoff, 1991). Adequate vitamin A level appears to be maintained in the elderly. Although many elderly take supplements that contain vitamin A, data suggest that due to an increase in absorption from the gastrointestinal tract and a decrease in hepatic uptake, vitamin A is one of the only nutrients in which requirements decrease with advancing age (Lipschitz, 1995). Side

effects of vitamin A include headaches, lassitude, reduction in white cell counts, impaired hepatic function, and bone pain (Keller & Fleury, 2000). The RDA of vitamin A intake is 1,000 mg retinol equivalents for men and 800 mg retinol equivalents for women (Food and Nutrition Board, National Research Council, 1989b). For Thai elderly, the RDA of vitamin A intake is 700 and 600 mg retinol equivalents for men and women, respectively (Nutrition Division, Ministry of Public Health of Thailand, 2003).

Vitamin E plays an important role as antioxidants in aging (Chernoff, 1991). It is a major free radical chain- interrupting antioxidant in the lipid phases of biologic systems. Oxygen radicals may play an important role in certain diseases and clinical conditions, such as inflammatory immune injury; ischemic conditions; alcohol-induced organ damage (e.g. alcoholic cardiomegalopathy); immune deficiency conditions (e.g. immune deficiency of advanced age); certain cancers; Parkinson disease; and atherosclerosis (Niki, 1987). A correlation between vitamin E status and ischemic heart disease has been reported (Gey, Brubacher, & Stahelin, 1987). Dietary sources of vitamin E may be found in polyunsaturated fatty acid-rich foods such as vegetable oil (soybean, corn, cottonseed, virgin olive oils, and sunflower) and products made from these oils (margarine or mayonnaise). Wheat germ is one of the best sources, and nuts and some leafy green vegetables are desirable sources (Keller & Fleury, 2000). The present daily RDA of Vitamin E for the group over age 51 years is 8 mg of tocopherol equivalents for women and 10 mg for men (Food and Nutrition Board, National Research Council, 1989b). For Thai elderly, the RDA of vitamin E intake is 15 mg of tocopherol equivalents (Nutrition Division, Ministry of Public Health of Thailand, 2003).

Vitamin K is essential for the production of a number of factors involved in both the intrinsic and extrinsic clotting cascade. There is evidence that vitamin K administration is beneficial in the elderly who have prolonged prothrombin time. Although dietary intake is adequate, deficiencies can result from the administration of drug that interfere with the vitamin's absorption or interfere with bacterial flora (Keller & Fleury, 2000). The Vitamin D intake recommended by AI is 120 and 90 μg/day for men and women (Food and Nutrition Board, National Research Council, 1989a; Nutrition Division, Ministry of Public Health of Thailand, 2003).

Minerals. Minerals, like vitamins, are required for all metabolic process. Many factors may contribute to minerals deficiencies in the elderly such as diseases and adverse medication effects. There are essential minerals for the elderly as follows:

Iron: the body's requirements for iron are lowest in old age (as iron is not required for growth and there are no menstrual blood losses), but factors associated with old age may increase the risk of iron deficiency anemia. Such factors include chronic blood loss from ulcers or other disease conditions, poor iron absorption due to reduced stomach acid secretion, or medicines like aspirin that can cause blood loss from the gastrointestinal tract (Horwarth, 1991). The elderly should be encouraged to consume foods containing bioavailable haem iron, such as red meat, liver and meat products. The RDA for iron intake is 10 mg/day for persons aged 51 and over (Food and Nutrition Board, National Research Council, 1989b).

Calcium: calcium absorption is reported to decline with age (WHO, 2003) and the elderly, and in particular, postmenopausal women who are at risk of osteoporosis, should continue to include foods rich in calcium, such as milk and dairy products, in their diets, making the need for calcium-rich foods as important as ever.

The RDA for calcium intake is 800 mg/day for persons aged 51 and over (Food and Nutrition Board, National Research Council, 1989b).

Zinc: zinc is an integral part of hundreds of enzymes, hormones and proteins in the body. It is needed for a wide range of biochemical and physiological functions and has an important role to play in immune function. The RDA for persons aged 51 and over of zinc intake is 15 mg/day for men and 12 mg/day for women (Food and Nutrition Board, National Research Council, 1989b).

Selenium: there is suggestive evidence that selenium deficiency may contribute to age-related declines in cellular function. Furthermore, selenium deficiency has been associated with a two - to- threefold risk of coronary heart disease mortality, and is correlated with coronary atherosclerosis (Moore, Noiva, & Wells, 1984). The RDA for persons aged 51 and over of selenium intake is 70 μg/day for men and 55 μg/day for women (Food and Nutrition Board, National Research Council, 1989b).

Water. Water is such a commonly available and tasteless substance that it is often overlooked as a nutritional requirement. However, it is essential for all metabolic activities and must be consumed in adequate amount for proper physiological performance. The functions of water include regulating body temperature, maintaining a suitable metabolic environment, diluting water-soluble medications, and facilitating renal and bowel excretion (Miller, 1999). Fluid balance is extremely important because of the propensity of the elderly to develop dehydration and the ease with which over dehydration can occur among the individuals with compromised renal function or other disorders associated with fluid retention. Dehydration is the most common cause of fluid and electrolyte disturbances in the

elderly (Chernoff, 1994). As a general rule, water intake should be 1 ml/kcal or 30 ml/kg body weight. Dehydration may be the most common cause of an acute confusional state in the elderly (Lipschitz, 1995). Studies have demonstrated a decreased ability of the elderly to response to fluid deprivation. This becomes a particularly serious problem in the elderly who develop minor infections and illness. This results in fever, increased metabolism, and fluid loss. Thus, aggressive attempts at assuring adequate hydration are essential in the elderly (Keller & Fleury, 2000).

Eating Behaviors

Persons consume foods differently based on their eating behaviors. They eat certain foods for many reasons, such as good health and nutrition. Eating behaviors develop through a learning process from early childhood and are influenced by environmental factors. Persons obtain and prepare food based on their own ideas and learn from others about food that should be eaten, food transformation, and eating patterns (Maville & Huerta, 2002). Suitor and Crowley (1984) defined eating behaviors as an individual's activities related to a human's eating such as food choice, food preparation, and food consumption. Bootsri (1993) mentioned that eating behaviors were the favoring or familiar expression on food consumption or the rejected foods, food choices, and number of daily servings. Furthermore, eating behaviors involved all activities related to a human's eating, whether observable or not. Eating behaviors are included of learning about food, food procurement, food preparation, characteristics and amount of food, food consumption, food storage and disposal (Aree, Tanphaichitr, Suttharangsri, & Kavanagh, 2004).

According to Encyclopedia or Dictionary, food choice is defined as the act of choosing or selection or preference of food. It means the power, right, or liberty to choose food (American Heritage Dictionary of the English Language, 2003). Food preparation is defined as cooking that is the act of preparing food to eat (Columbia Electronic Encyclopedia, 2007). Cooking means heat treatment of food to make it more palatable, digestible, and safe (Medical Dictionary, 2007). Food consumption is the act of consuming food or the state of being consumed (Dorland's Medical Dictionary for Health Consumers, 2007). In addition, it means an amount of consumed food or the process of taking food into the body through the mouth (as by eating) (American Heritage Dictionary of the English Language, 2003).

In sum, this study defines eating behaviors as an individual's activities related to a human's eating such as food choice, food preparation, and food consumption behaviors. Food choice behavior means the activities relating to choosing or selection of food. Food preparation behavior is defined as the activities of preparing of food, cooking, and food storage, and food consumption behavior is defined as the acts of consuming food or eating food.

Healthy Eating

There is a clear linkage between some common chronic diseases suffered by the elderly and a combination of inappropriate diet and unhealthy eating behaviors. The common chronic diseases in which diet plays a prominent role include obesity, osteoporosis, diabetes, hypertension, cardiovascular disease, and cancer (McCann & Bovbjerg, 1998).

Appropriate eating behaviors or healthy eating can help elderly maintain their health and independence. Healthy eating could help maintain adequate nutrition and prevent nutritional deficiencies, as well as reduce risks of chronic diseases, such as heart disease, hypertension, osteoporosis, obesity, and diabetes (Fletcher & Rake, 1998). Healthy eating provides a balanced intake of sufficient amounts of all nutrients that are required for growth development and physical activity, as well as for maintenance or restoration of good health (Dudek, 2001).

From practical perspective, the term "healthy eating" was defined similarly in various countries' perspective. The U.S. Department of Agriculture (USDA) and the Department of Health and Human Services (1995) defined "healthy eating" as "healthy food consumption behaviors" including consumption of diets with; (1) low in fat, saturated fat, and cholesterol, (2) plenty of vegetables, fruits, and grain products, (3) moderate sugar, (4) moderate salt and sodium, (5) balanced diet, (6) variety of foods, and (7) drink alcoholic beverages in moderation. In England, the term healthy eating was described as "eating healthy foods", "avoiding unhealthy foods", and "eating food containing fiber" (Povey, Conner, James, & Sheperd, 1998). D'Cruz and Collings (2002) provided "Eight Guidelines to Healthy Eating" to help ensure a balanced diet, as following: enjoy your food; eat a wide variety of food; eat plenty of food rich in starch and fiber; avoid eating too much fat; avoid eating sugary food too often; look after the vitamins and minerals in your food; drink alcohol in moderate amount; and eat the right amount to be healthy. In Spain, healthy eating was defined as eating "balanced and having variety" (Martinez-Gonzalez, Holgado, Gibney, Kearney, Martinez, 2000). In Japan, it was interpreted as "eating a nutritionally balanced diet" and "eating plenty of vegetables" (Akamatsu, Maeda,

Hagihara, & Shirakawa, 2005). In Scotland, reducing salt, refined sugar and saturated fat in the diet and increasing the consumption of fruits and vegetables, carbohydrates, fiber, and oily fish were the meaning of healthy eating (Shelton, 2005).

Similarly, Almeida, Graca, Afonso, Kearney, & Gibney (2001) defined healthy eating as eating "less fat", more fresh "vegetables and fruit", and "natural foods". Healthy eating was accepted by dietary recommendations that would result in increased antioxidant defenses, which was to enrich the diet with fruits and vegetables and other plant based agents (e.g. tea, herbal drinks, red wine) and to limit salt, saturated fat and total energy intake (Tse & Benzie, 2004). Akamatsu et al. (2005) revealed that healthy eating is related to eating behaviors (or habits) and styles, and foods and dietary intake. Furthermore, Shahan (2002) and Warahut (1999) found that eating behaviors included food purchases, dietary intake, and food choice.

In Thailand, some studies provided the meaning of healthy food consumption or healthy eating similarly to nutritional behavior. Healthy food consumption meant having five major nutritious substances in their meal; reducing the amount of food which contain high level of cholesterol, fat, spicy, sugar and sodium; and increasing the amount of fish, fiber (vegetables and fruits), calcium (low-fat milk), and clean water (at least 6-8 glasses a day) (Churthong, 2001; Neelapaichit, 2002; Purinthrapibal, 1998; Sakulrang, 2001). Studies of nutritional behaviors also measured abilities to have all five major nutritious substances in each meal, to increase food with high fiber (vegetables and fruits), and to decrease food with high fat and fatty meat (Srisaad, 1997). Athikamanon (1998) defined nutrition behavior as eating high fibers (vegetables and fruits), low fat, and avoid drinking alcohol, eating spicy and sweet food. Thongyord (2000) defined nutrition behaviors as reducing or

avoiding food which contained high fat, salt, cholesterol, and spicy food consuming. Panprom (2002) defined it as eating five groups of nutrition and increasing fish, purified water and fiber from fruits and vegetables.

In conclusion, those previous studies provided the meanings of healthy eating as the activities associating food choice or purchasing and consumption behaviors that food in their meals should have five major nutritious substances, balance and variety, increase the amount of healthy food, and avoid or reduce unhealthy food. Those studies did not mention the meaning of healthy eating in view of the food preparation. According to previous studies, the meanings of eating behaviors referred to the activities related to food selection (or purchasing), preparation (or cooking, storage), and consumption behaviors (Aree et al., 2004; Suitor & Crown, 1984). Similarly, WHO (2003) and Fletcher and Rake (1998) gave appropriate advices on selecting a balanced diets that promote health, food purchasing and preparation, and food consumption. Therefore, in this study, healthy eating is defined as the activities relating to proper food choice, food preparation and food consumption including (1) choosing or purchasing food in each meal considering fresh food, variety of food, food with five major nutritious substances, low cholesterol, low fat and saturated fat, having moderate sugar and salt, plenty of vegetables and fruits, limited or no alcohol, and adequate clean water; (2) properly preparing food or cooking each meal making it clean, digestible, and safe including safety from contaminated food, and high-fat, sugar and salty food. Proper serving size for easily chewing and swallowing, cleanliness of food or utensils, and proper storage of food are required; and (3) consuming food in each meal that contains five major nutritious substances, eating a variety of food, eating low- cholesterol, fat and

saturated fat food, sugar and salt in moderation, high fiber (vegetables, fruits), avoiding or limiting of alcohol consumption, and drinking clean water at least 6-8 glasses a day.

Factors Affecting Eating Behaviors of the Elderly

Eating behaviors are an integral part of individual and family lifestyle. Effective modification requires consideration of the factors that determine eating behaviors and the use of appropriate behavioral change techniques. Pender et al. (2002) classified factors influencing eating behavior including biological, psychological, socio- cultural- economical and environmental factors.

1. *Biological factors*. The biological changes of aging have a marked effect on eating behavior. The elderly have altered nutrient requirements for calories, protein, and other nutrients as a result of changes in lean body mass, physical activity, and intestinal absorption. Many elderly skip meals and exclude whole categories of food from their diets because of reduced appetite, lack of energy to cook, and difficulties in chewing and swallowing.

2. *Psychological factors*. Psychological factors can have positive or negative effects on eating behaviors. Perceiving benefits from good eating behaviors encourage individuals to select foods that are high in nutrients, low in fat and refined carbohydrates, high in fiber, and low in sodium and food additives. A positive self-concept also creates a psychological climate that encourages persons of all ages to take care of themselves and control what they eat because they place a high value on their own health and well-being. Emotions, such as depression, low self-esteem, and lack of personal control over one's life, particularly overeating behavior, can

markedly impair eating behaviors. Negative emotions, such as anger, frustration, and insecurity, can lead to disturbances in eating behavior too that lead to under-nutrition or over-nutrition. Furthermore, belief and perceptions also affect eating behavior.

3. *Socio-cultural-economical factors.* Culture and ethnic backgrounds serve as important influences on eating behaviors. Cultural factors influence definition, selection, preparation, and eating of food. Food selection of the elderly relates to one's health status, and eating patterns may be influenced by ethnic background or religious belief (Miller, 1999). Price of foods, quality and freshness of foods were found to be associated with elderly's food choices (Almeida et al., 2001). Low income has affected the food consumption behavior, food purchases, and dietary intake of the elderly (Almeida et al., 2001). In addition, mass media have influence on over eating behavior. The mass media are frequently cited as a primary source of health and nutrition information for the elderly. Other sources are family, friends, physicians, nurses and dietitians.

4. *Environmental factors.* There are many environmental barriers to healthy eating behavior. The complexities of modern life make it difficult for many individuals to consistently maintain access to foods rich in important nutrients. The major environmental factors influencing eating patterns are accessibility, and convenience. Seasonal variation in availability of foods such as raw vegetables and fresh fruits determines both accessibility and costs. Ease of preparation also plays an important role in food selection. Quick and effortless preparation techniques appeal to many families because of busy work schedules. In addition, attractiveness of prepared foods is an important consideration too. Some studies reported that the appearance of

foods was the most important factors influencing elderly's food choices (Almeida et al., 2001; Shahan, 2002).

Dudek (2001) mentioned about the factors influencing eating behaviors: (1) cultural factors that included values and beliefs about food that are related to health and wellness; (2) socio-demographic factors that included ethnicity, region, age, education, income, religion, and gender; and (3) individual factors that included nutritional requirement, health status, and taste physiology.

In Thailand, many factors were found to affect elderly's eating behaviors. The strong evidences showed that healthy food consumption of Thai elderly significantly related to nutritional knowledge (Churthong, 2001; Neelapaichit, 2001; Sakulrang, 2001), perceived self-efficacy (Chaisongkarm, 2002; Churthong, 2001; Sakulrang, 2001), outcome expectations (Chaisongkarm, 2002; Churthong, 2001), and social support from families, friends, and researchers (Churthong, 2001). Similarly, studies of health-promoting behaviors of Thai elderly showed that nutritional behaviors associated with perceived self-efficacy (Athikamanon, 1998; Kalawong et al., 2005; Purinthrapibal, 1998; Srisaad, 1997), perceived benefits of nutritional behavior (Athikamanon, 1998; Srisaad, 1997; Wonglarmthong, 1999), perceived barriers to nutritional behavior (Athikamanon, 1998; Pothiban et al., 2002), and social support from family members (Intarapanich, 1994; Panprom, 2002). In addition, personal factors such as educational level, gender (Cheunarrom et al., 2000; Pothiban et al., 2002), and income (Sanguanwang, 1996; Warahut, 1999; Yamchanchai, 1995) were also significantly related to nutritional behavior among the elderly.

Eating Culture of Thai Northeast Elderly

Thailand is divided into four regions, the North, Northeast, Central, and South, which vary in geography, natural resources, culture, and history of contact with outer societies. Consequently, each region is characterized by its own foods and style of eating, although the increase in communication and extensive internal migration has been accompanied by the movement of regional dishes into different areas within the country (Wikipedia Encyclopedia, 2010).

The northeastern region is called that Isaan. It has a fascinating culture and is unique from other regions within Thailand which include the indigenous form of folk music, silk weaving, and Isaan food. Isaan food reflects its relationship and similarity to neighboring Lao that is on the other side of Mekong River (Wanaratna, 1998). Glutinous rice is the staple food. Much of the food includes some herbs and prickled ingredients. Chilies also tend to be used with greater delight at this region, to lighten up a meal (Kumtanode, 2006).

A study of Tantipopipat, Boonpraderm, Chareoenkiatkul, Wasantwisut, & Winichagoon (2010) reported that habitual northeast Thai diets contain several spices, herbs and vegetables indigenous and grown in the local areas. The main cooking methods are boiling, roasting/grilling, and raw meat with added lime. Oil is not typically used. Raw fermented fish sauce, salt and lemon juice may be the most commonly used condiments. The typical dishes included Sôm tam, Jaew, Pon, Soup, Kang, Ooh, Moak, Toam, Om, Kua, Laab, Koi, Yum and Pudphed.

Sôm tam is a spicy vegetable salad. The main ingredients are green papaya, cucumber and string bean, fresh or dry chili pepper, garlic, lemon juice, fish sauce and

fermented fish. Jaew is a sauce composed of chopped garlic, shallot bulb, dry or fresh chili pepper, seasoned with fish sauce or fermented fish sauce and lime juice, mint or tamarind. Pon is made from boiled fish or frog. The cooked meat is minced and mixed with a blend of roasted garlic, chili pepper, shallot bulb, then added a small amount of broth. Soup is similar to Pon. Fish or frog is main ingredients, but it is grilled instead of boiled. Kang, the main ingredient is meat or vegetables boiled with galangal, lemon grass and hairy basil leaves. Salt, fish sauce or fermented fish sauce is added for the taste. Ooh, the main ingredients and cooking method are the same as Kang but the content is simmered until the volume is reduced by about one-fifth. Moak is made from fish, frog, mushroom or minced chicken mixed with condiments similar to Ooh. The mixed ingredients are wrapped in banana leaves then steamed or grilled (Tantipopipat et al., 2010; Wanaratna, 1998).

Toam, the main ingredients are fish, chicken, beef or internal organs, cooked in water, seasoned with salt or fish sauce, galangal, lemon grass and tamarind leaves, until boiled. A variety of herbs e.g. shallot bulb, dill, chili pepper or tamarind, may be added. Om, the main ingredients and condiments are similar to Toam. Ground roasted rice is usually added for flavor, making the soup thicker than Toam. Kua, the main ingredients and condiments are similar to Oam, except for roasted rice. A small amount of water or oil is used in the cooking. All ingredients are heated and stirred in a pan until almost dried. Laab, the main ingredients and condiments are raw fish, beef, chicken or pork minced and mixed with dried chili powder, fish sauce or fermented fish sauce, and lemon juice. Mint, spring onion and roasted rice powder are usually added. Koi is similar to Laab, but thin slices of grilled beef or pork are the main ingredients. Yum is well-cooked meat mixed with the same condiments as Laab,

except for roasted rice. The taste is sourer than Laab. Pudphed is fish or frog that is stir-fried with curry paste and a variety of vegetables (Tantipopipat et al., 2010; Wanaratna, 1998).

Regarding the nutrients of Isaan food, rice or glutinous rice provides a diet high in carbohydrates. Green vegetables provide some vitamins and minerals. The meat including chicken, pork, fish, beef, snakes, lizards, frogs, snails, field crabs, birds, rice field rats, large red ants and insects provide high protein, and bones of those and some green vegetables also provide calcium. Oil is not typically used in Isaan food, therefore mostly food contain low fat. It is certainly agreeable that Isaan food can enhance the body with appropriate nutrients, energy, minerals, vitamins and dietary fiber. In addition, herbs added in Isaan food can help digestion and the gastrointestinal system (Wanaratna, 1998).

Regarding eating style of Isaan people, family members will join together and share food from communal bowls placed in the centre of the group on a mat and floor. This practice is also applied to special feasts at traditional ceremonies. Food or glutinous rice is commonly eaten with the fingers. There is no distinction between the dishes eaten for breakfast, lunch and dinner. The purchasing, preparing and cooking of food are female responsibilities in each family and the younger women have to take care of the elderly. Isaan food has become a staple throughout the country, partly as it is the favorite of the numerous workers from the Northeast who have spread throughout the country in search of work (and taken their food with them), and partly as it really is unique and delicious (Wikipedia Encyclopedia, 2010).

Promoting Healthy Eating in the Elderly

Interventions Approaches

Health promotion is a process of enabling people (individuals and communities) to increase control over (determinants of health), and to improve their health. Health promotion emphasizes on prevention rather than focusing on disease or disability. Three levels of care are recommended including primary, secondary, and tertiary. Primary care strategies aim to reduce risks to illness, maintain well-being and prevent diseases. Secondary care strategies emphasize early diagnosis and prompt treatment and disability limitations. Tertiary care strategies focus on rehabilitation to help people attain and retain an optimal level of functioning regardless of their disabling condition (WHO, 2003). Moulton, Frankish, Rootman, Cole, and Gray (2006) mentioned key domains of health promotion comprising of strategies, process, and outcomes. These domains are mentioned as follows.

1. *Strategies*. Strategy in health promotion is defined as a plan of action to anticipate barriers and resources in relation to achieving a specific objective (Green & Kreuter, 1991). Within the strategy, there are a number of methods of achieving the goals of improved health. Method is a tactic employed as part of a strategy (Egger et al., 1999). The strategies of primary health care interventions focus on individuals, groups, community and organizational strategies (Moulton et al., 2006).

Individual strategies are fundamental level of health care interventions occurring between an individual and a health care provider. The individual is targeted for change rather than the social or environmental conditions underlying the illness or disease. Individual oriented health promotion strategies include personal skills,

psychological counseling, health education (and information), home visits, and preventive interventions (such as screening) (Moulton et al., 2006).

Group strategies typically refer to groups small in number, generally fewer than 20 participants. These groups generally focus on life conditions of their members. They assist individuals to modify or maintain health-related behaviors, and provide a supportive setting for individuals sharing a common goal or problem. They also help the members in groups to improve their capacity to identify and solve problems (Egger et al., 1999). Group strategies include group counseling, capacity building, outreach, self-help/mutual aid, and social support (Moulton et al., 2006).

Community strategies will affect the broad community and population through social and environmental changes. Community strategies include community development/ community economic development; healthy public policy e.g., economic and regulatory activities involving financial and legislative incentives or disincentives focusing on price, availability, restrictions, and enforcement; health communication e.g., social marketing, mass media strategies; advocacy e.g., direct political lobby; and supportive environments (Moulton et al., 2006).

Organizational strategies are targeted at the health settings themselves, and their practitioners. The range and content of the various strategies are vast. They can include any combination of medical conditions, determinants of health, lifestyle/ behavioral issues and/or population groups e.g., age, gender, and ethnicity. Organizational strategies implemented in primary health care settings will be based on the needs of population. In an inner city area, the strategies may address poverty, homelessness, while in a rural area, services may include farming safety and addressing the needs of an aging population (Moulton et al., 2006).

2. *Process*. Process describes aspects of providing client-centered care through interpersonal relationships. Health promotion is a process with the aim of enabling people to take action to improve their health. Health promotion is done with and by people, either as individuals or groups. The characteristics of the process of health promotion emphasize on proactive approach, individualization and choice, mutual learning, respectful communication, and meaningful participation (Moulton et al., 2006).

3. *Outcomes*. Outcomes are the intended or unintended results of the strategies, process and structures. The health outcome is defined as a change in the health of an individual, group or population that is attributable to an intervention or series of interventions. Healthy eating behavior is an important health outcome of health promotion interventions that should be promoted in population (Moulton et al., 2006).

WHO recommended that an important strategy to improve optimal health and quality of life of the elderly is promoting healthy eating. Promoting healthy eating behavior is one of the most challenging tasks in the overall effort to improve nutrition for people in all groups. The goals of promoting healthy eating are helping the elderly optimize their health and decrease their risk for chronic diseases such as obesity, heart disease, diabetes, and some cancers. Furthermore, it could help prevent functional declines, extend life longevity, and enhance their quality of life (WHO, 2003).

McCann and Bovbjerg (1998) recommended two approaches for promoting healthy eating as follows.

Individual or Group Approach for Promoting Healthy Eating

Individuals or groups play a critical role in the determination of their own health. Health promotion for the individuals or group approach improves personal decision making and health practices. Individual or group approach identifies a finite number of lifestyle areas that can be targeted for intervention. Strategies of this approach provide clients for wellness and/or lifestyle change such as eating behavior. Individual or group models of health behavior changes included Health Belief Model, Theory of Planned Behavior, Social Cognitive Theory, and Transtheoretical Model. Those theories or models focus on attitudes, beliefs, or other characteristics of individual or group that are amenable to change. Interventions for promoting knowledge and skills are needed to change individual behaviors. Effective individual- or group-based programs have mainly used cognitive-behavioral theories/models to guide the interventions (Pender et al, 2002). The health promotion interventions approaching individuals or groups were useful to persuade individuals or groups to change their health behaviors such as eating healthy foods and avoiding unhealthy foods. The individually oriented approach was an educational model that sought to convince individuals to change their health-related behaviors. It is assumed that providing accurate information would help individuals or groups see the light and adopt healthier lifestyles. The main challenge for individually oriented interventions was to give the information to people in clear and persuasive ways (WHO, 2003).

McCann and Bovbjerg (1998) mentioned that the cornerstone of all dietary interventions with individuals or groups for promoting healthy eating was nutritional education interventions including nutritionist-led individual or group sessions

covering recipe modification, grocery shopping, and concrete recommendations regarding food to eat and to avoid. Individual- or groups dietary interventions had some limitations including their inability to reach large segments of the population, and losing tendency to gain risk factors reduction relating to healthy diets after exposure of social and environmental pressures. Although some limitations were reported, these interventions had also some advantages including relatively easy to implement and access, inexpensive, and highly motivating (Pender et al, 2002). Performing and maintaining individual skills and behavioral changes to promote healthy eating could be accomplished through intense health education such as providing classes, assessing readiness, initial assessment of the diet, establishing dietary goal settings, and self-monitoring. Stimulus control training, problem solving training, relapse prevention training, enlisting social support (particularly from family members), enhancing self-efficacy, and ongoing program contact were also essential methods of programs to promote healthy eating habits (McCann & Bovbjerg, 1998). Furthermore, Sherman et al. (2000) mentioned that education, motivation, behavior skills, and supportive personal interactions could enhance adherence of the dietary change interventions. Knowledge could motivate and assist individuals or groups to consider changes. It could also promote and maintain changes in individuals or groups already motivated to changes. Attitudes, cultural norms, and reading skills had influences on dietary changes that will be considered. Motivating individuals or groups to change their eating behaviors was implemented with enhancing self-efficacy beliefs that could encourage adoption and maintenance of specific dietary changes. Behavioral skills were provided to help individuals' recognition for dietary

change and maintenance schedules. Interactions with supportive others could also improve adherence to dietary change.

For the elderly, Stuifbergen and Redland (1993) reported that an individual's view of health might affect the elderly's motivation to perform health-promoting behaviors including healthy eating. Removal of barriers, creation of supportive environments and a strong sense of self-efficacy were important aspects of adoption and maintenance of health-promoting behaviors. Goal setting, contracting, and other behavioral techniques could help an individual develop competence in self-regulation of behaviors. There were strong evidences indicated that health education or nutritional education was an effective strategy for promoting healthy eating in the elderly (Boyle & Morris, 2000; Haber, 1996; Huang, Wu, Jeng, & Lin, 2004; McCamey et al., 2003; Mitchell, Robert, & Hollander, 2004; Sahyoun et al., 2004; Sharp et al., 1996). Health education could enhance knowledge and understanding of healthy eating behavior, and increase positive attitude toward healthy eating and skills for choosing healthy diets among the elderly (Haber, 1996; McCamey et al., 2003; Mitchell et al., 2004; Sharp et al., 1996). Some studies recommended that nutritional education and counseling were clearly necessary in assisting the elderly to understand and apply the information to individuals' healthy eating habits (Clemen-Stone, McGuire, & Eigsti, 2002; Pignone et al., 2003; Sahyoun et al., 2004). The incorporation of social support into health education interventions could also help older people promote appropriate dietary changes and maintain their nutritional well-being (Collins & Benedict, 2006; Haber, 2004). Furthermore, Nutritional Guidelines and Nutritional Guide Pyramid, and group participation were recommended for promoting healthy eating for the elderly (Fletcher & Rake, 1998; Viteri, 2006; WHO,

2003), as well as goal settings programs (Fletcher & Rake, 1998; Kelley & Abraham, 2004).

Community Approach for Promoting Healthy Eating

The community approach is targeted at the total community aggregate, which includes individuals, families, and groups. This approach recognizes the intimate relationship between the social and physical environments, and individual behavior (McCann & Bovbjerg, 1998). Community approaches can increase quality, availability, and effectiveness of the interventions designed to prevent diseases and improve health and quality of life among all community members. This approach can reach large segments of the population. Especially, it can effectively reach special populations who are otherwise difficult to reach such as rural, undereducated, economically disadvantaged, or minority groups (The U.S. Department of Health and Human Services, 2000). WHO (2003) mentioned that community-based interventions could involve individuals in their own health, increase their sense of responsibility and efficacy for their health, and provide opportunities for clients input into their own health strategies. This approach was designed to reduce the sense of powerlessness that many people feel. In addition, Pender et al. (2002) mentioned that community-based interventions should consider broader factors that influence health other than individual beliefs and attitudes. This approach need the collaboration of individuals and organizations within the community and often demands considerable resources including time and money. Settings of community-based interventions included the workplace, churches, organizations, and entire communities or specific population

that each setting provided access to the select populations through existing organizational and social structures.

Community-based health promotion programs have many educational components. Individual, group, and community-wide education initiatives are needed to influence health behavioral changes. These programs should use multiple approaches to provide people with the knowledge, skills, and attitudes toward consuming healthful diet (U.S. Preventive Services Task Force, 1996). The Berkshire Health Promotion Nutrition Task Group (2002) offered the Pan-Berkshire Healthy Eating Strategy for taking forward healthy eating initiatives at a local level using a multi-agency approach; workplaces, community and primary care settings. The Pan-Berkshire Healthy Eating Strategy provided the evidence for healthy eating initiatives. The strategies included: (1) setting up goals based on behavioral theories; (2) having personal contact with individuals or small groups sustained over time; (3) providing personalized feedback on any changes in behavior and risk factors; (4) promoting changes in local environment, for example in shops and catering outlets to help people choose their healthy diets; and (5) focusing on diet alone, or diet plus physical activity (D'Cruz & Collings, 2002).

Community health promotion relies on coalitions to address the targeted health behaviors, so community activation is a critical component in implementing community program. Activation of the community is also very difficult because of the need to coordinate many agencies and develop actions that will not reflect the interests of a particular group or agency. A commonly unfulfilled goal of community-based health promotion interventions were found, because of the difficulty, and sustained community activation to promote health behaviors. Factors that facilitate

community activation include the ability of the community coalition to provide its own vision, members in community who have the skills and time to work together, frequent and productive communication, and a sense of cohesion. Barriers to communication and coalition building include staff that lack organizational skills, staff turnover, difficulty in recruiting members, and reluctance of community members to conduct activities (Pender et al., 2002).

For the elderly, Boyle and Morris (2000) mentioned that community-based nutrition interventions could reach older people in many different contexts of their daily lives. Supportive social environments could help individuals change their eating behaviors. Health education or nutritional education is a strategy in assisting the elderly and families in communities to maintain and improve health and well-being as well as network building, collaboration, empowerment, and advocacy (WHO, 2003). In summary, the interventions at individual, group and community approaches have resulted in eating behavior change, which is the cause of optimism in health promotion of the elderly. Promoting healthy eating behavior using those approaches through educational interventions is an effective way for achievement of health of the elderly. Although the interventions using community approach have potential for promoting and maintaining healthy eating behavior of the elderly, these interventions have some limitations. The limitations include the difficulty of community activation, considering broader factors, and extending to large population that can affect to unfulfilled goals of community-based interventions. In addition, this approach needs the collaboration of both individuals and organizations within the communities, and often demands considerable resources including time and money. Therefore, the interventions approaching individuals and/or groups seem to be having a suitable

approach in this study that has the limitations of time and money. Several advantages of individual or group approach include inexpensive, save time and money, easily implementing, easily accessible, and highly motivational for the elderly living in rural communities. The educational interventions by approaching individuals or groups have also adequate potential for promoting and maintaining healthy eating behavior of the elderly through suitable educational methods. The methods to improve healthy eating of the elderly should be available such as nutritional education, nutritional counseling, and motivation.

Health Education Methods for Promoting Healthy Eating in the Elderly

Nutritional Education

Health education was defined as any combination of learning experiences designed to facilitate voluntary adaptations of behavior conducive to health (Green et al., 1980). It was any activity with clear goals planned for the purpose of improving health-related knowledge, attitudes, or behavior (Carlyon, & Cook, 1981). In the U.S., the terms health promotion and health education are often used interchangeably (Breckon, Harvey, & Lancester, 1994). Health promotion was defined as the combination of health educational and related organizational, economic, and environmental support for behaviors actions and conditions of living conducive to health (Green & Kreuter, 1991). In some countries, such as Australia, health education is considered a much narrower endeavor than health promotion. Although the terms health promotion emphasizes efforts to influence the broader social context

of health behavior, the two terms remain closely linked and overlapping, and are often used in combination (Glanz, Rimer, & Lewis, 2002).

According to Kiger (2004), teaching can enhance learning. Health behavior, such as healthy eating is the result of learning and it can be influenced by health educational process in which nurse assumes the role of teacher and client (or patient), and accepts the role of a learner too. Teaching emphasizes "what to teach and how to teach". Teaching will give information and knowledge to help a person solve the problems or avoid trouble (Simon-Morton, Green, & Gottlieb, 1995). Kiger (2004) defined teaching as giving information or advice, counseling, and helping people clarify their thinking, express their feelings, identify options or develop new skills. It might be defined as the process of helping or enabling another person to learn. The kinds of teaching are included of the following:

1) Teaching for understanding and recall is basic to cognitive learning that the learner is able to comprehend the message or information that needs to be understood. Technique language (technical term) that educators use for teaching, the amount of information and its sequence, written reminders and consideration of the immediate personal experience of the learner (pain, anxiety) are important considerations when trying to increase understanding and recalling. Lecture is a useful way for presentation of information.

2) Teaching for skill learning is the need to learn how to do something when learning information is not sufficient. Learning is generally more effective when the learner is active in the process. Thus, it is an important method, in order to learn to perform a skill that the learner is able to observe and practice it, and then receive

feedback about the practice. The learner will also need the opportunity to ask questions. Demonstration is a suitable teaching activity for the learner.

3) Teaching for affective learning is more difficult than teaching for other domains. Topics that relate to attitude and belief inevitably have implications for the individual's right to make decisions about his/her own life. Thus, teaching needs to be alert to the ethics of the situation. The learner needs the opportunity to question and evaluate, to express feelings, to argue and explore. The use of group work and role play is important teaching technique for affective learning.

Peyrot (1999) provided examples of five educational targets that had been linked to specific educational interventions. The educational targets included knowledge and beliefs, skills, intentions, barriers, and self-efficacy. The intervention of knowledge and beliefs targets were didactic education including increasing awareness of risks and benefits, helping clients know how to make appropriate self-care decisions. The intervention of skill target was demonstration and feedback. Intentions and barriers targets, the intervention were goal settings, and problem solving. The final target, self-efficacy, the intervention is to support and counseling by helping clients to maintain positive emotional well-being.

Mayeda and Anderson (1993) mentioned that nutritional education is a cornerstone of health education/promotion programs. Nutritional education is one method to encourage the elderly to maintain optimal health and manage chronic disease by modifying their diet. It is a series of learning experiences designed to support the adoption of nutrition-related behaviors conducive to optimal health (Contento et al., 1995). Nutritional education has provided learning experiences involving a needs assessment, development of objectives, identification of content,

selection of learning activities, implementation of learning activities, and evaluation of learning (Kicklighter, 1991).

There were some evidences of the association between nutrition knowledge and healthy eating. Wardle et al. (2000) found that nutrition knowledge is related to intake of fruits, vegetables, and fats. The results support the value of nutrition knowledge as an important target for health education, and have the potential to contribute to promote healthy eating habits. For the elderly, nutrition knowledge is positively related to their eating attitudes, high-fat or high-cholesterol food restriction behavior, fermented or pickled food restriction behavior, attention to nutritional information, and regularity of meals in the elderly (Lin & Lee, 2005). Therefore, nutrition education is a necessary healthcare service to promote healthy eating for the elderly. It can help the elderly and their family meets individual's needs relating to healthy eating habits.

Nutritional education activities or tools. From literature reviews, some studies reported effective health education activities relating to promote healthy eating in the elderly. Nikolassy (1995) mentioned health education activities to involve in nutritional education programs for the elderly included posters on the wall, handout materials, group programs, skill teaching, and individual counseling. Bell (1997) recommended appropriate activities for providing nutritional education to promote healthy eating among the elderly including non-distracting environment, small groups, shorter teaching sessions, presentation of one to three new ideas at a time, and uncluttered large print visuals. This study showed three phases of nutritional education instructions that had been effective in changing healthy eating behaviors in the elderly. In the first phase, nutrition skills experiences, the elderly were shown how

to evaluate their dietary intake. During the second phase, cognitive nutritional instructions, the elderly were provided nutrition information based on their needs and interests, using a variety of teaching activities. In the final phase, affective nutrition instruction, the elderly set their own goals and developed a plan for making changes to improve their dietary intake. Encouraging expression of feelings about dietary change, and fostering peer support should be implemented. In addition, Higgins and Barkley (2004) recommended that brief handouts, newsletters, brochures, booklets, curricular lessons, board games, audiotapes, and videotapes were tangible nutrition educational resources used with the elderly.

Some studies evaluated effectiveness of health education materials in promoting healthy eating of the elderly. Taylor-Davis et al. (2000) evaluated the effect of theory-based nutrition newsletters on knowledge, attitude, and behavior change in the elderly. The study design was pretest-posttest, control group design with 2 experimental groups. One experimental group received newsletters only (n = 127), and another received newsletters with follow-up telephone interviews (n = 127). The control group did not receive both newsletters and telephone interviews (n = 132). Five nutrition newsletters were designed using "the Nutrition Communication Model and Adult Learning Theory Principles". The major sections of newsletters "Nutrition News" included self-assessment quizzes, a science corner, tips to try, "Nutrition" definition of terms, food label information, recipes, questions and answers, and nutrition and history trivia. After 2 weeks follow-up of intervention, the results showed that the elderly in the experimental group were significantly different from control group in correct and perceived nutrition knowledge at posttest, especially the elderly receiving newsletters plus follow-up telephone calls scored higher than those

who received the newsletters only ($p < 0.05$). Experimental groups also rated their interest in nutrition higher than the control group did; there were no significant differences between experimental groups. Experimental groups performed significantly better than the control group for dietary fiber food behavior ($p < 0.05$). And those receiving only newsletters scored significantly better than the control for the "avoid fat" food behavior ($p < 0.05$). Home-based nutrition newsletters based on this model could communicate better about health and nutrition information to older adults. This study suggested that interpersonal interaction, newsletter plus telephone interviews, and using multiple educational methods might improve cognitive, affective and behavior of nutrition. In addition, newsletters should be used for literate, or educated persons.

Daniels (2005) designed descriptive research study of the monthly nutrition education materials provided to participants in a home meal delivery program. The researcher wanted to determine whether the materials were being read, understood, used, and met the need of 90 homebound or frail elderly (over 60 years) who had limited or no help at home. Two conceptual frameworks, Making Health Communication Programs Work by the National Cancer Institute (2000) and the Social Marketing Theory, were used in this program providing guideline for health communication, community health program, and nutritional education. The subjects were provided a home meal delivery program using a telephone. A home meal delivery program was a service that delivered two nutritious meals a day to participants by caring volunteers. Nutritional education materials were information given to each participant via a newsletter on a monthly basis that covered a variety of topics about nutrition for the elderly. The results found that 75% of participants read

the materials, 38% rated the materials as excellent, and 60% rated the materials as good. This study suggested that the topics of special diets, vitamins/minerals, and general nutrition information should be included for the future topics. Maintaining adequate dietary intake, evaluating the long-term compliance of these nutrition educational materials, and the length of the recall period of the elderly should also be considered. Furthermore, monthly newsletters could offer an economical way of providing the necessary nutritional education to the elderly while they live at their own home.

Nutritional education materials including booklets, leaflets, informational handouts, and pamphlets are the most common instructional tools used by health professionals to promote health behavior change. Printed information targeting the elderly is important, since the elderly carry the greatest burden of chronic diseases (Viteri, 2006). Contents of written materials should be presented clearly and simply in large print, and engaged to multiple senses of older adults (Sharp et al., 1996; Viteri, 2006). Using bright and vibrant colors, interesting pictures, and short sentences and words should also be presented in those materials (Viteri, 2006). Advantages of using written materials include message consistency, flexibility of delivery, cost-effectiveness, portability, and permanence of information. For disadvantage, illiterate elderly may not understand the contents of written materials (Taylor-Davis et al., 2000; Viteri, 2006). Therefore, some studies suggested that multiple educational tools or methods should be added in nutritional education interventions such as telephone contacts (Taylor-Davis et al., 2000), individual counseling (Kumanyika et al., 1999; Nikolassy, 1995), providing classes (Viteri, 2006), board games, audiotapes, and videotapes (Higgins & Barkley, 2004).

Dietary guidelines and food guide pyramid. Robinson (1994) emphasized that the Daily Recommended Dietary Allowances, the Dietary Guidelines for Americans, and the Food Guide Pyramid are beneficial in nutritional education interventions for U.S. older people. Similarly, Boyle and Morris (2000) recommended that nutritional education for health promotion in U.S. older people should be generally based on the Dietary Guidelines and the Food Guide Pyramid for Americans that were important educational tools. These educational tools could help older people select diets that provided an appropriate amount of energy to maintain a healthy weight, met the recommended intakes for all nutrients. Furthermore, Viteri (2006) also recommended that topics in nutrition education interventions for the elderly should include the Dietary Guidelines and the Food Guide Pyramid for Americans, as well as Food Labels.

Choosing a varied and balanced diet is emphasized in current public health nutrition recommendations, such as the Dietary Guidelines for Americans and Food Guide Pyramid. In 1992, The U.S. Department of Agriculture (USDA) and the Department of Health and Human Services developed Seven Dietary Guidelines for promoting healthy eating of U.S. people. Seven guidelines consisted of (1) eating a variety of foods, (2) maintaining a healthy weight, (3) choosing a diet low in fat, especially saturated fat and cholesterol, (4) choosing a diet that contained plenty of vegetables, fruits, and grain products, (5) using sugar sparingly, (6) using salt and sodium in moderation, and (7) drinking alcoholic beverages in moderation (if they drink alcohol). In 1995, the USDA provided the accumulated evidence regarding diet and chronic diseases that led to the development of a number of recommendations and guidelines for promoting healthy eating. The recommendations emphasize on lowered

fat and cholesterol intake; increased fruits, vegetables, and complex carbohydrates; limited alcohol consumption for individuals who drink; limited salt intake; and maintenance of appropriate body weight (USDA, 1995).

In Canada, Health and Welfare Department (1992) developed Canada's Guidelines for promoting healthy eating among people. The guidelines encourage people to (1) enjoy a variety of foods, (2) emphasize cereals, breads, other grain products, vegetables, and fruits, (3) choose lower-fat dietary products, leaner meats, and foods prepared with little or no fat, (4) achieve and maintain a healthy body weight by enjoying regular physical activity and healthy eating, and (5) limit salt, alcohol, and caffeine.

Casper (1995) suggested the nutritional guideline for U.S. people to promote healthy eating that consisted of (1) eating a variety of foods, (2) eating fat not to exceed 15-30% of calories, (3) eating cholesterol intake 0-300 mg/day, (4) eating polyunsaturated fat 3-7%, (5) eating complex carbohydrates 50-70%, (6) eating protein 10-15%, (7) consuming alcohol no more than 5% (~ 2 drinks), (8) reducing or eliminate bad lifestyle habits, and (9) avoiding harmful alternative dietary supplements in excess of RDA, including mega-doses of vitamins. Robinson (1994) recommended nutritional guide to menu planning for older people including: plan to serve meals on a regular schedule; include a variety of foods; plan to serve smaller amounts of food more frequently; prepare and serve food attractively; increase fluid intake; season foods to stimulate taste buds; select complex carbohydrates; use meat substitutes such as dried beans and peanut; serve fresh fruits and vegetables; serve whole- grain or enriched breads and cereals; and use polyunsaturated oils.

The Food Guide Pyramid (USDA, 1995) was developed as a graphic representation of the Dietary Guidelines to help people implement the guidelines by making appropriate food choices. The Pyramid emphasizes food from five major food groups and suggested serving sizes for the food groups including: fats, oils, and sweets, use sparingly; milk, yogurt, and cheese group (2 to 3 servings); meat, poultry, fish, dry beans, eggs, and nut group (2 to 3 servings); vegetable group (3 to 5 servings); fruit group (2 to 4 servings); and bread, cereal, rice, and pasta group (6 to 11 servings).

In Thailand, the Nutrition Division, Ministry of Public Health developed the Nutritional Guideline for Thai people (2005) that consisted of (1) eating five groups in each meal that each group should eat a variety of foods and maintain healthy body weight, (2) eating rice as main meal or interchange with eating carbohydrate products in some meals, (3) eating high fibers (vegetables and fruits), (4) eating fish, eggs, leaner meats, and nuts, (5) drinking low-fat milk, (6) eating low-fat food, (7) avoiding sweet or salty food, (8) avoiding contaminated food, and (9) avoiding or reducing alcohol consumption.

The daily recommended dietary allowances (RDAs). The RDAs are defined as the level of intake of essential nutrients that the Food and Nutrition Board of the National Research Council (1989b) judges to be adequate, based on scientific knowledge, to meet the known nutrients needs of virtually all healthy people in U.S. Specifically, RDAs are set for protein, the vitamins A, C, D, E, K, thiamin, ribloflavin, niacin, B6, B12, and folate; the minerals calcium, phophorus, and magnesium; and the trace minerals iron, zinc, iodine, and selenium. However, data of the RDAs for older people are insufficient at this time because the diversity of older

adult population and their specific health problems that should be considered. The RDAs are expressed in nutrients rather than in specific foods (Hogstel et al., 1994; Lueckenotte, 1996).

Food labels. To be of most use to consumers, food labels must be easy to read and understand and be consistent with recent dietary recommendations, such as the Dietary Guidelines. Labels should contain information that is important for consumers to have, such as useful and accurate facts about serving size and calories. Labels should carry information on food components, such as calcium and iron that have a protective effect on health and need to be encouraged in many people's diets. Labels should also disclose information on food components, such as sodium, total and saturated fats, and cholesterol, that many people need to consume more moderately (Spark, 1998).

Nutritional Counseling

Counseling is a method of providing help and guidance that has become a major force in nursing (Quinn, 1988). Counseling was helping people to help themselves. It gave client the opportunity to explore, discover and clarify ways of living more resourcefully and toward greater well-being. Simon-Morton et al. (1995) mentioned counseling as a process of helping people learn how to achieve personal growth, improve interpersonal relationships, resolve problems, make decisions, and change behavior. WHO (2004) defined counseling as an interaction offering an opportunity for a person to explore, discover and clarify ways of living with greater well-being, usually in a one-to-one discussion with a trained counselor.

Nutritional counseling has been defined as the process of guiding a client toward a healthy nutrition lifestyle by meeting normal nutrition needs and solving problems that are barriers to change (Curry & Jaffe, 1998). Haney and Leibsohn (1999) provided three specific goals in nutritional counseling. The first goal was to facilitate lifestyle awareness that could be achieved by keeping the focus on clients including acknowledge feelings, experiences and behaviors, and providing information. The second goal was to increase healthy lifestyle decision making using exploring feelings, ambivalence, inner strengths, behaviors, and alternative options. And the third goal, nutritional counseling could help the clients take appropriate actions to obtain their healthier lifestyle.

For nutritional counselors, they needed a fundamental knowledge of basic counseling responses including three objectives; to develop productive relationships, to enhance listening and exploring to understanding clients' messages (needs and concerns), to provide the tools to utilize motivational strategies covered throughout this text. The basic counseling skills consist of attending (listening), advice, affirmation, personal support, reflection (empathizing), mirroring, respect, giving feedback, questioning, clarifying, and self-referent (Bauer & Sokolik, 2002).

Counseling was individual-based interventions that could effectively promote healthy eating (Mckinlay, 1995). An integrated review of Pignone et al. (2003) reported the effectiveness of interventions to promote a healthy diet among clients in primary care settings focusing on counseling interventions. They identified 21 randomized controlled trials for use in this review. Data synthesis of this study showed that dietary counseling provided modest changes in self-reported consumption of saturated fat, fruits and vegetables, and possibly dietary fiber. More-

intensive interventions were more likely to produce important changes than brief interventions. This study concluded that moderate- or high-intensity counseling interventions, including use of interactive health communication tools, can reduce consumption of saturated fat and increase intake of fruit and vegetable.

For the elderly, Sahyoun et al. (2004) mentioned that nutritional counseling could help older people understand the nutritional information and apply it to individual situations. Furthermore, counseling should include the provision of family and caregiver support, assistance in coping with and adjusting to the normal consequences of aging, assistance with the grieving process and coping with loss, and improvement of interpersonal communication between family members (Lashley, 1995).

Motivating

Health behavior is motivated by stimuli in individuals to achieve in adopting and developing health behavior such as healthy eating behavior (Egger et al., 1999). Motivation is an educational strategy for enhancing dietary changes to achieve in healthy eating. Motivating perceived benefit of healthy eating, perceived barriers to healthy eating, perceived self-efficacy, and social support from family members in individuals can effectively make specific dietary changes (Sherman et al., 2000).

Encouraging perceived benefits of healthy eating. Perceived benefits of healthy eating are proposed as directly motivating behavior. Perceived benefits of healthy eating are one's belief in the efficacy of the advised action to reduce risk or seriousness of impact to healthy eating behavior. If the elderly have a high level of perceived benefits of healthy eating, they will perform appropriate eating behavior

regularly. On the contrary, if they have low level of perceived benefits of healthy eating, they will not regularly perform appropriate eating behavior (Pender et al., 2002). Some studies reported that perceived benefits of nutritional behavior could effectively improve healthy eating in older persons (Athikamanon, 1998; Srisaad, 1997). In addition, Sherman et al. (2000) mentioned that important activities of health education interventions included encouraging the elderly to identify and clarifying the benefits of healthy eating, and to strengthen and reinforce them for selecting the actions with the highest probability of success.

Reducing perceived barriers to healthy eating. Perceived barriers to healthy eating have been identified as cognitive perceptual factors regarding things, events, and activities that inhibit the conduct of health promoting behaviors. Perceived barriers to healthy eating consist of perceptions concerning the unavailability, inconvenience, expense, difficulty, or time-consuming nature of a particular action relating to food selection, preparation and consumption. Barriers are often viewed as the blocks, hurdles, and personal costs of undertaking as a given behavior. If readiness to behave is low and barriers are high, appropriate eating behavior is unlikely to happen. On the contrary, if readiness to behave is high and barriers are low, the probability of appropriate eating behavior is much greater (Pender et al., 2002).

Eikenberry and Smith (2004) mentioned that the most frequently cited barriers to healthy eating of the elderly were time, taste, and financial considerations. Economic considerations may serve as barriers to meeting dietary recommendations. Therefore, the intervention focused on quick and easy healthful, less-expensive food preparation or selection might help overcome the most common barriers to healthy

eating. The studies recommended the effectiveness of health education intervention focused on decreasing perceived barriers to nutritional behavior that could effectively promote healthy eating in the elderly (Athikamanon, 1998; Wongpeng, 2004). A study mentioned that activities including identifying and reducing perceived barriers through reassurance, correction of misinformation, incentives, and assistance should be motivated in the health behavior interventions (Janz, Champion, & Strecher, 2002). In addition, the individuals should be encouraged to search and deal with their barriers to healthy eating for problem solving (Sherman et al., 2000).

Enhancing perceived self-efficacy. Perceived self-efficacy is defined as perceived ability to perform the necessary behaviors to achieve an outcome. It is a judgment of one's abilities to accomplish a certain level of performance. Perceived self-efficacy is a strong determinant and predictor of the level of accomplishment that individuals finally attain. The elderly with high level of perceived self-efficacy will continue conducting appropriate eating behavior, despite barriers. They usually perceive a problem as a challenge rather than avoiding it (Pender et al., 2002). Perceived self-efficacy can be enhanced by providing four major sources namely being; mastery experience, vicarious experience, verbal persuasion, and physiological feedback (Bandura, 1997).

Mastery experience or performance experience is the most powerful input of self-efficacy. The term of mastery experience refers to learning through personal experience where one achieves mastery over a difficult or previously feared task and thereby enjoys an increase in self-efficacy (Bandura, 1997). The activities include encouraging realistic goal settings, demonstration, skill training, and guiding for positive performance in real situation (Glanz et al., 2002; Pender et al., 2002).

Vicarious experience refers to learning that occurs through observation of events or behaviors of others. These events or people are referred to as models (Bandura, 1997). Modeling is especially helpful when clients are aware of their specific health goals but are uncertain about the exact behaviors that should be developed to move toward the goal (Glanz et al., 2002). Verbal persuasion is convinced by others of personal capacities. The clients should be provided verbal reinforcements throughout the interventions to motivate behavior changes (Glanz et al., 2002; Pender et al., 2002). Physiological feedback is negative arousal such as anxiety, fatigue, pain, or positive arousal such as pleasure or happiness. Positive feedback on healthy eating should be facilitated to client's performances appropriately (Glanz et al., 2002; Pender et al., 2002).

For the elderly, several studies showed that perceived self-efficacy is the most important factor of promoting healthy eating in older people. They recommended the effectiveness of health education programs enhancing perceived self-efficacy in the interventions that could effectively improve healthy eating habits (Athikamanon, 1998; Chaisongkarm, 2002; Churthong, 2001; Miller, Edwards, Klissling, & Sanville, 2002; Purinthrapibal, 1998; Sakulrang, 2001; Srisaad, 1997; Viteri, 2006).

Encouraging social support from family members. Social support is defined as a network of interpersonal relationships that provide companionship, assistance, and emotional nourishment (Newcomb & Bentler, 1986). Social support is aid and assistance exchanged through social relationships and interpersonal transactions. It is an interpersonal transaction involving emotional concern (expressions of caring, encouragement, empathy), aid (services, money, or

information), and affirmation (constructive feedback, acknowledgement). Four types of social support consist of emotional, instrumental, informational and appraisal supports (House, 1981). The types that are beneficial at any given time may differ depending on the nature and stage of the confronting situation. Emotional support may help in a crisis circumstance involving the provision of empathy, love, trust, and caring, whereas information support may be more useful in assisting individuals to understand how to relate effectively with their peers. Informational support involves the provision of advice, suggestions, and information that individuals can use to address their problems. Instrumental support provides help with specific tasks involving the provision of tangible aid and services that directly assist the needy elderly. Appraisal supports or affirmation helps individuals to realize their own strengths and potentials involving the provision of information or affirmation, or acknowledgement that is useful for self-evaluation purposes (House, 1981; Pender et al., 2002).

Social support can be enhanced through friends, neighborhoods, peers, and family members. Family is a natural support system that constitutes the primary support group. Family, in order to provide appropriate support, must be sensitive to the needs of their members to establish effective communication, respect the unique needs of members, and establish expectations of mutual help and assistance. Social Support from family members by enhancing strategies have three goals: assisting individuals and families to strengthen existing supportive relationships, helping individuals and families to establish satisfying interpersonal ties, and preventing disruption of ties from evolving into mental or physical illness (Pender et al., 2002).

For the elderly, family members are the most common promoters of healthy eating habits. Promoting eating together with family members may be a method of increasing healthy eating (Eikenberry & Smith, 2004). Individuals with high levels of support from their family members are more likely to attain their dietary goals than those with weak levels of family support (McCann & Bovbjerg, 1998). The roles of the family members influence changing of eating behaviors of the elderly and can assist the elderly to achieve healthy eating (Pender et al., 2002). Several studies showed that social support from family members were the relating factors to improve healthy eating behaviors of the elderly (Churthong, 2001; Haber, 1996; Intarapanich, 1994; Panprom, 2002; Sherman et al., 2000; Wellman, 2004). Enhancing social support from family members to promote healthy eating of their elderly was an effective educational strategy of health education interventions. The interventions using social support from family members could encourage adoption and maintenance of specific dietary changes to achieve in healthy eating (Carpenter, Finley & Barlow, 2004; Churthong, 2001; Haber, 1996; Sherman et al., 2000; Wellman, 2004).

Programs for Promoting Healthy Eating among the Elderly

From literature reviews, the researcher found a number of studies that developed programs or interventions to promote healthy eating of the elderly in Thailand and other countries. Most programs or interventions were addressed at home and community settings, as following:

Programs to Promote Healthy Eating of the Elderly in Community Settings

There were some studies for developing health education programs based on different theories or models including Transtheoretical Model, Theory of Planned Behavior, and Health Belief Model.

Program based on Transtheoretical Model. Two studies developed nutrition education interventions to promote increased fruit and vegetable consumption among the elderly. Marcus et al. (2001) conducted a randomized trial of a brief proactive educational intervention based on Transtheoretical Model to promote increased fruit and vegetable consumption among callers to the National Cancer Institute's Cancer Information Service (CIS). The CIS callers assigned to intervention group (n = 861) and control group (n = 856), approximately 44% of participants aged 50 years and over. Both groups were interviewed by telephone for baseline assessment. A brief telephone counseling intervention combined with two mailed educational packets, were implemented for intervention group. A short list of concrete behavioral suggestions for increasing fruits and vegetables consumption was provided by telephone counseling. Educational package advised eating at least five servings of fruits and vegetables per day. The first mailing included: (1) a booklet, suggestion, worksheets, and recipes to help increase fruit and vegetable consumption, (2) a brochure advised eating more fruits and vegetables, (3) a bookmark/tip card, advised to eat more salads, and (4) a magnet, logo of eating more fruits and vegetables. The second mailing (14 days later) included; (1) a recipe book, advised to taste for all seasons, (2) two brochures, advised time to eat and take at least five servings of fruits and vegetables a day, and (3) a magnet and pencil, logo of eating more fruits and

vegetables. After intervention, follow-up assessments of both groups were performed by telephone interviewing at four week, four month and 12 month. The results found that the brief educational intervention was associated with higher levels of self-reported, 24-hrs recall of fruit and vegetable intake at both short- and long-term follow up. However, the intervention was targeted in a population that was mainly female and of high socioeconomic status, which undoubtedly limits the generalization of these findings.

Another study of Long et al. (2003) used a quasi-experimental and nonequivalent control-group design to examine the influence of nutrition education on eating behaviors of the elderly who resided in non-metropolitan or semi-rural geographic areas in Ohio, U.S. The intervention was applied from Transtheoretical Model. Purposive sample of the elderly attending congregate meals participated in this study, with treatment group (n=50, 70% women) receiving four lessons on fruits and vegetables over four weeks that included the Healthy Eating for Life Program (HELP), while control group (n=51, 67% women,) did not receive it. The HELP lessons specifically addressed nutritional needs of the elderly. The connection between good health and healthful eating habits was emphasized. The treatment group was taught a series of four nutrition lessons in classes namely suggested number and sizes of serving; vegetables and fruits as source of various nutrients and few calories; linked between eating vegetables and fruits and decreased risk for some diseases; cost-effective purchasing, storage, and preparation of vegetables and fruits; and vegetables and fruits with less fat, salt, and sugar. Pre- and post-test results showed that after 4 weeks, the treatment group's consumption of vegetables changed significantly, a positive movement from a lower stage of change (e.g., from

precontemplation, which was 30 % at pre-test and 12 % at post-test) to a higher category at post-test behaviors (e.g., taking action to change, or maintaining, their fruit- and vegetable-eating. This study suggested that HELP might promote positive changes in eating behaviors of non-metropolitan participants of congregate meals. Furthermore, nutrition education should be based on the elderly's needs, behaviors, motivation, and desires. Nutrition information could promote healthful nutrition-related behaviors. However, the generalization of findings was limited because participants were not randomly selected. In addition, measurable behavior changes might have been limited because of the short time of intervention.

Program based on Theory of Planed Behaviors. Kelley and Abraham (2004) evaluated the effectiveness of a booklet promoting healthy eating and increased physical activity in a theory-based intervention among older people aged 65 years and over, attending hospital outpatient clinics at a medium size urban hospital. The Theory of Planned Behavior was used for guiding the intervention. One hundred participants were randomly assigned to the intervention group, and 101 to the control group who completed pre- and post-intervention. Intervention group received healthy living booklet, while control group received a patient satisfaction questionnaire and no booklet. The booklet was designed to target intentions and perceived behavioral control in relation to healthy eating and increasing activity levels as well as encouraging action by prompting goal setting. After two weeks follow-up of the intervention, the results indicated that the healthy living booklet successfully increased perceived behavioral control and intentions in relation to healthy eating and physical activity. The booklet also promoted goal setting in relation to healthy eating but was less successful in prompting goal setting in relation to increased physical

activity. Intervention participants appreciated the booklet and 95% acceptance of the invitation to participate in the study. The researchers suggested that health education materials (such as the booklet) could provide an engaging and potentially promote healthy eating for the elderly. In addition, enhancing self-efficacy and goal commitment in relation to healthy eating were beneficial outcomes of the nutritional interventions.

Program based on Health Belief Model. A study of Klinedinst (2005) developed a community-based nutrition education program based on Health Belief Model. This study evaluated the Eat and Learn Nutrition Program in low-income elderly who lived in urban high-rise apartment buildings (n = 25). The objective of this program was to increase knowledge of nutrition and promote healthy eating in this group. A series of three program topics included (1) hidden salt, (2) reducing dietary intake of fat and cholesterol, and (3) reducing dietary sugar intake, based on the identified knowledge, behavior, nutrition, and needs of the residents. This educational program focused on the benefits and addressed barriers to healthy eating to reduce their risk of CVD. This program was a collaborative effort among a graduate nursing student, community college faculty, nursing students, a part-time public health nurse, the building management, and the program participants for planning, implementation, and evaluation. The results revealed that participants were able to increase their nutrition knowledge by learning one major point per session. In addition, participants discussed alternative methods for healthy eating and shared culturally diverse nutritious recipes with each other. Collaboration between nurses and nursing students from a variety of educational backgrounds may enhance learning and program success. The study concluded that this program was successful in a

number of ways and feasible for all phases of developing a community program among nursing students and faculty, nurses, building management, and the elderly. Social support, social interaction, and stimulating participation of participants were also beneficial in a nutritional program.

Furthermore, several studies developed health promotion or health educational programs to promote healthy eating in the elderly that was not based on theories or models. Mayeda and Anderson (1993) conducted a nutrition educational program, "Healthy Heart Program", to improve dietary behaviors in reducing risk factors for heart diseases of free-living elderly who participated in a congregated-meal site at Colorado, U.S. The study was of a quasi-experimental design. The intervention group (n = 18) received the self-paced program, and the control group (n = 11) did not receive this program. The 14 week self-paced intervention included reading the self - care material, keeping food records, diet analysis and feedback, and setting own dietary goals and determining what changes they wished to make. In addition, this program included a refrigerator magnet card with reminders and wrote target three month goals for cholesterol level.

The results found that the treatment group did not significantly improve their dietary behaviors than the control group. The researchers suggested that lack of difference between groups might be due to high drop out rate (34.09%) and small sample size. The control group practiced more healthy heart habits that might be related to being observed in this study, and other community nutrition programs held during the study period. Therefore, future studies should increase sample size, expand and investigate the long-term impact of a nutrition intervention on the dietary behaviors of the elderly. Repeated measurements would need to be done again at six

months follow-up. However, this study recommended that self-paced intervention were cost-effective nutrition educational tools for the elderly that could raise their awareness of making diet changes. In addition, brief dietary counseling should be added in this program for helping the elderly better understand their dietary status and potential areas for improvement.

Sharp et al. (1996) developed a nutrition education program aiming to improve nutrition knowledge, attitude and behaviors for low-income elderly who were healthy, primarily the African American women. The study was quasi-experimental design. Fifty three intervention and 39 comparison subjects were selected from seven congregated meal sites at Central South Carolina, U.S. The researchers constructed six educational sessions using principles of adult learning. The sessions included participatory learning and engaged multiple senses (visual learning, tactile learning, taste and smell, auditory learning). The six educational sessions were conducted within three months including; (1) the Food Pyramid Guide for a healthy diet, (2) fats, saturated fats and cholesterol, (3) sugar and salt, (4) fruits and vegetables (five-a-day recommendation), (5) nutrition and disease, and (6) food shopping, safety, and storage. Written materials were presented in large print, and simple, straightforward recommendations were emphasized. Charts (e.g., USDA food pyramid guide), recipes, demonstrations and food labels engaged visual learning. Choosing food models and food products from food groups to create a meal engaged tactile learning. Food sampling employed taste and smell; and the instructor's oral presentation, question-and-answer time, and group discussion involved auditory learning. After two months of the intervention, this program was successful in improving knowledge and increasing food frequency behavior, especially fruit

consumption behavior in the intervention group. No differences were found between the groups on attitudes, because of low level of attendance and control over food choices. The researchers recommended that family members or neighbors who bought foods might play a central role to dietary behavior changes in the elderly. And nutrition education should be considered as one component of a comprehensive approach to healthful nutrition for the elderly and involved strategies to create an environment on healthy food choices in addition to providing the elderly with knowledge and skills.

Kumanyika et al. (1999) developed a Cardiovascular Nutrition Counseling Program for African-Americans who aged 40 to 70 years with high blood pressure or cholesterol level residing in Washington, D.C., U.S. The study was a randomized design. Participants were randomly assigned to the self-help group (n = 163) and full-instruction group (n = 167). Each group received nutritional counseling and clinical monitoring every 4 months. Nutritional counseling based on a set of nutrition education materials named, "Cardiovascular Dietary Education System (CARDES)", aimed to facilitate reductions in the intake of dietary fat, cholesterol and sodium. CARDES materials including food-picture cards, a nutritional guide (self-help and full-instruction group), a video and audiotape series and 4 classes (full-instructions group only) were designed for introduction during an office visit, then for self-directed, self-paced learning within the context of the person's social network, home environment, and daily routine. A nutritionist helped the persons follow the physician's advice through periodic, brief counseling sessions. This study showed that the effectiveness of the program in improving lipid levels and blood pressure for both groups showed positive effects after 12 months follow-up of the intervention. An

approach consisting of periodic, brief client-centered nutritional counseling, supplemented with CARDES materials and monitoring of outcomes, was effective in this population. However, this study had limitations including lacking of no-treatment control group, and short duration of intervention. Therefore, the future studies should have control group, and evaluate long-term outcome for considering the maintenance of dietary behaviors change.

Barr et al. (2000) conducted two randomized control trials aiming to increase consumption of milk (skimmed or 1% milk), without other dietary advice. This intervention was evaluated for the impact of increased consumption of milk (skimmed or 1% milk), without other dietary advice, on elderly's energy and nutrient intakes, weight, cardiovascular risk factors (blood pressure, plasma lipid levels), and quality of life in healthy elderly. The healthy elderly aged 55 to 85 yrs, who consumed fewer than 1.5 dairy servings per day were chosen from six U.S. academic health centers (intervention group = 101, control group = 103). The intervention group received advices to increase skimmed or 1% milk intake by three cups per day, or to maintain usual diet (control group) for 12 weeks after four weeks baseline period. The results found that the intervention group significantly increased energy and nutrient intakes (protein, vitamins A, D, and B-12, riboflavin, pantothenate, calcium, phosphorus, magnesium, zinc, and potassium intakes). This study suggested that collaboration between health service providers and the elderly was the effective strategy of the intervention.

A study of Gorman (2001) used quasi-experimental research to develop a nutritional education intervention by focusing on reduction of intake of dietary fat, saturated fat and cholesterol. This study determined the effectiveness of a one day

education seminar, titled "Cut-the-Fat", on dietary practice change among middle-aged (n = 5) and elderly women (n = 9) at Texas, U.S. Topics covered in this seminar consisted of Good and bad fat, Cholesterol, Why cut back?, Tips for cutting back, Eating out, Label reading, How to change recipes?, and Exercise. Data collection was done before and after 4- month follow- up of the seminar. The results reported those four months following the seminar, participants increased use of practices for reducing intake of fat, saturated fat and cholesterol. This study recommended that collaboration between health service providers and the elderly was the effective strategy of programs or interventions. However, the researcher mentioned about the limitations of this study. Small sample size and no control group might influence the interpretation of the results that should be considered in future studies.

McCamey et al. (2003) constructed a nutrition education curriculum and physical activity intervention program (leg exercise) to enhance the elderly's knowledge about nutrition and fitness, and to improve their behaviors related to diet, physical activity, overall health, and well-being by targeting 501 healthy elderly who participated in a congregated-meal site at Georgia, U.S. The study was quasi-experimental design. The researchers provided a nutrition education intervention focused on correcting risk factors for poor nutrition in the elderly, and facilitating the voluntary adoption of eating behaviors that promoted health and well-being for the elderly. This study did not describe the duration of the conducted intervention and evaluation before and after the intervention. The results showed positive changes in knowledge related to nutrition and physical activity. The elderly increased their knowledge about types of fat, the need to decrease dietary fat intake, and the need to increase fruit and vegetable consumptions. They increased behaviors for reducing

dietary fat or cholesterol. They significantly changed from frying to broiling and baking to cook meat, chicken, or fish ($p < 0.05$). They also improved physical activity, and decreased the possible barriers to physical activity. The researchers suggested that brief dietary counseling could help the elderly better understand their dietary status and potential areas for improvement. Moreover, self-report was difficult to assess in the elderly related to many factors including low literacy, low educational level, low socioeconomics status, and age-related declines in sensory function, memory and cognitive functioning.

Patterson, et al. (2003) conducted two randomized control trials aiming to evaluate changes in food sources of dietary fat made by participants in the Women's Health Initiative (WHI) Low - Fat Dietary Modification Trial at baseline, one year and two years follow-up after randomization. Post-menopausal women aged 50 to 79 years were randomly selected from 40 clinical centers across the U.S. to intervention group (n = 5,004), and control group (n = 7,426). The intervention group participated in a structured set of group sessions for learning and practicing dietary and behavioral change skills. The sessions delivered within 12 months including the intensive phase and quarterly maintenance sessions. Self-monitoring was conducted throughout the intervention. In the intervention, participant was given an individualized goal (grams of fat per day) and taught to self-monitor intake. The participants could select a dietary pattern by themselves that met their goals. The two keys of nutrition principles in the Dietary Modification Trial included development of new eating patterns and dietary change skills. The intervention was supported by psychosocial and behavioral themes including reinforcements and motivation, self-management, behavioral skills training, self-control or self-reliance, social support, and relapse prevention. The

results showed that major sources of fat at baseline were added fats (butter, oils and salad dressings), meats, and desserts. From baseline to the first year, the intervention group could reduce fat intake (24.3 g/day) when compared with the control group. This study suggested that reinforcement and motivation, self-management, behavioral skill training, self-control or self-reliance, and relapse prevention were useful psychological and behavioral themes for dietary changes in the elderly. In future studies, other themes should be considered, such as social support and social interactions.

Mitchell et al. (2004) constructed the Lifestyle Change Program to examine the effect of health promotion intervention for promoting eating habits, activity level, health status, and stress management by using health education strategy among 26 senior citizens and 4 caregivers in the metropolitan Washington, D.C. area. The program was conducted at a common room of an assisted-living apartment building for four weeks (twice a week for two hours per session). This program consisted of three activities; (1) teaching how to maintain their health by health care providers' presentation, (2) educating participants about good food choices by nutrition educators' food preparation demonstrations, and (3) encouraging participation in physical exercise in the ambulatory elderly and caregivers. Health educational materials were recipes, real foods for demonstration, and exercise techniques. Health assessment included anthropometric measurements (body weight and height), body fat analysis, blood pressure and blood glucose screenings were completed at the beginning and end of the program. This study reported that participants showed reductions in body weight and improvement in body mass index, percent of fat, blood pressure, and blood glucose levels. Some participants lowered their dietary intakes of

fat, sodium and sugar while increasing consumption of fruits, vegetables and whole grains. The majority of participants felt that the health education sessions helped them understand the effects of disease and served as the main contributing factor for making lifestyle changes. From the findings, the researchers suggested that the elderly and caregivers participating in the programs should be trained as peer health educators.

From literatures reviews in Thailand, there were many studies that examined the effectiveness of programs relating to promoting positive health behaviors such as exercise, stress management, accidents prevention, and food consumption behaviors (or nutritional behaviors) among Thai elderly. Promoting healthy food consumption behaviors was always a part of the whole programs. All programs were addressed for the elderly in community settings. These programs were developed by applying some theories/concepts such as Self-efficacy Theory, Pender's Health Promotion Model, Health Belief Model, Motivation Theory, Health Model, and Social Support to guide their interventions for promoting positive health behaviors including healthy food consumption behaviors. Several evidences indicated that health education programs were effective for promoting positive health behaviors among Thai elderly including healthy food consumption behaviors.

Program based on Self-efficacy Theory. There were four studies conducted for developing health education programs based on Self-efficacy Theory. The strong evidences supported the positive effect of health education programs based on Self-efficacy Theory on the elderly's food consumption behavior. All studies used quasi-experimental, two group pretest-posttest designs and were conducted with community elderly in the central region.

Purinthrapibal (1998) determined the effectiveness of a health education program on nutritional behavior among elderly attending elderly club of Pathumthani Province. Thirty-six elderly were randomly assigned as the experimental group and thirty-two as the comparison group. Only the experimental group participated in the program. The 10-week intervention of a program included various activities for promoting knowledge, self-efficacy perception, outcome expectation, and motivation. The activities consisted of group discussions, food menu planning and analyzing, demonstration about cooking for health, providing nutritional handbook, playing card game, weekly food consumption recording, training self-control about food consumption behavior, weekly weighing, exchanging experience and feelings with model person, and verbal persuasions. After the end of intervention, the results found that this program significantly improved the elderly's nutritional behavior. The proportion of subjects who decreased body mass index in the experimental group was significantly greater than the proportion in the comparison group. This study suggested that elderly's family members influenced to food selection and preparation for the elderly that could encourage them to improve the nutritional behaviors.

Neelapaichit (2001) studied the effectiveness of a health promotion program in improving exercise and healthy food consumption behaviors in Thai Muslim elderly. Forty-two and forty-five elderly from Nongjok District, Bangkok municipality were assigned to the experimental and comparison groups. The experimental group received a program, while the comparison group did not receive it. The program consisted of 12 weeks intervention and follow up after 4 weeks. This intervention included various activities for promotion of knowledge, self-efficacy, outcome expectation, and having appropriate exercise and food consumption

behaviors. The activities consisted of (1) lecture and video presentation, (2) group discussions for behavior analysis, exchanging opinion about advantages and disadvantages and obstacles in practice, and giving advice to one another in problem solving, (3) model menu presentation, (4) demonstration and training exercise, (5) monthly testing of physical fitness, (6) exchanging experiences and feeling with healthy person as a model, (7) providing the elderly guidebooks, brochures and posters, (8) self-evaluation, (9) verbal persuasions, (10) healthy elderly contest, and (11) home visits. After 4 weeks of implementing the program, the results showed that this program could significantly improve knowledge, self-efficacy, outcome expectations, and exercise and healthy food consumption behaviors. In addition, the program could also significantly improve body mass index, mean arterial pressure, total cholesterol, and physical status. The researcher suggested that future research should be on family support such as from adult children or persons who were cooking for the elderly. Family support might affect behavior of control and sustainability in their healthy food consumption.

Sakulrang (2001) examined the effectiveness of a health education program in promoting exercise and food consumption behaviors among the elderly attending elderly club, the Department of Medical Service of Bangkok Metropolitan Administration. Ninety elderly aged 60-74 years were purposively selected based on inclusion criteria and divided into the experimental and the comparison groups in equal number. Interview techniques with structured schedules, and physical examinations were used for data collection before and after a period of 12-week intervention in both groups. The intervention aimed to promote knowledge, self-efficacy perception, outcome expectation, and having appropriate exercise practice

and healthy food consumption behaviors. The interventions included; (1) group discussion to analyze the behaviors of participants, sharing opinion relating to problems or obstacles, (2) food menu planning, (3) exchanging experiences and feelings with healthy person as a model, (4) exercise training, and (5) feedback for physical fitness test. The results showed that the program could significantly increase positively about participants' knowledge, perceived self-efficacy, and appropriate exercise and food consumption behaviors. The levels of cholesterol, triglyceride, fasting blood sugar and mean arterial pressure of the experimental group were also significantly improved after participating in health education activities. The researcher suggested that future study should be extended to 6 months or longer to facilitate the follow-up study of the elderly's sustainable behavioral modification.

Chaisongkarm (2002) studied the effects of a health promotion program on food consumption, exercise and stress management behaviors among the elderly who were members of the elderly clubs at Amphoe Mueang, Nonthaburi Province. One hundred elderly were randomly assigned to experimental and comparison groups in equal number. This program was provided for only the experimental group. The intervention was emphasized on promoting knowledge, self-efficacy perception, outcome expectations, and having appropriate exercise practice, stress management and food consumption behaviors. The 12-week intervention consisted of group discussions, model and video presentations, demonstrations and skill training to improve practice regarding food consumption, exercise and stress management. The 10 activities were conducted for each group (10 persons / group) once a week, and each activity took two hours. The results showed that after the intervention, the program could significantly improve knowledge, self efficacy, outcome expectations,

and appropriate exercise, stress management and food consumption behaviors. This study suggested that family members or persons who were cooking for the elderly should participate for health promotion programs in the future study.

Program based on Self-efficacy Theory and Social Support. A study of Churthong (2001) aimed to study the effectiveness of a health education program based on Self-efficacy Theory and Social Support to improve exercise and healthy food consumption behaviors in the elderly at Amphoe Thamuang, Kanchanaburi Province. Forty-two subjects and forty-four subjects were assigned to the experimental group and the comparison group, respectively. Interviews and physical fitness tests were administered before and after the experiment and data were recorded. The 12- week intervention was conducted to only the experimental group by applying Self-efficacy Theory together with Social Support for promoting knowledge, self-efficacy perception, outcome expectation, and having appropriate exercise practice and healthy food consumption behaviors. The activities consisted of; (1) slide and video presentations, (2) providing guidelines, (3) group discussions for analyzing behaviors, presenting the opinion relating to problems or obstacles, (4) brain storming in problems resolutions, (5) food menu plan, (6) exchanging experiences and feelings with healthy person as a model, (7) recording weekly food consumption behaviors, (8) monthly testing physical fitness, (9) verbal persuasion, (10) healthy elderly contest, (11) exercise training, and (12) home visits, advisory service, and encouraging family members or friends to support the activities.

The results showed that the program was effective in increasing knowledge, perceived self-efficacy, perceived outcome expectations, exercise and healthy food consumption behaviors, as same as the four studies based on Self-efficacy Theory.

Moreover, this program could improve some physical fitness indicators, such as resting heart rate, systolic and diastolic blood pressure of the elderly. The researcher suggested that the time for future studies should be longer. Social support from family members played an important role to reinforce the intention to practice for the elderly. In addition, home visits by the researcher are useful for observing food consumption behaviors, providing advice, and encouraging the elderly to have self-efficacy.

Program based on Pender's Health Promotion Model. A study of Athikamanon (1998) evaluated the effectiveness of a health education program applied on the Pender's Health Promotion Model for promoting the positive health behaviors such as exercise, food consumption, stress management, accident prevention and sexual behaviors among the rural elderly at Ayuthaya Province in the central region. The quasi-experimental, two groups, pretest-posttest design was used in this study. The experimental group of 36 subjects attended the health education program, while the comparison group of 40 subjects did not attend it. Both groups were interviewed with structured schedule three times, before the experiment, at 6-week and at 11- week of the experiment. The five weeks intervention of this program consisted of providing information about health behaviors regulation, viewing video tapes and attending group discussions about health promotion behaviors, demonstration and training on selective health behaviors, and home visits. Health education materials of this program were health promotion behaviors curriculum, health promotion behaviors record, video, and guidebooks for the elderly. Results indicated that after intervention the experimental group had statistically higher level of mean scores on perceived benefits, perceived barriers, perceived self-efficacy and health promotional behavior than before interventions and than the comparison group

($p < .05$). The selective health behaviors concerning exercise, food consumption and accidents prevention behaviors of the experimental group had statistically higher level of mean scores than before the experiment and than the comparison group ($p < .05$). In addition, it was found that perceived benefits, perceived barriers and perceived self-efficacy were significantly related to health behaviors concerning food consumption behaviors.

Program based on Social Mobilization Process Addressing Empowerment and Community Participation. Sornngai (1999) constructed the program for modifying health-promoting behavior of the elderly attending the elderly club of rural community targeted on both the elderly and stakeholders (health centre staff at district and sub-district level, religious leaders, and community leaders) at Phitsanulok Province in the North region. The program was developed through social mobilization process addressing empowerment and community participation. The quasi-experimental, two groups, pretest-posttest design was conducted for testing the effectiveness of social mobilization process aiming to modifying health-promoting behaviors of the elderly. This study used two areas as experimental and control groups. The experimental group was the elderly ($n = 113$) attending the elderly club of Bang Kratum District and stakeholders ($n = 41$). The control group was the elderly ($n = 108$) attending the elderly club of Ban Wang Thong District. Moreover, the approach of participatory research was also applied in this study. The study was divided into 3 phases: (1) situational analysis concerning health promotion of the elderly; (2) intervention programs of social mobilization; (3) and evaluation. At the phase of situational analysis, focus group discussions, formal interviews, and clinical blood examinations were conducted to obtain base-line information that was used for

designing the program of social mobilization for experimental group. This phase took three months to complete. At the 2nd phase, empowerment programs were implemented in experimental group. Empowerment program for the elderly focused on raising the awareness, building positive attitudes toward health promotion and enhancing the skills of the elderly regarding nutrition, exercise, stress management, accidents prevention and health seeking behaviors. Empowerment program for the stakeholders focused on raising consciousness regarding health promotion of the elderly and the necessary of social mobilization. This phase was 10 weeks long. The last phase, formal interviews supplemented by observations and one-day record by family members were assessed. Stress, clinical blood test and blood pressure of the elderly were tested. The social mobilization process was follow-up for three months. The results showed that social mobilization did affect nutrition and stress management behaviors as shown in the elderly club participation, self-esteem, perceived self-efficacy, and blood pressure. This study suggested that the participatory technique allowed the elderly to accommodate the given knowledge into their own decisions and practices.

Program based on Motivation Theory. Thongyord (2000) conducted health education program based on the Motivation Theory in prevention of high blood pressure in the elderly living in Det-Udom municipality of Ubornratchathani Province. The studies used quasi-experimental, two groups, pretest-posttest design. The experimental group of 48 subjects attended the health education program. The control group of 48 subjects did not attend a health education program. The subjects had blood pressure less than 159/99 mmHg. Interviews with questionnaires and blood pressure assessments were administered before and after the experiment. The program

intervention consisted of 12 weeks activities that included lectures with slide presentation, lived modeling, demonstrations, skill practice, and promoting self esteem. The activities to promote healthy eating behaviors for preventing high blood pressure were included. The results showed that after the program, the elderly in the experimental group had higher perceived severity and perceived self-efficacy than before the program. The elderly in experimental group had better hypertensive prevention behaviors including appropriate food consumption behaviors than the control group. The results of this study reported that the program could improve perceived self-efficacy of the elderly consistently with the study of Athikamanon (1998). This study suggested that the activities should be suitable to the culture of community in the future studies.

Program based on Health Belief Model, Positive and Negative Health Model, and Motivation Theory. Wongpeng (2004) developed and evaluated the effectiveness of a health education program to promote hypertensive prevention behaviors among the elderly in a Bangkok community, Central area. The quasi-experimental, two groups, pretest-posttest design was used in this studies. The subjects were divided to experimental group (n = 33) who received a program, and control groups (n = 50) who did not receive it. This program applied Health Belief Model, Positive and Negative Health Model, and Motivation Theory using buddies, community health volunteers and presentation of real examples to guide the intervention. The activities included promotion of eating behaviors for hypertension prevention in the elderly. After 4 weeks of the intervention, the results revealed that a health education program could significantly improve the elderly's knowledge, perceived susceptibility, perceived benefits and barriers, and self esteem. The

researcher suggested that the health education program to promote hypertensive prevention behaviors among the elderly in the community should be deployed in other communities to decrease morbidity, mortality and hypertension complications. The results of this study were in accordance with the study of Athikamanon (1998) about the effectiveness of the program to improve perceived benefits and perceived barriers.

Furthermore, a study of Chanakok, Opas, and Kasermpitappong (2001) investigated the effectiveness of self care and social support promotion using health education strategy on knowledge and self care behavior among hypertensive elderly and family members at Amphoe Muang, Chiang Mai Province, the Northern region. This study was quasi-experimental, two groups, pretest-posttest design. Experimental group (n = 50) were provided with intervention including self care and social support promotion, while control group (n =50) were not provided. Twenty five elderly of the experimental group, a class teaching and small group teaching, knowledge of hypertension and self-care practices including healthy food consumption were provided at the health center. Exercise demonstration was also done during class teaching. While the others of the elderly in the experimental group had individual teaching including the same information as class teaching was given to them at home. The results found that knowledge of hypertension and self care practices of the elderly in the experimental group after implementation were better than the control group. The knowledge between the elderly receiving the intervention to either at the health center or at home was the same. Promotion of self care and social support from family members had positive relationship with self care behaviors of hypertensive elderly. The researcher suggested that the promotion of self care and social support from family members to the elderly were useful for health education intervention.

Programs to Promoting Healthy Eating of the Elderly in Home Settings

Two studies of home-based nutrition interventions reported improving on dietary intake for the elderly at home settings. One study was a randomized control trial to investigate the effectiveness of a home-based nutrition intervention increasing the daily consumption of fruits, vegetables, and calcium-rich foods in community-dwelling functionally impaired elderly (Bernstein et al., 2002). Similarly, another study was quasi-experimental study to investigate effect of home-based intervention on daily intake of fruits and vegetables in homebound elderly (Johnson, Beaudoin, Smith, Beresford, & Logerfo, 2004).

Bernstein et al. (2002) evaluated the efficacy of a home-based nutrition education program in community-dwelling, functionally impaired elderly for increasing the daily consumption of fruits, vegetables, and calcium-rich foods. The participants were randomized to either a nutrition education intervention (n = 38) or a control group that received an exercise intervention (n = 32). Six- month nutrition education program was provided through eight home visits, bi-weekly phone contacts, and monthly letters over a 6-month period. This program used behavior-modification techniques such as goal setting, rewards, food log recording, role-playing, and troubleshooting that were included in the home visit sessions. Participants were given an educational book designed for the program. Some nutrition topics covered by including the importance of good nutrition at any age, health benefits of eating more fruits and vegetables, the importance of calcium-rich foods and risk factors for osteoporosis, the importance of choosing a variety of foods, what constitutes a serving, grocery shopping tips, and nutrient dense recipes. The results showed that

intervention group increased their self-reported intake of fruits serving (2.8 to 3.9), vegetables serving (2.3 to 3.4), and milk/dairy serving (3.0 to 3.9) per day. This study suggested that increasing daily consumption of fruits, vegetables, and calcium-rich foods should be specific and individualized to meet the dietary pattern and lifestyle of the individuals. Compliance should be encouraged with record keeping as well as through continuous monitoring and positive reinforcement.

Johnson et al. (2004) determined the effects of the Seattle Senior Farmers' Market Nutrition Pilot Program to increase fruits and vegetables intake for homebound elderly who participated in the Elderly Nutrition Program (ENP). Intervention group received market baskets, and control group who lived outside the project did not receive the baskets. Both groups were recruited to complete a telephone survey before and at the end of the farmers' market basket season. After the 6- month market basket season, 87 basket recipients and 44 control respondents completed the follow-up survey. This program delivered bi-weekly market basket that included a variety of fresh, nutritious, unprepared, locally grown produce to homebound elderly, and to increase consumption of agricultural commodities by developing and expanding markets. Over five-month basket delivery period, an average of 1.6 serving of vegetables and 0.67 servings of fruits were provided per day per person. A newsletter that described the product, provided recipes for less common seasonal foods, and promoted eating fruits and vegetables accompanied each basket. The results found that 22% of the basket recipients at baseline were consuming five or more servings of fruits and vegetables per day, but by the end of the season, 39% reported consuming five or more per day. The researchers suggested that home

delivery of fruits and vegetables was an effective way to increase fruit and vegetable intake in homebound elderly.

To conclude, there were strong evidences of the previous studies indicated that nutrition education was an effective strategy that could improve or enhance knowledge and understanding about healthy or nutritious eating behavior, and increase positive attitude toward healthy eating and skills for choosing healthy diets among the elderly. The majority of programs were developed in U.S., and most programs targeted in both community and home settings. Most programs that were developed were based on different theories/models/concepts and yielded similar results in promoting healthy eating in the elderly. Some studies of other countries revealed that reinforcement or motivation such as benefits of and barriers to dietary change; group participation; realistic goal setting; and collaboration between health providers, elderly and family members implemented in health education interventions could affect to improve eating behaviors in the elderly. Furthermore, several studies also recommended individuals' brief nutritional counseling and social support to promote the elderly's' healthy eating. In most studies, effective activities of health education interventions were reported such as individual counseling (face to face or telephone), providing educational materials (mail-educational packets, booklets, newsletters, and food charts), teaching (lectures in classes, seminars, and group sessions), skill training, home visits, and group discussions.

For Thailand, all programs were developed in community settings at elderly clubs or primary care centers. Most programs used behavioral theories to guide the programs development and evaluation. Several studies used Self-Efficacy Theory to plan the interventions and found the promising results. Relating factors to

promote healthy eating in the elderly were reported in the studies including nutritional knowledge, perceived self-efficacy, perceived benefits of nutritional behavior, perceived barriers to nutritional behavior, and social support. Regarding social support, many studies recommended having family members to help or support the elderly in improving nutritional knowledge, attitude toward eating behaviors. Most family members took responsibilities and roles including food selection, preparation and consumption for the elderly that affected to promote and maintain the elderly's healthy eating. So, encouraging social support from family members should also be conducted in promoting Thai elderly's healthy eating. For activities of the interventions, individual and group approaches such as teaching, group discussions, demonstration and skill training, modeling, counseling, food menu planning, self-evaluation, home visiting, and giving handbooks or handouts were found that could effectively promote healthy eating in the elderly. Although the programs developed in Thailand showed the effectiveness in promoting nutritional behaviors or food consumption behaviors, having some limitations of the studies were mentioned. All programs did not investigate sustainability of nutritional behaviors or food consumption behaviors; most programs were conducted with nonequivalent control group; and most of the studies were conducted in the central region in which context was different from other regions. Moreover, several studies having conducted the programs took short-time period of implementation and follow-up.

Therefore, the researcher will construct a comprehensive nutritional education program in this study using individual and group approaches, and health education strategy in promoting and maintaining healthy eating for the elderly living in community of northeastern Thailand. Testing the effectiveness of the developed

program will also be done. The intervention focuses on multiple educational methods including nutritional education, nutritional counseling, and motivation (enhancing perceived self-efficacy, increasing benefits of and decreasing perceived barriers to healthy eating, and encouraging social support from family members). Both individual and group activities will be provided through group teaching, group discussions, demonstrations and skill training, giving educational materials (a booklet and mailed-handouts), realistic goal settings, self evaluation, and home visiting. Nutritional counseling will also be provided using individual or telephone contacts. Furthermore, long term follow-up of participants extending to 6 months should be investigated regarding the maintenance of healthy eating in the elderly.

Conceptual Framework

Pender's Health Promotion Model (Pender, 1996) and nutritional education instruction method is selected as the conceptual framework for this study because of its emphasis on responsibility for health, and increases the level of well-being and self-actualization of a given individual or group. This model integrates concepts from the expectancy-value model of human motivation and social cognitive theory to form the theoretical basis. The model incorporates individual characteristics and experiences, and behavior-specific cognitions and affect, to motivate health-promoting behavior. A health-promoting behavior is the end point or the outcome of the model and is directed toward positive health outcomes and experiences throughout the life span. Health promoting behaviors are defined as activities directed towards increasing the level of well-being and actualizing the health of individuals or groups.

Health promoting behaviors are essential for preventing unnecessary illness and for improving health throughout the life span. It is initiated by committing to a plan of action, accompanied by competing demands and references. Individual characteristics and experiences involve two factors: 1) prior related behavior, and 2) personal factors including biological, psychological, and socio-cultural. The behavior-specific cognitions and affect involve six factors: 1) perceived self-efficacy, 2) perceived benefits of action, 3) perceived barriers to action, 4) interpersonal influences, 5) activity-related affect, and 6) situational influences. Finally, the behavioral outcome consists of: 1) commitment to a plan of action, 2) immediate competing demands and preferences, and 3) health-promoting behavior.

Individual Characteristics and Experiences

Prior related behavior. Behavior factors have been retained in the health promotion model as "prior related behavior". Empirical studies indicated that often the best predictor of behavior is the frequency of the same or a similar behavior in the past. Prior behavior is proposed as having both direct and indirect effects on the likelihood of engaging in health-promoting behaviors. The direct effect of past behavior on current health-promoting behavior may be due to habit formation, predisposing one to engage in the behavior automatically, with little attention to the specific details of its execution. Habit strength accrues each time the behavior occurs and is particularly augmented by concentrated, repetitive practice of the behavior. Consistent with social cognitive theory, prior behavior is proposed as also having an indirect influence on health-promoting behavior through perceptions of self-efficacy, benefits, barriers, and activity-related affect.

Personal factors. The relevant personal factors predictive of a given behavior are shaped by the nature of the target behavior being considered. Personal factors have been categorized as biological, psychological, and socio-cultural factors. Biological factors include but are not limited to variables such as age, body mass index, strength. Psychological factors can include variables such as self-esteem, self-motivation, and perceived health status. Socio-cultural factors include variables such as race, ethnicity, acculturation, education, and socioeconomic status.

Behavior-Specific Cognitions and Affect

Perceived self-efficacy. Perceived self-efficacy means judgment of self ability to achieve certain level of success in practicing a certain behavior. Perceptions of skill and competence in a particular domain motivate individuals to engage in those behaviors that they excel in. Four types of self-efficacy consist of mastery experiences, vicarious experience, verbal persuasion, and emotional feedback. Perceived self-efficacy is proposed as being influenced by activity-related affect. The positive affect increases, the perceptions of efficacy will also increase. Self-efficacy is proposed as influencing perceived barriers to action, with higher efficacy resulting in lowered perception of barriers to the performance of the target behavior. Self-efficacy motivates health-promoting behavior directly by efficacy expectations and indirectly by affecting perceived barriers and determining level of commitment or persistence in pursuing a plan of action.

Perceived benefits of action. Perceived benefits of action are the mental representations of positive or reinforcing consequences of behaviors. Individuals often engage in a particular behavior because of anticipated outcomes. Perceived benefits

of action are proposed as directly motivating behavior as well as indirectly motivating behavior through determining the extent of commitment to a plan of action to engage in the behaviors from which the anticipated benefits will result.

Perceived barriers to action. Perceived barriers to action have been identified as cognitive perceptual factors regarding things, events and activities that inhibit the conduct of health- promoting behavior. The barriers may be imagined or real consisting of perceptions concerning the unavailability, inconvenience, expense, difficulty, or time-consuming nature of a particular action. Perceived barriers to action affect health-promoting behavior directly by serving as blocks to action as well as indirectly through decreasing commitment to a plan of action.

Interpersonal influences. Interpersonal influences are cognitions concerning the behaviors, beliefs, or attitudes of others. Primary sources of interpersonal influence on health-promoting behavior are family, peers, and health care providers. Interpersonal influences include social norms, social support, and modeling. Social norms define as the standard of action of individuals. Social support means the sustaining resources offered by others including emotional, instrumental, informational and appraisal supports. Modeling defines as learning through observing the behaviors of others. Interpersonal influences are proposed as affecting health-promoting behavior directly as well as indirectly through social pressures or encouragement to commit to a plan of action.

Activity-related affect. Activity-related affect consists of emotional arousal to the act itself, the self acting, and the environment in which the action takes place. The resultant feeling state is likely to affect whether an individual will repeat the behavior again or maintain the behavior long term. The affect associated with the

behavior reflects a direct emotional reaction to the thought of the behavior, which can be positive or negative. Behaviors associated with positive affect are likely to be repeated, whereas those associated with negative affect are likely to be avoided. Activity-related affect is proposed as influencing health behavior directly as well as indirectly through self-efficacy and commitment to a plan of action.

Situational influences. Personal perceptions and cognitions of any situation or context can facilitate or impede behavior. Situational influences on health-promoting behavior include perceptions of options available, demand characteristics, and aesthetic features of the environment in which a given behavior is proposed to take place. Individuals are drawn to and perform more competently in situations or environmental contexts in which they feel compatible rather than incompatible, related rather than alienated, safe and reassured rather than unsafe and threatened. Environments that are fascinating and interesting are also desirable contexts for the performance of health behaviors. Situational influences are proposed as direct and as indirect influences on health behavior.

Commitment to a plan of action. This commitment will the individual into and through the behavior unless a competing demand that the individual cannot avoid or a competing preference that the individual does not resist intervenes. Commitment to a plan of action implies the underlying cognitive process: (1) commitment to carry out a specific action a given time and with specified persons or alone; and (2) identification of definitive strategies for eliciting, carrying out, and reinforcing the behavior. The requirement of identification of specific strategies to be used at different points in the behavioral sequence goes beyond intentionally to further the

likelihood that the plan of action developed by nurse and client will be successfully implemented.

Immediate competing demands and preferences. Immediate competing demands and preferences refer to alternative behaviors that intrude into consciousness as possible courses of action immediately prior to the intended occurrence of a planned health-promoting behavior. Competing demands are viewed as those alternative behaviors over which individuals have a relatively low level of control because of environmental contingencies such as work or family care responsibilities. Competing preferences are viewed as alternative behaviors with powerful reinforcing properties over which individuals exert a relatively high level of control. They can derail a health-promoting behavior in favor of the competing behavior. Immediate competing demands and preferences are proposed as directly affecting the probability of occurrence of health behaviors as well as moderating the effects of commitment.

Health-promoting behavior. Health-promoting behavior is the endpoint or action outcome in the health promotion model. It is ultimately directed toward attaining positive health outcomes for the client. Health-promoting behaviors, particularly when integrated into a healthy lifestyle that pervades all aspects of living, should result in improved health, enhanced functional ability, and better quality of life at all stages of development.

Since from literature reviews, many studies have recommended that health education strategies could effectively promote health-promoting behaviors among the elderly. Therefore, the researcher developed a nutritional education program using both individual and group approaches, and multiple educational methods aiming to increase nutritional knowledge and skills, and to modify behavior-specific cognitions

and affect to promote healthy eating behaviors of the elderly. Multiple educational methods included teaching, counseling, motivating, behavioral maintaining and monitoring. In this study, cognitions and affect specific to healthy eating included perceived self-efficacy, perceived barriers, perceived benefits, and perceived social support from family members.

The nutritional education program used in this study contained six group teaching lessons including: (1) Thai Food Pyramid Guide, the Dietary Guidelines, and Nutrition Facts labels for Thai elderly (Nutrition Division, the Ministry of Public Health of Thailand, 2005); (2) major nutrients requirements; (3) food choices and purchase; (4) food preparation, safety and storage; (5) the benefits and barriers of healthy eating; and (6) healthy food menu for Thai northeastern elderly. In addition, this program contained skill training on personal menu plan and goal setting. Information was provided on the topics of benefits of healthy eating, significance of supports from family, roles and responsibilities of family members in supporting the elderly's healthy eating and managing barriers to healthy eating. Strategies for increasing perceived self-efficacy including mastery experience, verbal persuasion and emotional arousal were used. The program, therefore, was expected to increase nutritional knowledge, perceived benefits of healthy eating, and perceived supports from family members, and to decrease perceived barriers to healthy eating leading to increased healthy eating behavior. Providing handouts and encouraging self monitoring helped maintaining healthy eating.

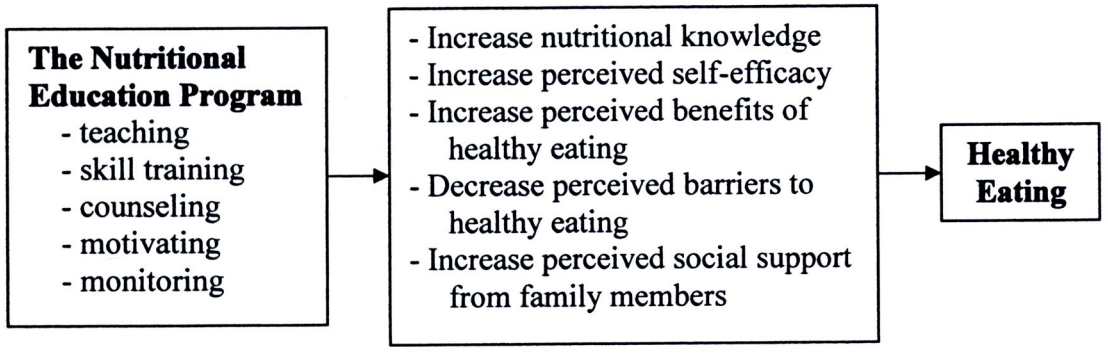

Figure 2-1. Conceptual Framework of Promoting Healthy Eating among the Elderly in Northeastern Thailand