

**A STUDY OF OSTEOPOROSIS PREVENTIVE BEHAVIOR  
AMONG VILLAGE HEALTH VOLUNTEERS**

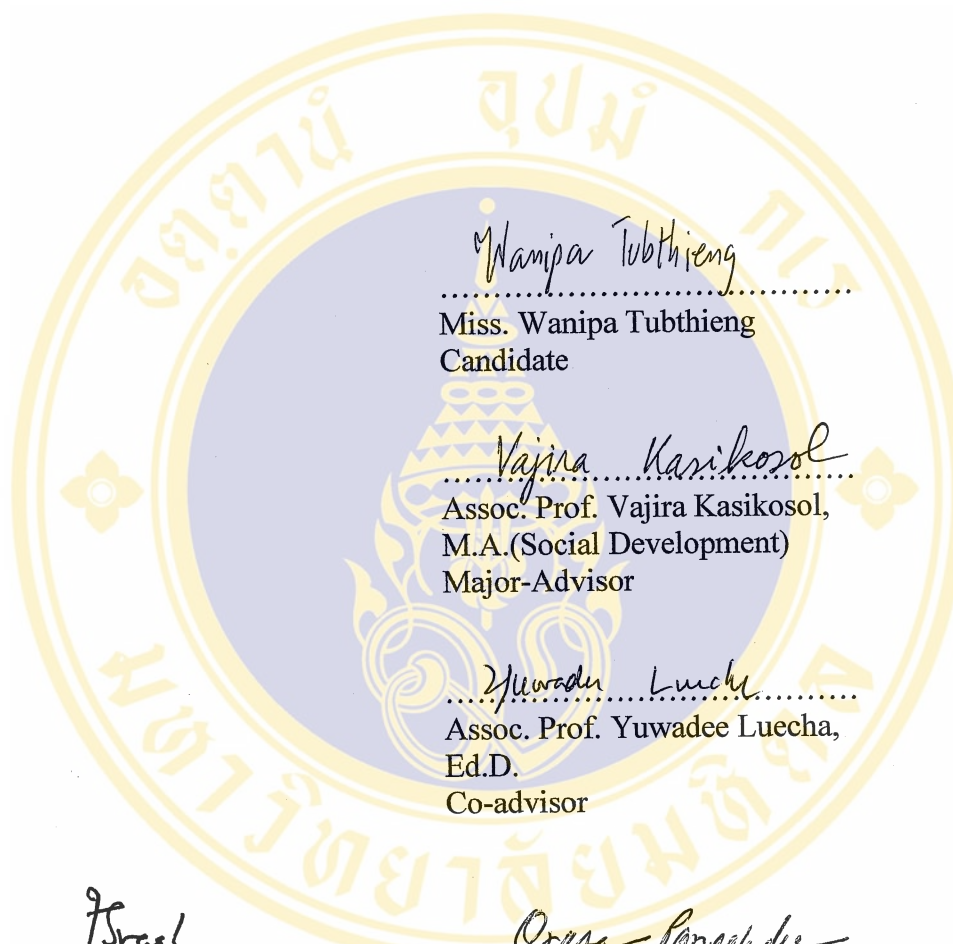


**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR  
THE DEGREE OF MASTER OF NURSING SCIENCE  
(COMMUNITY HEALTH NURSING)  
FACULTY OF GRADUATE STUDIES  
MAHIDOL UNIVERSITY  
2005**

**ISBN 974-04-6757-1  
COPYRIGHT OF MAHIDOL UNIVERSITY**

**Thesis  
entitled**

**A STUDY OF OSTEOPOROSIS PREVENTIVE BEHAVIOR  
AMONG VILLAGE HEALTH VOLUNTEERS**



*Wanipa Tubthieng*.....

Miss. Wanipa Tubthieng  
Candidate

*Vajira Kasikosol*.....

Assoc. Prof. Vajira Kasikosol,  
M.A.(Social Development)  
Major-Advisor

*Yuwadee Luecha*.....

Assoc. Prof. Yuwadee Luecha,  
Ed.D.  
Co-advisor

*J. Svasdi*.....

Prof.M.R.Jisnuson Svasti, Ph.D.,  
Dean  
Faculty of Graduate Studies

*Orasa Panpakdee*.....

Assoc. Prof. Orasa Panpakdee,  
DNS  
Chair  
Master of Nursing Science  
Faculty of Medicine Ramathibodi Hospital,

**Thesis  
entitled**

**A STUDY OF OSTEOPOROSIS PREVENTIVE BEHAVIOR  
AMONG VILLAGE HEALTH VOLUNTEERS**

was submitted to the Faculty of Graduate Studies, Mahidol University  
for the degree of Master of Nursing Science (Community Health Nursing)

on

November 21, 2005

*Wanipa Tubthieng*

.....  
Miss. Wanipa Tubthieng  
Candidate

*Vajira Kasikosol*

.....  
Assoc. Prof. Vajira Kasikosol,  
M.A.(Social Development)  
Chair

*Yuwadee Luecha*

.....  
Assoc. Prof. Yuwadee Luecha,  
Ed.D.  
Member

*Panudda Priyatrak*

.....  
Assoc. Prof. Panudda Priyatrak,  
M.Sc. (Epidemiology)  
Member

*Suparb Aree-ue*

.....  
Assist. Prof. Suparb Aree-Ue,  
Ph.D (Nursing)  
Member

*J. Jisnuson Svasti*

.....  
Prof.M.R.Jisnuson Svasti, Ph.D.  
Dean  
Faculty of Graduate Studies  
Mahidol University

*J. Kunchitthape Tanpowpong*

.....  
Assoc.Prof.Kunchitthape Tanpowpong, M.D.  
Deputy Dean, Acting Dean,  
Faculty of Medicine Ramathibodi Hospital,  
Mahidol University.

## ACKNOWLEDGMENT

The completion of this thesis would not have been complete without the help and support from many individuals. I would like to profoundly thank my major advisor, Associate Professor Vajira Kasikosol, and my co-advisors, Associate Professor Dr. Yuwadee Luecha, Assistant Professor Dr. Suparb Aree-ue, and Associate Professor Panudda Priyatrak for their valuable advice and suggestions, as well as for their attentive efforts in checking and correcting the thesis, rendering this thesis beneficial and valuable.

I am indebted to the Director of Trang Provincial Public Health Office, and the Director and the Head Nurse of Huaiyot Hospital for their permission enabling me to pursue my Master's Degree at Mahidol University.

I am grateful to all Village Health Volunteers in Huaiyot District, Trang Province, who kindly took part in the study and provided the vital information on which the study was based.

Finally, I would like to offer my heartfelt thanks to my parent, brothers, and sister for their endless love, warmest support, understanding, and encouragement in completing this study.

Wanipa Tubthieng

A STUDY OF OSTEOPOROSIS PREVENTIVE BEHAVIOR AMONG VILLAGE HEALTH VOLUNTEERS.

WANIPA TUBTHIENG 4337506 RACN/ M

M.N.S (COMMUNITY HEALTH NURSING)

THESIS ADVISORS : VAJIRA KASIKOSOL, M.A., YUWADEE LUECHA, Ed. D

ABSTRACT

This descriptive correlational study aimed to explore the relationship between knowledge of osteoporosis, perceived self-efficacy in osteoporosis prevention, and osteoporosis preventive behaviors. The study sample was 309 female village health volunteers working at the Huaiyot Contracting Unit Primary Care (CUP), Trang Province. The instruments used in the study were the Fact on Osteoporosis Quiz questionnaire (FOOQ), the Self-Efficacy of Osteoporosis Prevention Questionnaire, and the Osteoporosis Preventive Behavior Questionnaire. Data was collected between 15 May to 15 August 2005. Descriptive statistics, Pearson's Product Moment Correlation Coefficient, and Stepwise Multiple Regression were used for data analysis.

Results revealed that, among the volunteers, higher knowledge of osteoporosis and higher perceived self-efficacy of osteoporosis prevention were significantly related to osteoporosis preventive behavior ( $p < 0.001$ ). Higher family income was also found to be significantly related to osteoporosis preventive behavior ( $p < 0.05$ ). The multiple regression analysis demonstrated that perceived self-efficacy of osteoporosis prevention, education level, and knowledge of osteoporosis were able to explain about 60.9 % of variance in the total osteoporosis preventive behavior score (overall  $F_{(3, 305)} = 158.46, p < .001$ ).

The results from this study provide more understanding of the village health volunteers' knowledge of osteoporosis, self-efficacy of osteoporosis prevention, demographic characteristics and osteoporosis preventive behavior. Based on these results, further intervention strategies for prevention of the osteoporosis in Huaiyot Contracting Unit Primary Care (CUP) are suggested for community health nurses, who are responsible for promoting health in the community sector.

KEY WORDS: OSTEOPOROSIS/ VILLAGE HEALTH VOLUNTEER/ PREVENTIVE BEHAVIOR/  
SELF-EFFICACY / KNOWLEDGE

64 P. ISBN 974 -04 -6757-1

การศึกษาพฤติกรรมการป้องกันภาวะกระดูกพรุนของอาสาสมัครสาธารณสุขประจำหมู่บ้าน (A STUDY OF OSTEOPOROSIS PREVENTIVE BEHAVIOR AMONG VILLAGE HEALTH VOLUNTEERS)

วณิกา ทับเที่ยง 4337506 RACN/ M

พย.ม. (การพยาบาลอนามัยชุมชน)

คณะกรรมการควบคุมวิทยานิพนธ์: วชิรา กสิโกศล, ศศ.ม., ยุวดี ภาษา, กศด.

บทคัดย่อ

การวิจัยแบบวิเคราะห์ความสัมพันธ์นี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างความรู้เกี่ยวกับภาวะกระดูกพรุน, การรับรู้ความสามารถของตนเองในการป้องกันภาวะกระดูกพรุน และพฤติกรรมการป้องกันภาวะกระดูกพรุน. กลุ่มตัวอย่าง คือ สตรีอาสาสมัครสาธารณสุขประจำหมู่บ้านประจำหน่วยคู่สัญญาบริการระดับปฐมภูมิอำเภอห้วยยอด จังหวัดตรัง จำนวน 309 คน. เก็บข้อมูลโดยใช้แบบสอบถามประกอบด้วยข้อมูลทั่วไปของอาสาสมัครสาธารณสุข, ความรู้เกี่ยวกับภาวะกระดูกพรุน, ความรู้เกี่ยวกับภาวะกระดูกพรุน, การรับรู้ความสามารถของตนเองในการป้องกันภาวะกระดูกพรุน, และพฤติกรรมการป้องกันภาวะกระดูกพรุน. เก็บข้อมูลระหว่างวันที่ 15 พ.ค.-15 ส.ค. 2548. การวิเคราะห์ข้อมูลใช้สถิติเชิงบรรยาย, สัมประสิทธิ์สหสัมพันธ์ของเพียร์สัน และการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน

ผลการศึกษาพบว่าความรู้เกี่ยวกับภาวะกระดูกพรุน การรับรู้ความสามารถของตนเองในการป้องกันภาวะกระดูกพรุน ข้อมูลส่วนบุคคลของอาสาสมัครสาธารณสุขบางรายการ (ระดับการศึกษา และระยะเวลาที่เป็นอาสาสมัครสาธารณสุขประจำหมู่บ้าน) เป็นปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันภาวะกระดูกพรุน อย่างมีนัยสำคัญทางสถิติ ( $p < .001$ ). นอกจากนี้ยังพบว่ารายได้ครอบครัวมีความสัมพันธ์กับพฤติกรรมการป้องกันภาวะกระดูกพรุน อย่างมีนัยสำคัญทางสถิติ ( $p < .05$ ). การรับรู้ความสามารถของตนเองในการป้องกันภาวะกระดูกพรุน, ระดับการศึกษา, และความรู้เกี่ยวกับภาวะกระดูกพรุนสามารถร่วมกันทำนายพฤติกรรมการป้องกันภาวะกระดูกพรุน ได้ร้อยละ 60.9 (overall  $F_{(3, 305)} = 158.46, P < .001$ ).

ผลการศึกษาครั้งนี้จะเป็นประโยชน์สำหรับทีมสุขภาพได้เข้าใจความรู้เกี่ยวกับภาวะกระดูกพรุน, ความสามารถตนเองในการป้องกันภาวะกระดูกพรุนของอาสาสมัครสาธารณสุขประจำหมู่บ้านซึ่งมีผลต่อพฤติกรรมการป้องกันภาวะกระดูกพรุนของอาสาสมัครสาธารณสุขประจำหมู่บ้าน. ซึ่งจะเป็นประโยชน์สำหรับพยาบาลอนามัยชุมชนในการวางแผนและดำเนินการณรงค์ป้องกันภาวะกระดูกพรุนของประชาชนในชุมชนอำเภอห้วยยอด จังหวัดตรังต่อไป.

64 หน้า. ISBN 974 -04 -6757-1

## CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENT</b>	iii
<b>ABSTRACT (ENGLISH)</b>	iv
<b>ABSTRACT (THAI)</b>	v
<b>LIST OF TABLES</b>	vii
<b>LIST OF FIGURES</b>	viii
<b>CHAPTER</b>	
<b>I INTRODUCTION</b>	
Background and rationale	1
Conceptual framework	3
Research questions	6
Objectives	6
Hypotheses	7
Scope of the study	7
Definition of terms	7
Expected research outcome	8
<b>II LITERATURE REVIEW</b>	9
Osteoporosis	12
Osteoporosis preventive behavior	16
Self-Efficacy and Health practice	18
Knowledge and Osteoporosis Preventive behavior	18
<b>III MATERIALS AND METHODS</b>	
Study site	20
Sample and sampling technique	21
Research instrument	24
Data collection	27
Data analysis	28
<b>IV RESULTS</b>	
Part I: Sample description	29
Part II: The results of hypothesis testing	38
<b>V DISCUSSION</b>	42
<b>VI CONCLUSION</b>	49
<b>BIBLIOGRAPHY</b>	52
<b>APPENDIX</b>	58
<b>BIOGRAPHY</b>	64

## LIST OF TABLES

Table		Page
1.	Number of the sampled village health volunteers classified by sampling Sub-Districts and Primary Care Unit (PCU) .....	28
2.	Number and percentage of samples' demographic characteristics .....	30
3.	Scores on subjects' self-report classified by their knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors.....	32
4.	Number and percentage of samples' correct responses on knowledge of osteoporosis .....	33
5.	Number and percentage of samples' perceived self-efficacy of osteoporosis prevention .....	35
6.	Number and percentage of samples' osteoporosis preventive behavior .....	37
7.	Pearson's product moment correlation between variables .....	39
8.	Factors predicting osteoporosis preventive behavior .....	41

## LIST OF FIGURES

Figure	Page
1. Research conceptual framework	5



## CHAPTER I

### INTRODUCTION

#### **Background and Rationale**

As it has been known, the development of health sciences and higher medical specialization has made longer life for man than ever before. However, the modern medical care and sophisticated medical instruments still cannot stop the lifetime erosion of human body bone structure, which is known as osteoporosis. Results from some studies have shown significant higher risk for osteoporosis in aging populations (Tachamahachai, 2000; Sunthontum, 2001).

Osteoporosis is the condition of decreasing bone density, which leads to fragile bones and higher risk of fractures. (Bouillon, et al., 1991; Peck, et al., 1993). Osteoporosis is one of the major health problems after menopause and andropause. Over 200 million of the world populations are facing osteoporosis health problems (Christiansen, 1991).

Lack of awareness of osteoporosis in the population may be due to there being no signs and symptoms or any pain in the early stages of osteoporosis. People would not know they have osteoporosis until their low bone mass density is measured (Dowd & Cavalieri, 1999). This low bone mass density cannot turn back to prior bone condition. Cooper and others reported that vertebral fracture, particularly one that produces about 15 percent loss of vertebral height, which may cause significant pain or immobility. Beside, vertebral fractures can result in kyphosis (accompanied by notable height loss) and eventually back pain, which can significantly limit mobility and physical activity. Additionally, kyphosis can cause dyspnea, impede execution of activities of daily living to the point that patients need assistance with them, cause embarrassment about physical appearance, and precipitate emotional problem, particularly depression. Moreover, vertebral fracture has been shown to be associated with a decrease in survival (Cooper, et al., 1992). Regarding hip fracture related to osteoporosis, only half of the hip fracture patients could be back to their normal walking gestures, while 20 percent of patients who had hip fracture died within 5 years (Rachatanawin, 1995).

Dempster and Lindsay (1993) convinced that osteoporosis is the global public health problem. Osteoporosis affects more than 20 million individuals in the USA and accounts for about 250,000 hip fractures a year and an annual toll of around 1.5 million fractures in total. According to projections, the number of hip fractures world wide will increase sharply over the next half century, especially in Asia and Latin America, making osteoporosis a truly global issue (Cooper, et al., 1992 as cited in Dempster & Lindsay, 1993). However, white people and Caucasian seem to be more increase risk at osteoporosis, therefore the importance of osteoporosis in public health teams is already recognized in North America and Europe, but not much concern found in Asian countries, particularly in Thailand.

The osteoporosis fracture can caused life long burden to individual, family, community and health care system. Estimates of the burden of osteoporosis fracture commonly utilize lifetime risks. These take account of the incidence of fracture as well as life expectancy in specific communities. Such estimates are not only useful for research purposes, but also are important in the future planning strategy for community osteoporosis prevention.

In Haiyot, a district of about 80 thousands population of Trang Province. Among the three leading complaints of patient population in the Haiyot Contracting Primary Care Unit (Haiyot CUP) is bone and muscle malaise. The Haiyot Hospital Director, the top public health administrator of the Haiyot CUP, as well as the community health team, recognized the needs for Haiyot CUP to provide some strategies to protect the Haiyot community population from having the bone problem such as osteoporosis.

If community osteoporosis prevention is developed, the preparation of the Haiyot village health volunteers to work in the program is also needed. Because there is not any data available on village health volunteers' osteoporosis behavior, whether the village health volunteers do appropriate osteoporosis preventive behavior or not is unknown. What are the related factors, which might influence their osteoporosis preventive behavior? There were many factors found related to this health behavior. However, because of the limitation of time and resources, this primary study is only intended to assess the village health volunteer osteoporosis behavior. And to explore whether their knowledge of osteoporosis, self-efficacy of

osteoporosis prevention and demographic are related to osteoporosis preventive behavior. This research resources was provided by the Haiyot CUP.

## Conceptual Framework

Social cognitive theory is used to guide the conceptual framework of this study. A major concept of social cognitive theory is self-efficacy, which is believed to be the single most important characteristic that determines a person's behavior (Bandura, 1986). Martin and Poland (1980) were also identified skill and ability building accompanied by cognitive restructuring as it could be a highly effective approach for fostering change of behavior (Martin & Poland, 1980; as cited in Pender, 1996).

Self-efficacy includes individuals' judgments of their capabilities, confidence, and convictions to organize and carry out courses of action that are required for them to attain designated types of performances (Bandura, 1977). According to Bandura, efficacy expectations determine how much effort people will expend, and how long they will persist in the face of obstacles and adverse experiences. The stronger the efficacy or mastery expectations, the more active the efforts. Expectations of personal efficacy are based on several sources of information. The strength of people's convictions in their own effectiveness determines whether they will even try to cope with difficult situations (Bandura, 1977). Bandura believed that the internal representations of behavior, constructed from informative response consequences, serve as guides to overt action on later occasions. The cognitive processes play a prominent role in the acquisition and retention of behavior (Bandura, 1977).

Pender is the one who propose the relationship between self-efficacy and health promotion behavior. The greater the perceived self-efficacy, the more vigorous and persistent individuals will be to engage in a behavior, even in the face of obstacles and aversive experience (Pender, 1996).

Pender described knowledge regarding one's self-efficacy which increased individuals motivation to change behavior based on one's mastery experiences (performance attainments), observing the behavior of others (vicarious learning),

being convinced by others of capabilities (verbal persuasion), and aversive arousal (stress and anxiety, fatigue or pain) (Pender, 1996).

Knowledge is an awareness or perception of reality acquired through learning or investigation. Knowledge concerns a specific subject component of specific science, and is based on factual information. One also acquires knowledge about things and events of the subject matter of interest through experience (Chinn & Jacobs, 1987; Keck, 1994 as cited in Suzhen, 1998).

In health care systems, individuals' knowledge of their disease can help them cope with specific health problems (Jones, 1982 as cited in Suzhen, 1998). Behaviors to prevent osteoporosis have not been widely publicized. Egger and other (1995) state that it is a common belief that the mere presence of knowledge about what influence health is sufficient to motivate individuals towards that healthier alternative (Egger, et al., 1995).

Piaseu (2002) discussed in her study that knowledge alone is not enough to effect behavior change as she had reviewed in many education programs focus primarily on knowledge. Piaseu (2002) emphasized that enhancing self-efficacy can facilitate the link between knowledge and behaviors.

Pender (1996) proposed that personal factors were directly influencing both behavior-specific cognition and affect as well as health behavior (Pender, 1996). Many relevant personal predictive factors were identified and categorized as biologic, psychologic and sociocultural. Since numerous personal factors were considered, Pender (1996) suggested that those factors to be included in any given study should be limited to the few that are theoretically relevant to explanation or prediction of a given target behavior. In this study, the selected demographic characteristic factors including: age, marital status, education level, occupation, family income and duration of being village health volunteer were selected as the village health volunteers' personal as the predictive factors of the village health volunteers' osteoporosis prevention behavior.

Osteoporosis preventive behavior included exercise, adequate calcium and vitamin D intake, along with smoking cessation and modifying alcohol intake. (Berarducci, et al., 2002). The osteoporosis preventive behavior factors involved calcium intake (nutrition), weight-bearing exercise (physical activity), and avoidance

of osteoporosis risk factors as the nature of osteoporosis is preventable and treatable. This makes the focus on osteoporosis preventive behavior paramount (Prasitphol, 1999). The village health volunteers' osteoporosis preventive behavior focused on nutrition, physical activity, and avoidance of risk factors was proposed in this study.

The frame work for this study focused on the village health volunteer's knowledge of osteoporosis, perceived self- efficacy of osteoporosis prevention, demographic characteristics and osteoporosis prevention behaviors as described above was developed. The purposed research framework was shown (in figure1).

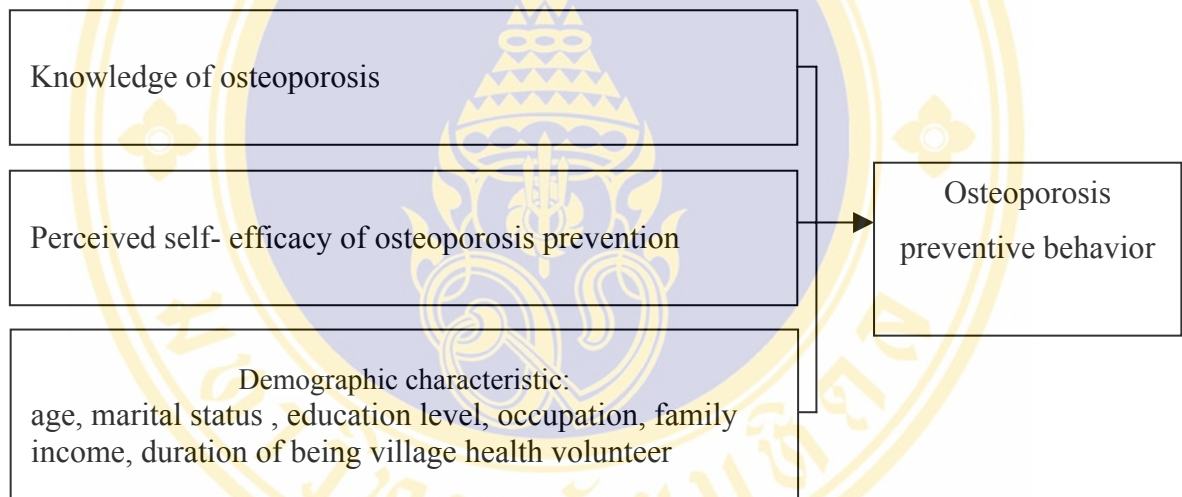


Figure 1: Research conceptual framework

### Research questions

1. What are village health volunteers' knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors?
2. Is there any relationships between the village health volunteers' demographic characteristics (age, marital characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis, self-efficacy of osteoporosis prevention and their osteoporosis preventive behaviors?

3. Is there any predictive value of village health volunteers' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis and self-efficacy over village health volunteers' osteoporosis preventive behavior?

### **Objectives:**

1. To explore knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior among village health volunteers.
2. To examine the relationship between village health volunteers' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior among village health volunteers.
3. To examine the incorporated predictability of village health volunteers' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis and self-efficacy of osteoporosis prevention on their osteoporosis preventive behavior.

### **Hypotheses:**

1. There are relationship between village health volunteers' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), volunteers' knowledge of osteoporosis prevention, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior.
2. Village health volunteers' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis and self-efficacy of osteoporosis prevention are incorporated predictors of their osteoporosis preventive behavior.

## Scope of the study

This descriptive correlational study aimed at exploration of the village health volunteers' demographic characteristics, knowledge of osteoporosis, self-efficacy of osteoporosis prevention, which may be related to their osteoporosis preventive behaviors. Subjects in this study were formally registered female village health volunteers who were drafted to be studied samples and signed the study participation consent. Huaiyot District, Trang Province was the study setting. Data was collected from May to August of 2005.

## Definition of Terms

- 1. Knowledge of osteoporosis** was the understanding of osteoporosis, risk factors, and preventive behaviors evaluated by the Fact on Osteoporosis Quiz questionnaire (FOOQ) (Ailinger, Harper, & Lasus, 1998). High score indicated more knowledge of osteoporosis.
- 2. Perceived self-efficacy of osteoporosis prevention:** was the village health volunteers' belief about their ability to perform osteoporosis preventive behavior: nutrition, physical activity and avoidance of osteoporosis risk behaviors measured by the Self-Efficacy of Osteoporosis Prevention Questionnaire (Parichatnont, 2002). High score indicated higher level of perceived self-efficacy of osteoporosis prevention.
- 3. Osteoporosis preventive behaviors** was defined as the behavior on nutrition, physical activity and avoidance of osteoporosis risk behavior undertaken by an village health volunteer who believes her being healthy for the purpose of preventing osteoporosis measured by the Osteoporosis Preventive Behavior Questionnaire (Teraroganawong, 2001). High score indicated more level of osteoporosis preventive behavior.

## Expected Research Outcome

The expected research outcome is to find factors which may help maximize the village health volunteers' osteoporosis preventive behaviors. The information derive from this research will be very beneficial to the Ministry of Public Health as well as clients and health care providers in better planning future osteoporosis preventive programs to improve osteoporosis prevention program in women population of Haiiyot District, Trang Province.



## CHAPTER II

### LITERATURE REVIEW

This literature review is focused on published and unpublished researches, which may be related to factors influencing osteoporosis preventive behaviors. Concepts on current osteoporosis, knowledge, self-efficacy, osteoporosis preventive behaviors are also explored.

#### **Osteoporosis**

World Health Organization (WHO) defines osteoporosis based on bone mass density (BMD): the mass of normal bone per unit volume expressed as a T-score that is the number of deviations from the “Young Adult” reference. Osteoporosis is diagnosed when BMD is a 2.5 standard deviation (SD) or more below the average BMD for young adults. Measurement between 1 and 2.5 SD below normal are defined as osteopenia (Nation Osteoporosis Society, n.d.-a, 2000 as cited in Aree-Ue, 2004).

#### **Osteoporosis risk factors**

Dempster and Lindsay (1993) suggested that, the osteoporosis preventive intervention in symptom-free individuals should consist of behaviors modification and avoidance of the risk factors. Scientists concerned the following risk factors.

**Age:** Liscum (1992) said that highest risk of osteoporosis is for elderly individuals. Half of all women over 45 years of age and 90 percent of women over 75 years are reported have some degree of osteoporosis. A year after, Dempster & Lindsay (1993) clarified that bone loss with age occurs at all skeletal sites, in all races and cultures, and in both sexes (Dempster & Lindsay, 1993). Later, many study revealed those women after menopause had higher incidence of osteoporosis than the younger ages group (Davis & White, 2000; Rose & Rose, 1994)

**Gender:** Liscum (1992) disclosed that females are four to eight times more likely to have potentially debilitating osteoporosis than male. The rapid bone loss lasts 5 to 10 years after menopause then slows gradually to a lower rate of loss. Women have less bone tissue and loss bone more rapidly than men because of the changes involved in menopause (Ali & Bennett, 1992; Areerat Sungworawongpana, B.E.2540; Christiansen, 1991; Liscum, 1992; McMahon et al., 1992; Peterson, 2001; Roach, 2001; Rose & Rose, 1994; Weiss & Sankaran, 1998). Japanese females were at 5 times higher risk for osteoporosis than males (Leslie, 2000).

**Estrogen deficiency:** Numerous studies have confirmed the cause and effect relationship between loss of ovarian function and acceleration of bone loss. Numerous studies have confirmed the cause and effect relation between loss of ovarian function and acceleration of bone loss. It is the main cause of rapid postmenopausal bone loss and contributes to aging associated bone losses as well. Consequently, early menopause may hasten the onset of osteoporosis. The first 5 years of women after menopause or total hysterectomy and ovalectomy, the occurring of rapid bone loss is more in women than men of the same age (Christiansen, 1991; Rose & Rose, 1994; Speroff et al., 1994). Several controlled clinical trials have shown that estrogen intervention slows or eliminates bone loss, especially in the early years after the menopause (Lindsay, 1988).

**Genetics, Heredity, and Race:** A genetic association with osteoporosis is evident. A number of studies on family members have strongly suggested that genetic factors determine bone density. A woman with positive family history was more likely to be at an increased risk of developing osteoporosis (Barthe et al., 1998; Goss, 1998, 2004; Finn, 1997; Kass-Anness, 1999; leslie, 2000; WHO, 1994). Osteoporosis is more commons in people of the Caucasian race with have fair complexions. African-Americans have more dense bones and a rapid loss of bone once this process begins. Persons of Asian origin may have an intermediate risk of getting the disease. (Rose & Rose, 1994; Speroff et al., 1994). Caucasian and Asian people, who have white and yellow skins, were at 10 times higher risk for osteoporosis than African who have black skin. Because the black African were found having 10 times higher bone density (Kujdych & Pittman, 1996; Matsen, 2001 as cited in Jumpathong, 2002 ).

**Body structures and body weight:** Body structures and body weight were found to be related to the risk of osteoporosis. Since 1994, Lappe said that thin women were more likely to be at higher risk of osteoporosis, because thin women had lower bone density. Beside, Lappe also identified positive value of body fat as the necessity ingredient for estrogen production (Lappe, 1994). Five years later, Goss (1998) identified the osteoporosis higher risk in small figure women. He said the petit and short women had higher risk for osteoporosis than the taller women because the shorter women had lesser cortical bone (Goss, 1998). A year after, Speroff and other (1999) support that thin women had higher risk for osteoporosis than heavy women (Speroff et al., 1999). The relationship between body mass index and Thai postmenopausal women femur bone density was reported at Chulalongkorn Hospital. (Limpaphayom et al, 2001). Persons who have small-framed and thin bodies are at greater susceptibility to osteoporosis than big-bones and obese persons. Luisetto (1995) found that differentiate body mass index could identified bone mass about 30 percent (Luisetto et al, 1995 as cited in Teraroganawong, 2001).

**Long-term low calcium intake:** The 98 percent of the bone mass build up from calcium. Calcium is the essential substance needed for bone reparation and keeping body bone strong. Chronic loss of calcium or chronic malnutrition would increase risk of osteoporosis. (Christiansen, 1991; Rose & Rose, 1994).

**Sedentary lifestyle and immobility:** Physical activity influences bone metabolism which helps to delay the process of osteoporosis. Exercise stimulates the cells in bones which make new bones, and more bone mass is formed. On the other hand, lack of exercise is well established as an important risk factor and caused of osteoporosis. (Christiansen, 1991; Ali & Twibell, 1994; Holmes, 1998; Kass-Anness, 1999). Runnebaum and others (1997) study found that a sedentary lifestyle and immobility in women increases 4 percent more of the bone mass loss after 8 months of immobilization (Runnebaum et al, 1997).

**Caffeine and soft drinks intake:** Caffeine in coffee and tea, or phosphate in cola drink increase urinary and fecal excretion of calcium, which contributes to a decline in calcium balance. (Laitinen, 1993) In addition, these kinds of foods and drinks can induce systemic acidosis. This acidosis stimulates osteoclast bone

resorption. Overall these drinks decrease bone mass. (Christiansen, 1991; Kathi, 1993; Kujdych & Pittman, 1996; Kulak & Bilezikian, 1998).

**Alcohol intake:** Excessive alcohol intake is caused to osteoporosis. Since alcohol intake reduces intestinal absorption of calcium, decrease foods desire and can lead to liver damage that may affect vitamin D metabolism, thus influencing calcium absorption and calcium deficiency (Agsaranucor, 1996; Christiansen, 1991; Diamond, Stiel, Lunzer, Wilkinson & Posen, 1989; Rose & Rose, 1994; Strother, 1999;).

**Smoking:** Lappe (1993) study revealed the decreased of estrogen from smoking 12 cigarettes a day which resulted in the loss of bone mass later. Many studies found smoking influences bone loss through demising intestinal calcium absorption, decreasing appetite for food and reduce body weight and including earlier onset of menopause (Clark & Sowers, 1996 as cited in Suzhen, 1998) Smokers have a higher incidence of osteoporosis than nonsmokers (Christiansen, 1991; Kulak & Bilezikian, 1998; Martin, 1998).

The literatures showed that described variables were related to man loss of bone mass. The investigator curiosity was whether the Huaiyot village health volunteers had received information on knowledge of osteoporosis described about. Therefore, the variables specified (as: age, estrogen deficiency, race, body weight ,low calcium intake, caffeine in coffee and tea, or phosphate in cola drink , lack of physical activity, caffeine and phosphate in cola drinks, alcohol intake, and smoking) were included in this study.

## **Osteoporosis Preventive Behavior**

Ali and Bennett (1992) conceptualized osteoporosis health behavior as promoting and protective behavior, which are related to osteoporosis prevention. The promotion behavior included improved nutrition and exercise. The preventive behaviors included adequate calcium intake beginning in the early years of life, exercise adherence, maintenance of healthy lifestyle pattern, and compliance with estrogen replacement therapy. Pender and other (1990) found that the health – promotion activities related significantly to better health status (Pender, Walker, Sechrist & Frank-Stromberg, 1990). Pender (1996) also said that focuses on efforts to

move away from or avoid the negatively valance states of illness and injury. Pender used the term health protecting behaviors and preventive behaviors interchangeably in her book.

Lindsay (1993) recommended that, prevention is likely to remain the most effective method of dealing with osteoporosis. Osteoporosis preventive behavior is a preventive strategy to protect the individuals from osteoporosis. Lindsay (1993) included ensuring adequate calcium and exercise, and the avoidance of habits detrimental to take skeleton (cigarettes and alcohol) as part of osteoporosis preventive behavior. There were reports describing ideas and finding on osteoporosis preventive behaviors: Alioli (1992) defined osteoporosis preventive behavior as the practices of a person that includes adequate dietary calcium consumption, appropriate exercise, and avoidance of risk factors. Wiliwan Tongjareun et al. (B.E.2539) defined osteoporosis-protecting behavior as the practices of a person to prevent herself from osteoporosis including decreasing or avoiding of risk factor, having sufficient calcium intake, and having regular exercise.

#### **Nutrition: calcium intake**

Calcium intake were found as part of osteoporosis preventive behaviors in many studies. Carter (1987) studied calcium intake in young adult women to derive at implications for osteoporosis risk assessment calcium intake from milk. A convenience sample consisted of 41 healthy women, aged 25 to 35 years, who were not pregnant, lactating, or menopausal. The results suggested that 31 of 41 subjects consumed less than 1,250 mg of calcium daily and were therefore, at risk for osteoporosis in late adulthood. Dawson- Hunghes and others (1987) studied dietary calcium intake and bone loss from the spine in healthy postmenopausal women. The subjects included 76 healthy Caucasian women aged 45-70 years in the Boston area. The results showed that women with a calcium intake of 405 mg/day lost spine density at a rate that was significantly greater than that of women with an intake of 777 mg/day (Dawson-Hunghes, Jacques, & Shipp, 1987). Dawrung Khunawutikunakorn (B.E.2543) studied awareness of the importance of calcium and consumption of calcium containing foods among secondary students of Surasakmontri School in 2000. The participants consisted of 360, both male and female students, attending seventh through ninth grades. The results showed that the majority of

students had a low level of consumption of calcium containing foods. There is  $555.03 \pm 247.45$  of calcium daily, estimated at 50% of the Recommended Daily Allowance (RDA) for calcium. Piaseu. (1994) studied calcium status and factors affecting calcium and bone status in healthy Thais living in Bangkok in 1994. The subjects included 396 healthy Thais (153 men, 243 women), aged 20-80 years. The results suggested that the mean  $\pm$  SD of daily calcium intake was  $361 \pm 168$  mg (men  $366 \pm 160$ , women  $359 \pm 189$  mg). The majority of the subjects (67%) consumed less than 400 mg calcium/day (low intake)

### **Physical activity**

Physical activity as part of osteoporosis preventive behaviors were found in many studies. Wilbur and others (1994) conducted a longitudinal study focused on aerobic fitness and body mass to prevent bone loss in 169 healthy midlife women aged 35-62 years in 1994. The results suggested that increased levels of aerobic fitness such as aerobic dancing, jogging, and running as well as body mass may prevent some of the bone loss that occurs in healthy midlife women (Willbur, Dan, Montgomery, & Homlm, 1994). Preisingar and others studied (1995) the effects of exercise to prevent loss of bone mass in menopausal women. The subjects included 146 menopausal women who were divided into three groups: the control group, the experimental group with regular exercise and the experimental group with no regular exercise. The results showed that the experimental group with regular exercise lost less bone mass than the experimental group with no regular exercise and the control group (Preisingar et al. as cited in Wiliwan Tongjareun et al., B.E.2539). Douchi and others (1999) studied the effects of physical exercise on body fat distribution and bone mineral density in postmenopausal women. The subjects were 57 postmenopausal women (mean age  $60.5 \pm 6.4$  years) who had exercised regularly for at least 2 years, and 130 age-matched controls were sedentary women. The results showed that regular aerobic physical exercise of at least 2 hours duration per week for at least 2 years. The exercises such as walking, jogging, volleyball or tennis playing, swimming, and aerobic may be more attributable to the decrease in body fat, and higher bone mineral density (BMD) in the dominant arm and lumbar spine than that in sedentary women (Douchi, Yamamoto, Oki et al., 2000). Proctor and others studied relative influence of physical activity, muscle mass and strength on bone density in

2000. The population-based sample of 348 men (aged 22-90 years) and 351 women (aged 21-93 years) were assessed for habitual physical activity levels over the preceding 12 months. The results suggested that the exercise using high energy leading to bone and muscle strengthening in women and men (Procter, Melton, Khosla, Crowson, O'Connor & Rigg, 2000).

#### **Avoidance of risk factors**

Avoidance of osteoporosis risk factors was found as part of osteoporosis preventive behavior. Krall and Hughes (1999) studied how smoking increased bone loss and decreased intestinal calcium absorption in 1999. The respondents consisted of 402 elderly men and women (32 smokers, 370 nonsmokers). The results suggested that smokers of at least 20 cigarettes per day had the lowest mean absorption fraction. Smoking accelerated bone loss from the femoral neck and total body in the elderly and that less efficient calcium absorption may be one contributing factor (Krall & Hughes, 1999). Hackshaw and Law (1995) conducted a meta-analysis of cigarette smoking, bone mineral density, and risk of hip fracture: recognition of a major effect. Meta-analysis of 29 published cross sectional studies reporting the differences in bone density in 2,156 smokers and 9,705 non-smokers according to age, and of 19 cohort and case-control studies according 3,889 hip fracture reporting risk in smokers relative to non-smokers. The results showed that in pre-menopausal women, bone density was smaller in smokers and non-smokers. In conclusion, hip fracture in old age is a major adverse effect of smoking after the menopause. In other word, smoking is a major cause of hip fracture (Hackshaw & Law, 1997).

Dempster and Lindsay (1993) also said that behavior modification should be done to intervene in symptom-free individuals. The many so-called risk factors that might increase the risk of osteoporotic fracture individual. The weight that can be given to any single group of risk factors is far from clear. Many of these factors are common to other diseases or markers of poor health, and their elimination often carries more benefits than mere reduction in fracture risk. Thus, patients should be encouraged to eliminate cigarette and alcohol use, improve their diet, and exercise more. Cigarette and alcohol are associated with an increased risk of osteoporotic fracture, alcohol not least because of the high prevalence of use among the elderly and the resultant increase in the risk of falls that can accompany overindulgence.

Avila and other (1991) investigated caffeine, moderate alcohol intake, and risk of fractures of the hip and forearm in middle-aged women in 1980. The subjects included women in the United States aged 34-59 years, with 593 forearm and 65 hip fractures. The results showed that women who consumed  $\geq 817$  mg caffeine per day had relative risk of hip fracture of 2.95 (95%, CI = 1.80-7.38) compared with nondrinkers consuming  $\geq 25$  grams of alcohol per day with relative risk of 2.33 (95%, CI = 1.18-4.57) for hip fracture. In summary, caffeine and alcohol consumption both increase the risk of osteoporotic fractures in middle-aged women (Avila, et al., 1991).

In summary, osteoporosis preventive behavior was clarified as the preventive strategies to protect the individuals from osteoporosis from many studies described. It includes ensuring adequate calcium and increase physical activity, avoidance of risk factors and behavior modification.

### **Self- Efficacy and Health Practice**

Self-efficacy is the belief in one's capabilities to organize and execute the sources of action required to manage prospective situations. Self-efficacy is a context-specific competence to perform a specific task or a range of tasks. Individuals would judge his or her capabilities in order to perform given actions (Bandura, 1986).

Since 1977, Bandura believed that an efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes. The strength of people's convictions in their own effectiveness determines whether they will even try to cope with difficult situations. People fear and avoid threatening situations they believe themselves unable to handle, whereas, they behave affirmatively when they judge themselves capable of handling successfully situations, that would otherwise intimidate them. Perceived self-efficacy not only reduces anticipatory fears and inhibitions but, through expectations of eventual success, it affects coping efforts once they are initiated. Efficacy expectations determine how much effort people will expend, and how long they will persist in the face of obstacles and aversive experiences (Bandura, 1977).

Fruin, et al. (1982) studied on 615 high school adolescent revealed that youths in the high self-efficacy condition indicated stronger intentions to exercise (Fruin, Pratt, Owen, 1982 as cite in Pender, 1996).

Areerat Tanopas (B.E.2540) quasi-experiment to assess the effectiveness of health education program on 80 samples aged 60-70 years in Manorom District of Chainat Province in 1996. Samples were the elderly who had hypertension or overweight problem. . The application of Self-Efficacy Theory and social support was used in the study program to prevent hypertension among the elderly people. The results showed significant relationship between self-efficacy and health preventive practice after having health education.

Punnapa Jitdamrongkhunti (B.E.2540) studied the effect of planned instruction and conventional instructional on breast self-examination behavior of females laborers in the medium industries in Bangkok by adapting Bandura's Self-Efficacy Theory for planned instruction in 1997. Sixty samples with aged 15-30 years were divided into two groups as experimental group and comparison group. The results revealed that the experimental group had higher knowledge and better practice than the comparison group with statistical significant ( $p < 0.001$ ), but there was no statistically significant difference between perceived efficacy and outcome expectation in both groups.

Parichatnont (2002) studied on 350 adult women in Palian , a district of Trang province, found adult women's perceive self efficacy on osteoporosis prevention was one of the predictive variables toward the osteoporosis preventive behavior

Piaseu (2002) intervention study in Thailand found that osteoporosis knowledge when mediate through attitudes and self-efficacy could predict young women behavior on calcium intake and exercise.

As the above identified research reports, there were studies on self-efficacy, the results showed the relationship between self- efficacy was found related to many of the preventive health behaviors. This study also aimed at exploration to scrutinize whether, there is any relationship and/or predictive value between the village health volunteers' self-efficacy, and their osteoporosis preventive behavior.

## **Knowledge and Osteoporosis Preventive Behavior**

Knowledge is an awareness or perception of reality acquired through learning or investigation. Knowledge concerns a specific subject component of a specific science, and is based on factual information. One also acquires knowledge about things and events of the subject matter of interest through experience. In health care systems, individuals' knowledge of their disease can help them cope with specific health problems (Chinn & Jacobs, 1987; Jones, 1982; Keck, 1994 as cited in Suzhen, 1998).

Since 1974, Baker explained that knowledge of diseases is the necessity cooperative factor for motivation of individuals to perceived risks of diseases and illnesses. Knowledge influence individuals health practice. The health behavior or practice rely on ones' believe of self -health positive out-come (Baker, 1974). Ten years later, Prapapen Suwan (B.E.2537) identified knowledge as a resource for intelligent and feeling. Knowledge help individuals to understand clearly on diseases. Beside, knowledge is the essential motivation factor for all individual practices. For health dimension, knowledge is the essential for individuals for the health practice, for the protection and restoration of health, and prevention of disease (Prapapen Suwan, B.E.2537).

Seven years later, Cook and others (1991) studied women who were given information about the risk of osteoporosis. The women completed the test after information about the risk of osteoporosis was given. The study revealed that women who had education beyond high school had higher scores on osteoporosis knowledge test. Beside, Cook's study also showed that women who were given information about the risk of osteoporosis were more likely to make positive lifestyle change (Cook et. al, 1991).

In 1996, Joakimsen, Sogard, Tollan, & Mgnus (1996) found that the Norwegians aged between 16-79 yeas old had fairly good general knowledge of osteoporosis. Women had better knowledge of osteoporosis than men; the older women, those at the highest risk of developing the disease, knew less about osteoporosis than the younger women.

As described before, the individuals' knowledge and osteoporosis preventive knowledge found were varied, according to the clients' general education, health information received, cultural and settings. This study also aimed at the assessment of the Huaiyot village health volunteers' osteoporosis knowledge and to explore the relationship and predictive value of the village health volunteers' osteoporosis knowledge and their osteoporosis preventive behavior.



## CHAPTER III

### MATERIALS AND METHODS

This descriptive analytical study aimed to describe the subjects' demographic characteristics, their knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention, and their osteoporosis preventive behaviors. The relationship between the subjects' demographic characteristics, knowledge of osteoporosis, self-efficacy of osteoporosis prevention, and their osteoporosis preventive behaviors were examined and their predictive values were explored. Research strategies and study location is clarified in this chapter.

#### **Study Site**

This study was conducted at Huaiyot District; Trang Province. This community consists of 16 sub-districts, 141 villages, and 19,044 houses. The total population for this area is 87,267 persons. There are women 43,436 (49.77%) and men 43,831 (50.23%).

Health of the Huaiyot district population is covered by Huaiyot Contracting Unit for Primary Care (Huaiyot-CUP). The CUP is the government cooperated unit perform by district hospital (Huaiyot Hospital) and the district health office (Huaiyot District Health Office). This Contracting Unit for Primary Care (CUP) is responsible for the health care of 87,267 population. The health infrastructure is connected through 22 Primary Care Units (PCU) and 1387 village health volunteers (VHVs). Among the volunteers, the majority (1350) is female and only 37 are males.

## Sample and Sampling Technique

The study sample was randomly selected from the population of 1,350 female village health volunteers of the Huaiyot Contracting Unit for Primary Care infrastructure. The sample size was calculated using Yamane's formula (Yamane, 1973) as the following:

$$n = \frac{N}{1 + N(e)^2}$$

When n = Sample size

N = Target population

e = The level of significant

For this study

$$n = \frac{1,350}{1 + 1,350(0.05)^2} = 309$$

Therefore, the sample size for this study was 309 randomly selected from the 1,350 female village health volunteer's population.

Sample selection was conducted by using the stratified random sampling.

### Step 1 Sub-district level

There were 16 sub-districts (tambols) in the Huaiyot District. Simple random sampling with out replacement was used to select 8 out of the 16 sub-districts. The 8 sub-districts of Bangdee, Huaiyot, Kaogob, Kaokhaw, Kaopoon, Pakkom, Thungto, and Wangkere were selected which represented 50 percent of the Huaiyot District geographical locations.

### Step 2 Primary Care Unit (PCU) level

There are 1 or 2 Primary Care Unit (PCU) in each of the 8 selected sub-district which formed the total of 11 PCUs. All of these 11 PCUs became the study site for the data collection.

### Step 3 village health volunteers s level

Due to the difference in number of village health volunteer's population in each PCU, the sample size of village health volunteers in each PCU therefore varied upon the proportion of the village health volunteers population in each PCU. Number of the 309 total sampled village health volunteers derived from the sampled village health volunteers in each of the 11 PCUs. The proportion allocation was used for the calculation of volunteer sample allocation from each PCU from the total village health volunteer's population.

The number of sampled village health volunteers from each sub-district was calculated using a proportional allocation formula as follows:

$$\text{VHVs sample in each sub-district} = \frac{\text{Total sample need} \times \text{No. VHVs' population in sub-district}}{\text{No. Pop. VHVs from 8 sub-district}}$$

Example:

$$\text{No. of sample VHVs in Bangdee sub-district} = \frac{309 \times 127}{731} = 54$$

Thus, the 54 village health volunteers were randomly (with out replacement) selected from Bangdee sub-district name list. This samples allocation would apply in other sub-district, which had only one PCU as well.

However, there are some sub-districts, which have more than one PCU in the sub-district, the calculation for number of samples village health volunteers from each PCU would be continued in the same manner.

$$\text{Number of samples VHVs in each PCU} = \frac{\text{Total sample needed} \times \text{No. VHVs pop. in PCU}}{\text{No. of VHVs' population in the sub-districts}}$$

Example:

$$\text{Number of VHVs in Bangdee PCU} = \frac{54 \times 74}{127} = 32$$

The number of sampled village health volunteers for the rest were calculated in the same manner as shown in the above examples. The summarized number of sampled village health volunteers from each PCU is show in Table 1.

**Table 1** Number of the sampled village health volunteers classified by sampling Sub-Districts and Primary Care Unit (PCU)

Sub- districts	No. of PCU	VHVs	The number of sampled VHVs in sub- districts	Number of VHV	The number of sampled VHVs from PCU
Bangdee	2	127	54	Bangdee PCU (74) Prujud PCU (53)	32 22
Huaiyot	2	110	46	Huaiyot PCU (50) Tesaban Huaiyot PCU (60)	21 25
Kaogob	2	133	57	Kaogob PCU (70) Nongpreu PCU (63)	30 27
Kaokhaw	1	65	27	Kaokhaw PCU (65)	27
Kaopoon	1	59	25	Kaopoon PCU (59)	25
Pakkom	1	92	39	Pakkom PCU (92)	39
Thungto	1	81	34	Tungto PCU (81)	34
Wangkere	1	64	27	Wangkere PCU (64)	27
Total	11	731	309	11 PCUs (731 inhabitants)	309

#### Step 4 Specified sampled village health volunteers

Since all village health volunteers were registered and recorded in the PCU computer, printing the name list of all the village health volunteers from each sampled PCU was done. Using simple random sampling with out replacement to pick up the sampled village health volunteers names from each PCU until reaching the number as calculated. Repeated the described procedures in all 11 sampled PCUs. All sampled village health volunteers' name and locations were indicated.

All sampled village health volunteers were visited by the investigator. The research and data collection process was explained and requested to consent to study was made.

### Research instrument

The overall instrument used in this study was an anonymous self-report questionnaire. There were four parts: demographic characteristics, knowledge of

osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior.

### **Part 1: Demographic Characteristics**

The Demographic characteristic was developed by the investigator. This part of the questionnaire contained the self-assessment questions on subject's personal data included sample's age, marital status, education level, occupation, family income and duration of being village health volunteers.

### **Part 2: Knowledge of Osteoporosis**

The Facts on Osteoporosis Quiz (FOOQ) was used to assess knowledge of osteoporosis. The original instrument was developed in English by Ailinger et al., (1998). The instrument had content validity judged by two nurse experts who were conducting clinical research on osteoporosis. Each item of the instrument was assessed for relevance and accuracy on a score of 1 (not relevant), 2 (somewhat relevant), 3 (quite relevant), and 4 (very relevant). The content validity index measured the proportion of agreement between the experts on items assigned a "3" or "4". The content validity index was .92. Six items considered by the experts as "somewhat" or "not relevant or accurate" were dropped from the original 34-item version. The construct validity was tested by using item analysis on the remaining 28 items. Three items were deleted since they did not meet criteria for item difficulty and/or item discrimination. The internal consistency of the FOOQ was .83 for the 104 women (Ailinger, Harper, & Lasus, 1998 as cited in Aree-Ue, 2004). Ailinger and Emerson (1998) reported that internal consistency reliability was .84 in a study on 247 women.

The FOOQ was translated into Thai by Aree-Ue and Pothiban (2003). The internal consistency reliability was .89 in a study on 111 Thai older adults. The FOOQ Thai version was used with permission for this study. The FOOQ consists of 25 items with a 3-choice format: true, false, and don't know. There are eight items reflecting general facts about osteoporosis, seven items related to osteoporosis preventive behavior, and 10 items related to osteoporosis risk factors. A score of 1 is given for a

correct answer and 0 for the incorrect one or for the answer “don’t know”. The total possible score on FOOQ is 25. Higher scores indicate more knowledge of osteoporosis (Aree-Ue, 2004). In this study, the reliability was conducted in 30 village health volunteers using Kuder-Richardson Formula 20 (KR-20) test. The reliability .57 was found.

### **Part 3: Perceived Self-Efficacy of Osteoporosis Prevention Questionnaire**

The Perceived Self-Efficacy of Osteoporosis Prevention Questionnaire was used. This questionnaire was created by Sirima Khemaphech (B.E.2540) based on Bandura’s concept of self-efficacy, which used to measure self-efficacy associated with osteoporosis preventive behavior in menopausal women (Sirima Khemaphech, B.E.2540). Parichatnont (2002) had modified the instrument for her research in adult women living in Palian District, Trang Province and had given permission to be used in this study.

The Perceived Self-Efficacy of Osteoporosis Prevention Questionnaire is the 17 items self-report questionnaire. It consists of a 3-choices format answer: yes, no, and not sure. The samples’ answer on each of the questions was scored on two-point from “no” or “not sure”=0 to “yes”=1, all of which has positive meaning. The total scores for the perceived self-efficacy of osteoporosis prevention questions were 17 scores. Higher scores indicate perceived higher self-efficacy of osteoporosis prevention (Parichatnont, 2002). The internal consistency reliability of the Perceived Self-Efficacy of Osteoporosis Preventive Behavior Questionnaire reported in Parichatnont’s study which was conducted on adult women aged 30-44 years was .95 (Parichatnont, 2002).

The perceived self-efficacy of osteoporosis prevention questionnaire was approved for the content validity. This study used the instrument with the same personal characteristic group of subjects who live in the same Trang province. So, the researcher didn’t re-modify nor re-proved for this instrument validity. In this study, the reliability was conducted in 30 village health volunteers using Cronbach’s Alpha Coefficient. The reliability of 0.75 was found.

#### **Part 4: Osteoporosis preventive behaviors questionnaire**

The Osteoporosis Preventive Behavior questionnaire was created by Prasitiphol (1999). The instrument was used as a measurement tool for her study on pre-menopausal women osteoporosis preventive behavior in Suphanburi Province. The questionnaire consisted of 23 osteoporosis preventive behaviors items. The individual construct item was scored on a two-point scale ranging from: “not practice”=0 to “practice”=1. This instrument yielded an overall Cronbach’s alpha of .87 (Prasitiphol, 1999).

Later in 2001, Teraroganawong had modified the instrument, the 7 out of the 23 items in the original instruments were discarded according to experts commented. The reasons for deletion of the 7 items were because some of those items were not relevant to osteoporosis preventive behavior and some of those items wording used in describe osteoporosis preventive behavior in items measuring nutrition, physical activity, and avoidance of risk factors was too complicated and similar. Then instrument was piloted in 30 pre-menopausal women. This instrument firstly gave relatively poor Cronbach’s alpha. In order to increase internal consistency of this instrument, one item was eliminated, 4 items were revised, and 2 items were added. Consequently, this revised questionnaire yielded an overall Cronbach’s alpha of .54 in the second pilot study (n=40). The reliability on 333 pre-menopausal women in Nakorn Srithamarat had overall Cronbach’s alpha of .61 (Teraroganawong, 2001).

Teraroganawong revised Osteoporosis Preventive Behavior Questionnaire consisted of 17 items: 5 items reflecting nutrition behavior, 6 items related to exercise behavior, and 6 items related to avoidance of risk factors of osteoporosis. There were 6 negatively and 11 positively-worded items. The individual construct item was scored on the three point scale ranging from “not practice”=0, “sometimes practices”=1 and “always practices”=2. Scores on negative-worded items were reversed prior to data analysis. The total scores for this part of questions were 34 scores. Higher scores indicate good osteoporosis preventive behavior (Teraroganawong, 2001).

Prior to be used in this study, this part of the instrument was used for Teraroganawong study on 333 healthy adult living in Nakorn Srithamarat Province, the Southern part of Thailand. The internal consistency reliability of this measuring

instrument was .54 (Teraroganawong, 2001). Trang population is more similar to Nakorn Srithamarat population than Suphanburi Population. In spite of Teraroganawong instrument had overall Cronbach's alpha of .61 and Prasitiphol original developed instrument had overall Cronbach's alpha of .87, Teraroganawong modified instrument, with permission, was used in this study. With a similar characteristic population, the instrument was with out validated for the content. In this study, the reliability was conducted in 30 village health volunteers using Cronbach's alpha coefficient. The internal reliability was 0.61.

### **Data Collection**

After the research proposal was introduced and explained to the Haiyot District Health Officer and Haiyot Hospital Director, the sampled PCUs were contacted by the investigator. Scheduled for data collection was made at ease of the sampled village health volunteers and PCUs. The investigators collected data collection during May to August 2005. The data was collected on Saturday and Sunday between 8.30 a.m. to 6.30 p.m. At each PCU collective point, the investigator introduced and gave descriptive, objectives and expected outcome of the study to the group of sampled village health volunteers. The village health volunteers were assured that their participation would not have adverse effects on them. Confidentiality was addressed, and data were collected anonymously. The information consent forms were signed before village health volunteers participate in completion of the self-report questionnaires. Total time spent in giving instructions and filling out the questionnaires was about 20-30 minutes.

At the end of each questionnaires completion session, all subjects were thanked for their participation in the study and brochures about osteoporosis prevention were given. The researcher checked for completion of the self-report papers before leaving the study site. Data editing was done on daily basis. The data processing was done and database was prepared for statistical analysis.

## Data analysis

The data was analyzed by using Special Package Program for Social Sciences (SPSS version 10.0) computer program. The data analysis was divided into two parts:

**1. Descriptive statistics:** Percentage, frequency, mean, and standard deviation were calculated to describe the samples' demographic characteristic, scores of knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors.

**2. Inferential statistics**

2.1 Pearson's Product Moment Correlation Coefficient was performed to examine relationships between each of these variables: demographic characteristic, knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors.

2.2 Stepwise Multiple Regressions was used to investigate predictions among demographic characteristic, knowledge of osteoporosis and perceived self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors.

## CHAPTER IV

### RESULTS

The present study was a cross sectional survey research, aimed to determine the village health volunteers' osteoporosis preventive behaviors. The factors that related to osteoporosis preventive behaviors were also explored. In this chapter, the results are presented in tables with interpretation in the following order:

Part I: Samples Descriptions

Part II: The Results of Hypothesis Testing

#### **Part I: Samples Descriptions**

The descriptions of village health volunteers' demographic characteristics knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior were analyzed as showed in Table 2-6.

Table 2 describes the details on samples' demographic characteristics (age, marital status, education level, occupation, family income, and duration of being village health volunteer). Out of the 309 subjects village health volunteers whose ages were between 20-59 years old (Mean = 43, SD= 7.82), almost half of them (42.7 %) ages were between 40-49 years old. More than three forth (82.8 %) were married, minority in number were those who were single, widowed, divorced, or separated all together which formed less than twenty percent (17.2 %) of the sampling population. Almost half of them had 4 years' formal primary education (41.7 %). About one forth (24.9 %) of the over all health volunteers had higher formal education up to 6 years. There is one volunteer who had no formal education at all. However, she could read and write Thai well. More than half of the studied population (57 %) was agriculturists.

As the Royal Thai Government Statistical Report, the Trang Provincial Administrative Committee Report (2547) on family's average income was about 6,500 baht per month, the samples health volunteers were classified as low and high family

income by using this provincial income figure. Although the average income of this studied samples seems to be higher than the average provincial populations (Mean=7,442, SD = 4,832), more than half of the volunteers (54.4 %) had income less than the average income of Trang provincial population (<6,500 Bath/ month). Only less than half (45.6 %) of samples had higher income ( $\geq$ 6,500 Baht/ month) than average population.

The sample duration of work as village health volunteers were examined, nearly half of samples (41.1 %) had been working as a volunteer less than 6 years. Among all of 309 subjects, 16 of them has been working as the village health volunteer for more than twenty years (range = 1-29, Mean = 8.6, SD = 6.39).

**Table 2** Number and percent of samples' demographic characteristics (n=309)

Demographic characteristics	Number	%
<b>Age (years)</b>		
20-29	14	
30-39	94	
40-49	132	4.5
50-59	69	30.4
(Mean = 42.86; SD =7.82 ;Range =22-59)		42.7
		22.3
<b>Marital status</b>		
Married	256	82.8
Single/ Widowed/ divorced/ separated	53	17.2
<b>Education level (years)</b>		
0	1	0.3
1-4	129	41.7
5-6	77	24.9
7-9	50	16.2
10-12	38	12.3
>12	14	4.5
(Mean = 6.82; SD =3.4 ;Range =0-16)		

**Table 2** Number and percent of samples' demographic characteristics (n=309) (cont.)

Demographic characteristics	Number	%
<b>Occupation</b>		
Agriculturists	176	57.0
Non-griculturists	133	43.0
<b>Family income *(Baht/ month)</b>		
Low (<6,500)	168	54.4
High (≥6,500)	141	45.6
(Mean = 7,442; SD =4,832; Range = 1,500-35,000)		
<b>Duration of being village health volunteers</b>		
1-5 years	127	41.1
6-10 years	80	25.9
11-15 years	51	16.5
16-20 years	35	11.3
20 years or over	16	5.2
(Mean =8.6; SD = 6.39; Range =1-29)		

\*Family income (6,500 Baht/ month) was based on the average income of people living in Trang in 2004

Possible range, actual range, mean, percent average, and standard deviation, on samples' knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors were illustrated in Table 3.

The total knowledge of osteoporosis scores reported by sample ranged between 7 to 23, with the maximum possible score of 25. Their mean score was 15.63, which was 62.54 percent of total score. The village health volunteers have had least knowledge of osteoporosis on the general facts of osteoporosis (61.16%) and have had most knowledge of osteoporosis on the preventive behavior (63.34%).

The total perceived self-efficacy mean score of the village health volunteers was 13.50, which was 79.37 percent of total score. The perceived self-efficacy part that the sample group have had most perceived self-efficacy was avoidance of risk factors (81.41%) and the least was physical activity (73.71%).

The village health volunteer at Huaiyot District had mean score on osteoporosis preventive behavior equal 20.10, which was 59.10 percent of total score. The most and the least osteoporosis preventive behavior were avoidance of risk factors (68.80%) and physical activity (47.82%), the same order as perceived self-efficacy score.

**Table 3** Scores on subjects' self-report classified by their knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors (n=309)

Variables	Possible Range	Actual Range	Mean	(%) average	SD
<b>Knowledge of osteoporosis</b>	0-25	7-23	15.63	62.54	3.26
- General facts	0-8	1-8	4.89	61.16	1.67
- Preventive behavior	0-7	1-7	4.43	63.34	1.51
- Risk factors	0-10	1-10	6.31	63.07	1.74
<b>Perceived self-efficacy</b>	0-17	3-17	13.50	79.37	2.79
- Nutrition	0-7	2-7	5.66	80.90	1.24
- Physical activity	0-4	0-4	2.95	73.71	1.13
- Avoidance of risk factors	0-6	0-6	4.89	81.41	1.30
<b>Osteoporosis preventive behavior</b>	0-34	8-29	20.10	59.10	3.53
- Nutrition	0-10	2-10	6.10	61.03	1.63
- Physical activity	0-12	0-11	5.74	47.82	2.16
- Avoidance of risk factors	0-12	3-12	8.26	68.80	1.76

Table 4 describes the details on samples' knowledge of osteoporosis. Regarding the subjects' self-report of their knowledge on the general fact of osteoporosis, only 28.5 percent of the volunteers had correct knowledge on the normal bone loss after menopause. About half (59.9 %) of them knew that the dairy products are a major source of calcium. However, the 69.9 percent of the volunteers know that "There is no treatment for osteoporosis once develops it".

The analysis of subjects' self-report on knowledge on preventive behavior showed that less than half (41.1 %) of the village health volunteers knew that the walking is not weight-bearing exercises which could help prevent osteoporosis. There were some major parts of the volunteers (64.1 %) who gave correct answer on "After age 40, it is too late for people to increase their calcium intake to prevent osteoporosis", "After menopause, osteoporosis may be slowed down by estrogen.", "Diet high in calcium throughout life can help prevent osteoporosis.", and "there is no way to prevent osteoporosis". Majority of samples (77.7%) had correct knowledge on "Inactivity increases the risk of osteoporosis".

The analysis of subjects' self-report on knowledge of osteoporosis risk factors revealed that about one third (33%) of the village health volunteers knew that White women are more affected by osteoporosis than African-American women. There were

some major parts of the volunteers (54.4%) who gave correct answer on “Early menopause, such as after a hysterectomy, is risk factors for osteoporosis”, “Thin women are more often affected by osteoporosis than heavy women” (58.3%). Majority of samples (81.9%) had correct knowledge on “One in four women over the age of 60 will develop osteoporosis”.

**Table 4** Number and percent of samples’ correct responses on knowledge of osteoporosis (n=309)

Item No	Knowledge of osteoporosis	Correct Responses	
		n	%
<b>General facts</b>			
2.12	There is no treatment for osteoporosis once develops it.	216	69.9
2.14	All individuals loss bone mass after 40 years of age. *	214	69.3
2.3	Heredity dose not plays a role in osteoporosis.	213	68.9
2.24	Alcohol abuse is not linked to the incidence of osteoporosis.	205	66.3
2.18	Women over 40 need about 1,500 mg of calcium. *. <sup>a</sup>	199	64.4
2.22	It is normal for bone loss to continue throughout life. *	192	62.1
2.21	Dairy products are a major source of calcium. *	185	59.9
2.16	Normally, bone loss slows down after menopause.	88	28.5
<b>Preventive behavior</b>			
2.2	Inactivity increases the risk of osteoporosis. *	240	77.7
2.7	Young women need the equivalent in calcium of a glass of milk a day to prevent osteoporosis.	211	68.3
2.11	After age 40, it is too late for people to increase their calcium intake to prevent osteoporosis	198	64.1
2.13	After menopause, osteoporosis may be slowed down by estrogen. *	198	64.1
2.17	Diet high in calcium throughout life can help prevent osteoporosis. *	198	64.1
2.19	There is no way to prevent osteoporosis.	198	64.1
2.10	Weight-bearing exercises such as walking can help prevent osteoporosis.	127	41.1
<b>Risk factors</b>			
2.1	One in four women over the age of 60 will develop osteoporosis.*	253	81.9
2.6	A lifetime low intake of calcium will increase the risk of osteoporosis. *	220	71.2
2.25	Risk factors for osteoporosis is having a mother with it. *	209	67.6
2.15	Africans have a higher risk of osteoporosis than Asians.	207	67.0
2.23	Active women are at higher risk for osteoporosis than inactive women.	207	67.0
2.8	Smoking is not a risk factor for osteoporosis.	206	66.7

**Table 4** Number and percent of samples' correct responses on knowledge of osteoporosis (n=309) (cont.)

Item No	Knowledge of osteoporosis	Correct Responses	
		n	%
<b>Risk factors</b>			
2.5	High caffeine intake (more than 2 cups per day) increases the risk of osteoporosis. *	197	63.8
2.9	Thin women are more often affected by osteoporosis than heavy women. *	180	58.3
2.4	Early menopause, such as after a hysterectomy, is risk factors for osteoporosis. *	168	54.4
2.20	White women are less affected by osteoporosis than African-American women.	102	33.0

\* True answers indicated by an asterisk .

<sup>a</sup> This item has been revised based on the national Institutes of Health Consensus Conference (1994) to read, "postmenopausal women not on estrogen therapy need 1500 mg of calcium per day."

Table 5 presents the samples' perceived self-efficacy of osteoporosis prevention in details. The self-report of village health volunteers perceived self-efficacy of osteoporosis prevention on nutrition behavior showed that more than 80 percent of subjects perceived that they had perceived self efficacy on most nutrition items. Those items of nutrition perceived self efficacy were : "I can eat dried shrimp, small fish, shrimp paste and canned fish at least - 2 times weekly" (90%), "I can eat green vegetables such as spinach, collard, or a water mimosa every day" (90%), "I can drink at least 1 glass or 1 box of milk every day" (89.6%), "I can eat low fat diets (83.5%), I can eat egg or fish 3 to 4 times weekly" (80.3%), and "I can eat bean curd or monk bean, red bean, peanut 1-2 times per week" (80.3%). Except the only one item "I can eat sesame-black or sesame-white once a week" which only 52.8 percent of village health volunteers perceived that they had self-efficacy on this matter.

Regarding the village health volunteer perceived of self-efficacy on the physical activity, 49.8 percent of the volunteers perceived that they "can exercise to increase heart rate and sweat". The 79.3 percent of them perceived that they "can set leisure time to exercise such as brisk walking, jogging, or aerobic dancing". Most of the village health volunteers (85.8 %) positively perceived that they "can exercise at least 20 to 30 minutes each time".

The village health volunteers self-report of perceived of self-efficacy on avoidance of risk factors was analyzed. The 59.9 percent of the volunteers perceived that they "can lift heavy things from the floor by bending my knees and straight my

back”. The 77.3 percent of them perceived that they “can sleep at least 6 to 8 hours daily. Over ninety percent of the village health volunteers (91.13 %) positively perceived that they “can stop or avoid alcohol drinking”.

**Table 5** Number and percent of samples’ perceived self- efficacy of osteoporosis prevention (n=309)

Item No	perceived self- efficacy of osteoporosis prevention	Positive perceived	
		n	%
<b>Nutrition</b>			
3.2	I can eat dried shrimp, small fish, shrimp paste and canned fish at least - 2 times weekly.	278	90.0
3.4	I can eat green vegetables such as spinach, collard, or a water mimosa every day	278	90.0
3.1	I can drink at least 1 glass or 1 box of milk every day.	277	89.6
3.6	I can eat low fat diets	258	83.5
3.3	I can eat egg or fish 3 to 4 times weekly	248	80.3
3.5	I can eat bean curd or monk bean, red bean, peanut 1-2 times per week	248	80.3
3.7	I can eat sesame-black or sesame-white once a week	163	52.8
<b>Physical activity</b>			
3.10	I can exercise at least 20 to 30 minutes each time	265	85.8
3.9	I can exercise at least 3 to 5 times weekly	247	79.9
3.8	I can set leisure time to exercise such as brisk walking, jogging, or aerobic dancing	245	79.3
3.11	I can exercise to increase heart rate and sweat	154	49.8
<b>Avoidance of risk factors</b>			
3.13	I can stop or avoid alcohol drinking.	282	91.3
3.12	I can stop or avoid smoking cigarette.	279	90.3
3.16	I can walk, sit, stand straight.	270	87.4
3.14	I can decrease or avoid drinking a lot of coffee	255	82.5
3.15	I can sleep at least 6 to 8 hours daily	239	77.3
3.17	I can lift heavy things from the floor by bending my knees and straight my back.	185	59.9

Table 6 presents the sample’ osteoporosis preventive behavior in details. Regarding to the village health volunteers’ self-report of osteoporosis preventive behavior on nutrition behavior, although over 30 percent of sample reported that they always ate 2 to 3 eggs a week and ate dark-green leafy vegetables such as spinach, collard, or a water mimosa approximately 1 measuring cup (s) a week, there were

about 20 percent of them who reported of not eating egg (23.9 %) or eating green vegetable (18.8 %). There were only 29.4 percent of the volunteers who reported that they always drank milk, yogurt or skimmilk 1 to 3 glasses a day and 12.3 percent of the subjects reported that they did not drink milk, yokurt or skim milk. The 57.3 percent of the health volunteers reported of having had always ate dried shrimps, small fish, shrimp paste, canned fish or crisp-dried fish about 1 to 2 measuring cup (s) a week while another 10 percent of the volunteers reported of not eating those fish or shrimp.

The subjects reported of osteoporosis preventive behavior regarding physical activity was examined. There were only 12 percent of the volunteers who reported that they got light sunshine in the morning at least 10 to 15 minute a day, and the 49.2 percent of the health volunteers reported that they did not expose get sunshine in the morning for at least 10-15 minute. The 46.3 percent other village health volunteers who reported of “not practice” on “exercised 20 to 30 minutes at least 3 times a week”. Beside, the 20.7 percent of the subjects reported of “not practice” on “did household chores such as cleaning, washing or sweeping or did hobbies such as gardening for 30 minutes a day continuously”.

Regarding avoidance of risk factors toward the osteoporosis preventive behavior which the subjects were asked to complete the self-report questionnaire on their “always practice”, “sometime practice” or “not practice” on the negative health behavior list (risk factors). The majority of the samples reported that they had never smoked cigarette or tobacco (90.9%) and never drank one or two glasses of alcohol a day (89.3%), whereas only few of them always smoke (1.6%) and always drank (2.6%). Although one-fifth (20.7%) did not bend down to lift heavy objects from the floor, but some of them always (19.4%) and sometimes (59.9%) did it. In addition, only 57.3% of them did not sit for a long time.

**Table 6** Percent of samples' osteoporosis preventive behavior (n=309)

Item No	Osteoporosis preventive behaviors	Not practice	Practice	
			sometimes	always
<b>Nutrition</b>				
4.2	I ate 2 to 3 eggs a week.	23.9	46.0	30.1
4.5	I ate dark-green leafy vegetables such as spinach, collard, or a water mimosa approximately 1 measuring cup (s) a week.	18.8	49.8	31.4
4.1	I drank milk, yogurt or skimmilk 1 to 3 glasses a day.	12.3	58.3	29.4
4.3	I ate dried shrimps, small fish, shrimp paste, canned fish or crisp-dried fish about 1 to 2 measuring cup (s) a week.	10.0	32.7	57.3
4.4	I ate dried peanut, soya or peanut products 1 to 2 measuring cup (s) a week.	8.1	56.6	35.3
<b>Physical activity</b>				
4.11	I got light sunshine in the morning at least 10 to 15 minute a day.	49.2	38.8	12.0
4.7	I exercised 20 to 30 minutes at least 3 times a week.	46.3	40.1	13.6
4.8	I did household chores such as cleaning, washing or sweeping or did hobbies such as gardening for 30 minutes a day continuously.	20.7	51.5	27.8
4.9	I exercised until you felt tired and heart rate increased.	20.1	48.5	31.4
4.6	I exercised by doing physical exercise, walking, or running.	15.5	58.9	25.6
4.10	I often changed positions.	13.9	56.6	29.4
<b>Avoidance of risk factors</b>				
4.12	I smoked cigarette or tobacco.*	90.9	7.4	1.6
4.13	I drank 1 to 2 glasses of alcohol a day.*	89.3	8.1	2.6
4.15	When I was sick, you bought drugs by yourself. *	42.1	40.8	17.2
4.14	I drank more than 2 glasses a day of coffee or tea. *	35.0	48.9	16.2
4.16	I had to sit for a long time. *	23.6	57.3	19.1
4.17	I must bend down to lift heavy objects from the floor. *	20.7	59.9	19.4

\* An asterisk indicates negative health practice.

## Part II: The Results of Hypothesis Testing

The association between sample's demographic characteristics, knowledge of osteoporosis, perceived self-efficacy of osteoporosis and the osteoporosis preventive behavior among female village health volunteers were explored. The Pearson's product moment correlation was used to find the relationship among the described variables. Then Stepwise Multiple regression was utilized to explore the predictive values of the studied factors, which may influence the studied village health volunteers' osteoporosis preventive behaviors.

### Hypotheses I:

The first hypothesis stated that “there is a relationship between village health volunteers' demographic characteristics (age, education level, marital status, occupation, family income, and duration of being village health volunteer), knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention and their osteoporosis preventive behaviors.”

The Pearson's product moment correlation was conducted to explore the relationship between demographic characteristic (age, marital status, education level, occupation, family income, and duration of being village health volunteer), knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention and osteoporosis preventive behaviors.

Education level had a statistically significant positive correlation with the osteoporosis preventive behaviors scores level ( $r = .337, p < .01$ ). The higher the education levels (years) the greater the possibility that these village health volunteers would have higher scores on osteoporosis preventive behaviors.

Family income had a statistically significant positive correlation with the total osteoporosis preventive behaviors scores ( $r = .132, p < .05$ ). The higher the family income (baht) the higher the possibility that these village health volunteers would have higher scores on osteoporosis preventive behaviors.

The results found there was statistical significant correlation between studied samples' osteoporosis preventive behaviors and duration of being village health volunteer ( $r = .159, p < .01$ ). Those who had higher duration of being village health

volunteers (years) were village health volunteers who would have the higher osteoporosis preventive behaviors score.

It was also found that there was statistically significant relationship between osteoporosis preventive behaviors and knowledge of osteoporosis ( $r = .366, p < .01$ ). The higher scores of their knowledge of osteoporosis, the higher scores they might had in osteoporosis preventive behaviors.

In addition, perceived self-efficacy of osteoporosis prevention scores was also found highly correlated with osteoporosis preventive behaviors ( $r = .737, p < .01$ ). This means that village health volunteer' higher scores on their perceived self-efficacy of osteoporosis prevention would helped the village health volunteer to have higher score on osteoporosis preventive behaviors.

However, age, marital status, and occupation were found not statistical significant associated with the osteoporosis preventive behaviors ( $p > 0.05$ ). These findings are presented in Table 7.

**Table 7** Pearson's product moment correlation between variables.

Variables	1	2	3	4	5	6	7	8	9
1. Age	1.000								
2. Marital status	.049	1.000							
3. Education level	-.407**	-.219**	1.000						
4. Occupation	.044	.021	-.013	1.000					
5. Family income	.015	.080	.134*	.136*	1.000				
6. Duration of being VHVs	.333**	.072	-.119*	.053	.077	1.000			
7. Knowledge of osteoporosis	-.019	-.075	.551**	.007	.128*	.414**	1.000		
8. Perceived self-efficacy of osteoporosis prevention	.037	-.051	.141*	.029	.129*	.172**	.216**	1.000	
9. Osteoporosis preventive behaviors	-.039	-.055	.337**	.036	.132*	.159**	.366**	.737**	1.000

\* $P < .05$ , \*\* $P < .01$

Note: Marital status (0=single ,devorce or widow, 1=married), Occupation (0= non -agriculture , 1=agriculture )

### **Hypotheses II:**

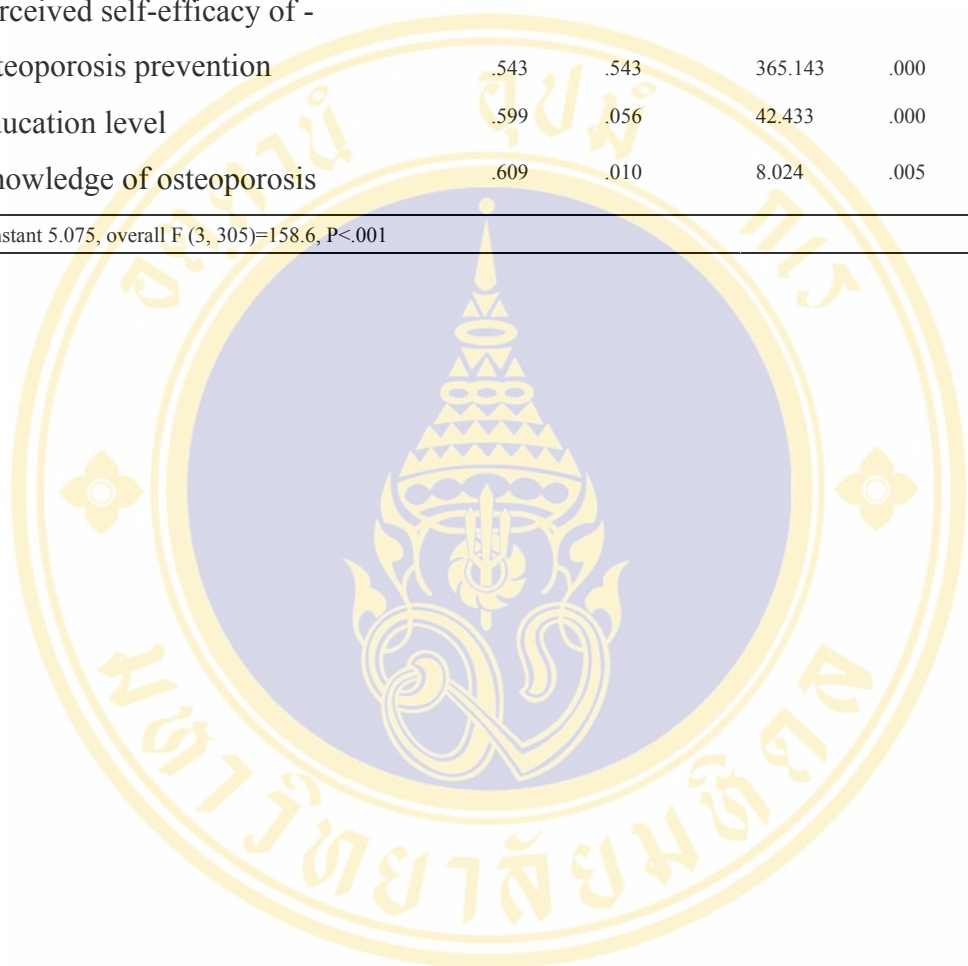
The second hypothesis stated that “village health volunteers’ demographic characteristic (age, marital status, education level, occupation, family income, and duration of being village health volunteers), knowledge of osteoporosis and self-efficacy of osteoporosis prevention are incorporated predictors of their osteoporosis preventive behavior”.

The stepwise multiple regression analysis was started, perceived self-efficacy of osteoporosis prevention score was the first variable that entered into the equation and could explained 54.3 percent ( $F_{1,307} = 365.14$ ,  $p < .001$ ) of osteoporosis preventive behavior. Then analysis was continued, education level was the second variable that entered the model. This second equation indicated that when education level entered the model, the predictability value increased 5.6 percent ( $F$  change = 42.433,  $p < .001$ ). The analysis was still proceeded, the knowledge of osteoporosis was the third variable entered the model, which increased 1 percent with predictability ( $F$  change = 8.024,  $p < .05$ ). Then the analysis was completed with the R square value of the last equation was .609 ( $F_{3,305} = 158.46$ ,  $p < .001$ ). There for, the result revealed that, perceived self-efficacy of osteoporosis prevention, education level, and knowledge of osteoporosis were cooperated to explain the village health volunteers’ osteoporosis preventive behavior scores. Thus the results partially supported hypothesis 2 (in Table 8).

In other word, osteoporosis preventive behavior scores could be predicted by equation: Osteoporosis preventive behavior scores = 5.075+.868 (perceived self-efficacy of osteoporosis prevention scores)+.179 (education level)+.133 (knowledge of osteoporosis scores).

**Table 8** Factors predicting osteoporosis preventive behavior

<b>Variables</b>	<b>R square</b>	<b>R square change</b>	<b>F change</b>	<b>sig F change</b>	<b>B</b>
Perceived self-efficacy of - osteoporosis prevention	.543	.543	365.143	.000	.868
Education level	.599	.056	42.433	.000	.179
Knowledge of osteoporosis	.609	.010	8.024	.005	.133
Constant 5.075, overall F (3, 305)=158.6, P<.001					



## CHAPTER V

### DISCUSSION

In this chapter, the result of data analysis, the experience of the investigator during data collection, and the findings of prior research will be discussed. The investigator's recommendations will also be incorporated in this chapter.

#### **Demographic Characteristic**

The village health volunteers' personal characteristics included education, family income and duration of work as a volunteer shown in Table 2. There were 309 female subjects, between 20-59 years of age. The average income of this studied samples was higher than the average provincial populations (mean=7,442, SD = 4,832). However, more than half of the volunteers (54.4%) had income less than the average income of the Trang Provincial population. Trang Province Official Report (2004) indicated Trang household income of 6,500 Baths per month (Trang Province Yearly Report, 2004). Moreover, National Statistics Office (2004) reported the national household income of 14,963 baht per month. It indicated that the subjects in this study had lower household income than the Trang province and National population groups.

#### **Knowledge of osteoporosis**

Knowledge of osteoporosis scores reported by this study sample ranged between 7 and 23, with the maximum possible score of 25. The subjects' knowledge of osteoporosis percent average mean scores was 62.54 (Mean =15.63, SD= 3.26). Haiyot village health volunteers having had a commitment to meet each other at least once a month. The group meets in order to share knowledge of community health problems. They also get health information for better health preventive behaviors from the Haiyot health team. It is possible that this type of meeting help volunteers

who had been working longer to have better health education as well as greater knowledge of osteoporosis. Sedlak and other (2000) experimental study in young women, showed that clients could acquire new knowledge and skills to deal with osteoporosis preventive behavior health education (Sedlak, Doheny, & Estok, 2000).

When considering samples' response on each individual item of the knowledge of osteoporosis question, the findings showed that the sample had scores higher than 50 percent of total score except for item 2.16 "Normally, bone loss slows down after menopause" and item 2.10 "Weight-bearing exercises such as walking can help prevent osteoporosis" (in Table 4). Responses from the sample to these items reflected that the sample might obtain inadequate information regarding risk factors for osteoporosis including relationships between level of hormone and bone loss, weight bearing exercise and osteoporosis prevention, and ethnicity and occurrence of osteoporosis.

### **Perceived self-efficacy of osteoporosis prevention**

The individual item responses on samples perceived self-efficacy of osteoporosis prevention questions was examined. The findings showed that the percent average among self-efficacy on avoidance of risk factors, nutrition, and physical activity, as 81.5, 80.85, and 73.75 respectively. The samples seem to have scored lowest on perceived self-efficacy in physical activity (in Table3).

While 85.8 percent of village health volunteers responded that they could "exercise at least 20 to 30 minutes each time", only less than half (49.8%) of them perceived that they had the ability to "exercise to increase heart rate and sweat" (in Table 5). Responses from the samples to these items reflected that most village health volunteers were not aware that the effective exercise is the "exercise to increase heart rate and sweat". Further community osteoporosis prevention program emphasis on the understanding of exercise is recommended. Beside, understanding how to exercise in the village health volunteers as well as community population should be provided with information on: type of exercises, how often, how long the duration, and how hard the exercises should be.

## Osteoporosis Preventive Behavior

Regarding nutritional dietary behavior, this study found that only 29.4 percent of the study subjects, who are all the health volunteers, reported that they always eat dairy products such as milk, yogurt or skim milk (1 to 3 glasses) daily. As the dietary sources of calcium are daily products such as milk, yogurt or skim milk. As Carter (1987) recommended that women should consume at least 1250 mg calcium daily. Other calcium rich foods include egg; dark-green leafy vegetables, such as collard, spinach or water mimosa; dried peanut, soya or peanut products; dried shrimps, small fish, shrimp paste, canned fish or crisp-dried fish. However, the results showed that not all of the subjects (90%) ate dried shrimps, small fish, shrimp paste, canned fish or crisp-dried fish (57.3% always ate and 32.7% sometimes ate). All of these calcium-rich foods are local products. They are very cheap and easy to buy. This behavior should be promoted to all of the population and volunteers to prevent osteoporosis before it occurs.

When the village health volunteers' report of their osteoporosis prevention behavior toward exercise was examined, only 25.6 percent of the village health volunteers reported that they always exercise, another 58.9 percent of them reported that they exercise sometime and it is even worse that 15.5 percent of village health volunteers in Huiyot reported that they did exercise at all. The findings of adult women lack of exercise were found prior to this study. Teraroganawong (2001) study, found that 26.1 percent of pre-menopausal women in Thasala Sub-District, Nakhon Srithammarat Province did not exercise and Parichatnont (2002) study had found 60.9 percent of adult women in Palian District, Trang Province did not exercise. A lesser percentage of Palian women studied samples who did not exercise may be because of this study group was all village health volunteers. Parichatnont discussed of her study that the studied subjects who were Palian district adult women had less exercise than subjects in the same study who were village health volunteers.

49.2 percent of the village health volunteers reported that they did not get sunshine in the morning. This may be due to the Huaiyot populations way of life. Rubber tree cutting is the occupation of most Huaiyot families. In order to get the maximum beneficial of the rubber trees, the gardeners have to cut the rubber tree to

get the tree sap, which rubber is made of, before sunrise. So those rubber cutters sleep during daytime and work at nighttime. This may be the reason that 49.2 percent of this study subjects did not get sunshine in the morning. The 57 percent of subjects in this study were agriculturists who grew rubber trees.

Regarding avoidance of risk factors, the result showed very high percentage (90.9%) of this study samples reported that they did not smoke and the 89.3 percent did not drink alcohol. This is conformed to rural Thai women ways of life. Most rural Thai women do not drink alcohol and do not smoke cigarette. All subjects in this study were women who lived in the rural of Huaiyot.

### **Hypothesis I:**

Village health volunteers' education level had a statistically significant positive correlation with their osteoporosis preventive behaviors (in Table 6). This finding indicates that osteoporosis preventive behaviors depended upon education. The result of this study is consistent with previous studies reporting the relationship between education and preventive behaviors. Teraroganawong (2001) study found the positive relationship between pre-menopauses' formal education level and their behavior for preventing of osteoporosis. This finding conformed to Parichatnont (2002) who found that adult women's formal education level was correlated to their behavior for preventing of osteoporosis. Prapapen Suwan (B.E.2537) explained the fact that persons who have a higher education should have better knowledge on health than those who have a lower education. Moreover, Pender (1987) confirmed that education is one of the factors concerned with personal behavior. Education allows human beings to have fuller growth of intelligence and knowledge and a better perception of health and illness and allow peoples to carry out healthier behavior.

Village health volunteers' family income was significantly related to their osteoporosis preventive behaviors. The higher the family income the higher the possibility that these village health volunteers would have higher scores on osteoporosis preventive behaviors. This finding indicated that osteoporosis preventive behavior depended upon income. This finding consistent with previous studies reporting that those with more income tended to participate in more preventive behaviors. Consequently, the finding of a significant relationship between income and

osteoporosis preventive behaviors was similar to the relationship between income and other health preventive behavior in a number of studies. Teraroganawong (2001) study found Nakorn Sritamrath pre-menopauses' income was significantly related to their osteoporosis preventive behaviors. This finding conformed to Parichatnont (2002) who found that adult women's family income was correlated to their behavior for prevention of osteoporosis. Pender (1987) state that income is an indicator of economic status. A person with high income would have a better opportunity to seek facilities, resources and knowledge than a person with low income. Harris & Guten (1979) also state that the high income had better health activities (Harris and Guten, 1979 as cited in Teraroganawong, 2001). Moreover, Robert (1998) stated that the socioeconomic status of family could directly impact physical, social, and service environment of an individual, which may consequently impact health.

Duration of being village health volunteer was significant related to their osteoporosis preventive behaviors. Those who had higher duration (years) of being village health volunteers were village health volunteers who would had the higher osteoporosis preventive behaviors score. This is possible that the longer the duration of being village health volunteers the longer time of getting contact with the health personnel and helped in conveying the simplified health information to the villagers. There was the old word "teaching is learning twice". Being health information gives for the villagers helped village health volunteers to gain more healthy way of life.

Village health volunteers' knowledge of osteoporosis was significant related to their osteoporosis preventive behaviors was found in this study. This was similar to statement of Pender (1996) that knowledge was important for preventive behavior. A significant relationship between knowledge and preventive behavior had been reported in a number studies. Suzhen (1998) found the relationship between knowledge of osteoporosis and Chinese osteoporosis women lifestyle. Cook and other (1991) also found that women who were given information about the risk of osteoporosis were more likely to make positive lifestyle change (Cook et. al, 1991 as cited in Taggart & Cornnor, 1995). These findings were supported by Keck (1994) who suggested that the knowledge concerns a specific subject component of a specific science, and is based on factual information. The knowledge of the subject matter of interest gain by individual experiences (Keck, 1994 as cited in Suzhen, 1998).

Village health volunteers' perceived self-efficacy of osteoporosis prevention was significant related to their osteoporosis preventive behaviors. This means that the studied village health volunteers who had higher scores on their perceived self-efficacy of osteoporosis prevention would had higher scores of osteoporosis preventive behaviors. Parichatnont (2002) study finding confirmed the positive correlation between pre-menopausal women' self-efficacy and their osteoporosis preventive behavior. This study found perceived self-efficacy and osteoporosis preventive behavior as the correlated variables, which was similar to Areerat Tanopas. (B.E.2540) whose research result showed significant relationship between self-efficacy and health practice. Sirima Khemapech. (B.E.2540) revealed that perceived self-efficacy was significantly correlated to health promotion behavior. Opposite to Punnapa Jitdamrongkhunti. (B.E.2540) whose study revealed that perceived self-efficacy was not significantly correlated to health promotion behavior.

### **Hypothesis II:**

The finding that the village health volunteers' osteoporosis preventive behavior scores could be predicted by perceived self-efficacy, education level and knowledge of osteoporosis was found in this study. Therefore, self-efficacy, education, and knowledge are three major variables influencing osteoporosis prevention behavior among this population. As shown in Table 8, the strongest predictor was self-efficacy. The finding was consistent with the social cognitive theory (Bandura, 1977). According to Bandura, self-efficacy is the most important factor determining a person's behavior (Bandura, 1977). Self-efficacy are known to be integral aspects of health preventive behavior, which is based on performance accomplishments, vicarious learning experiences, learning with desirable outcome expectations which helped individuals to increased motivation to change the behavior (Bandula, 1977; Salazar, 1991). Another predictive variable toward the increasing village health volunteers' osteoporosis preventive behavior scores found was education level score which showed 5.6 percent predictability value in this study. This result supported Sedlak, Doheny, & Estok, (2000) who found also that education could help clients acquire new knowledge and skills to deal with osteoporosis preventive behavior (Sedlak, Doheny, & Estok, 2000). Piaseu (2002) also emphasized that enhancing self-

efficacy could facilitate the link between knowledge and behaviors. This finding suggested an approach to provide opportunity for more education and knowledge supplementation as well as increase self-efficacy among the village health volunteers.



## CHAPTER VI

### CONCLUSION

This study was a cross sectional survey research which aimed to examine the osteoporosis preventive behavior and to determine and explored the significant factors relating to osteoporosis preventive behavior among female village health volunteers in Huaiyot District, Trang Province. This study aimed to 1) To explore knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior. 2) To examine the relationship between knowledge of osteoporosis, self-efficacy of osteoporosis prevention and osteoporosis preventive behavior. 3) To examine the incorporated predictability of village health volunteers' knowledge of osteoporosis and self-efficacy of osteoporosis prevention on their osteoporosis preventive behavior. The subjects were 309 female village health volunteer aged 20-59 years old selected by using the Multi-stage random sampling. Data was collected by self-completed questionnaires during 15 May to 15 August 2005. The instruments used in this study were from the permissions of Teraroganawong (2001), Parichatnont (2002), Aree-Ue (2004). These instruments used in this study included: 1) The Facts on Osteoporosis Quiz (FOOQ), 2) The Perceived Self-Efficacy of Osteoporosis Prevention Questionnaire, 3) The Osteoporosis Preventive Behavior questionnaire. Data analysis was conducted in terms of number, percentage, mean, standard deviation. Pearson's product moment correlation was used to determine the significant factors relating to osteoporosis preventive behavior and Stepwise Multiple Regression was also used to find their predictive values. Results of this study were as follows:

1) The subjects' knowledge of osteoporosis mean scores was 15.63, which was 62.54 percent of total score. Perceived self-efficacy of osteoporosis prevention mean scores was 13.5, which was 79.37 percent of total score. Osteoporosis preventive behaviors mean scores was 20.10, which was 59.10 percent of total score.

2) Education level, duration of being village health volunteer, knowledge of osteoporosis, and perceived self-efficacy of osteoporosis prevention were

significantly associated with the osteoporosis preventive behavior ( $p < 0.01$ ). Family income also were significantly associated with the osteoporosis preventive behavior ( $p < 0.05$ ). However, the relationship between age, marital status, occupation and osteoporosis preventive behavior was found no statistically significant ( $p > 0.05$ ).

3) Perceived self-efficacy of osteoporosis prevention, education level, and knowledge of osteoporosis were able to explain 60.9 percent of variances in osteoporosis preventive behavior scores ( $F_{3, 305} = 158.46, p < .001$ ).

## Recommendations

The results of this study were beneficial for community health nurses and other health care provider to better understand factors that related to osteoporosis preventive behavior. This understanding was useful in planning osteoporosis preventive programs among female village health volunteer in order to promote osteoporosis preventive behavior and reduce risk behavior of osteoporosis. In addition to giving knowledge on correct osteoporosis preventive behavior, these programs should emphasize on as well as enhancing these interventions should be initially begun in female village health volunteers and reinforced to adult women, pre-menopause women, and menopause women.

Therefore, there is the need for Huaiyot health team especially the community health nurses to help the village health volunteer to have better education in both general knowledge and also osteoporosis knowledge. The strategy to increase the health volunteers' osteoporosis knowledge and self-efficacy of osteoporosis prevention should be developed. The village health volunteers should be encouraged to improve osteoporosis preventive behavior. Steps toward this goal should be the special programs concerning dietary and exercise appropriate to local resources and life-style of the Huaiyot community population. Community osteoporosis education target should include all the volunteers especially be more focus on those volunteers who have lesser duration of working as the volunteers. Since community health nurses are responsible for the education of the community and the village health volunteer are the bridges and media between nurses and community. The level of Thai community health nurses' knowledge of osteoporosis was not exist at the time of

this study. The investigator highly recommends that further study on national study on community health nurses' knowledge of osteoporosis be performed.

### **The Limitation of the Study**

There are some limitations of the study. First, the data collection was gained from the sample's recall of their preventive behavior during the two weeks prior to the data collection day. Second, the 309 village health volunteers represented only the women who lived in Huaiyot District that cannot be generalizable. Finally, the reliability of osteoporosis preventive behavior questionnaire used in the study was low, that may affect the validity of the instrument.

## BIBLIOGRAPHY

- Ali, N.S., Bennett, S.J. (1992). Postmenopausal Women: Factor in Osteoporosis Preventive Behaviors. JOGN, 18, 23-32.
- Ali, N.S., Twibell, K.R. (1994). Barriers to Osteoporosis Prevention in Perimenopausal and Elderly Women. Geriatric Nursing, 15(4), 201-206.
- Ailinger, R.L., & Emerson, J. (1998). Women's knowledge of osteoporosis. Applied Nursing Research, 11, 111-114.
- Ailinger, R.L., Harper, D.C., & Lasus, H.A. (1998). Bone up on osteoporosis: Development of the Facts on Osteoporosis Quiz. Orthopedic Nursing, Sept/Oct, 66-73.
- Alioli, L.V. (1992). Osteoporosis syndromes: Patient selection for calcitonin therapy. Geriatrics, 47 (4), 58-67.
- Aree-Ue, S. (2004). Feasibility and acceptability of an osteoporosis prevention program for Thai older adults living in Chiang Mai. Unpublished Doctor of philosophy (Nursing), Chiang Mai University, Chiang Mai (Thailand).
- Avila, H.M., Colditz, G.A., Stampfer, M.J., Rosner, B., Speizer, F.F., Willett, W.E. (1991). Caffeine, moderate alcohol intake and risk of fracture of the hip and forearm in middle-aged women. Am J Clin Nutr, 54, 157-162.
- Bandura, A. (1977). Social Learning Theory. Whitehall Books Limited, Wellington, Newzeland.
- Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory. Englewood Cliffs, NJ: Prentice-Hall Inc, United State of America.
- Bandura, A. (1986). Self-Efficacy [On line] Available WWW:  
[www.des.emory.edu/mfp/efficacy.html](http://www.des.emory.edu/mfp/efficacy.html)
- Beaker, M.H. (1974). Health Belief Model. Health Education Monograph, 2(4), 226-235.
- Berarducci, A., Lengacher, C.A., & Keller, R. (2000). The impact of osteoporosis continuing education on nurses' knowledge and attitudes. The Journal of Continuing Education in Nursing, 33 (5), 210-216.

- Bouillon, R., Burckhardt, P., Christensen, C., et al. (1991). Consensus development conference: Prophylaxis and Treatment of osteoporosis. The American Journal of Medicine, 90 (1), 107-110.
- Carter, L.W. (1987). Calcium intake in young adult women : Implications for osteoporosis risk. JOGNN, 16, 301-308.
- Christiansen, C. (1991). Consensus development conference: Prophylaxis and treatment of osteoporosis. The American Journal of Medicine, 90, 107-111
- Cook, B., Notelviz, M., Rector, C., & Krischer, J.P. (1991). An osteoporosis patient education and screening program: Results and implication. Patient Education and counseling, 17, 135-145.
- Cooper, C., Campion, G., & III Melton, L.J. (1992). Hip fractures in the elderly: a world-wide projection. Osteoporosis Int, 2, 285-289.
- Davis, G.C., & White, T.L. (2000). Planning an osteoporosis education program for older adults in a residential setting. Journal of Gerontological nursing, 26 (1). 16-23.
- Dawson-Hughes B, Jacques P, Shipp C (1987). Dietary Calcium intake and Bone loss from the spine in Healthy postmenopausal women. Am J Clin Nutr, 46, 658-687.
- Dempster, D.W., & Lindsay, R. (1993). Pathogenesis of osteoporosis of osteoporosis. The Lancet, 341, 797-801.
- Donna, F. & Heinemann, M.D. (2000). An overview of the National Osteoporosis Foundation clinical practice guide. Geriatrics, 31-36.
- Dowd, R., & Cavalieri, R.J. (1999). Help your patient live with osteoporosis. American Journal of Nursing, 99 (4), 55-60
- Egger G, Spark R, Lawson J. (1995). Health Promotion Strategies & Methods. Australia: Mc Graw-Hill Book, 25-27.
- Goss, G.L. (1998). Osteoporosis in woman. Nursing Clinics of North America, 33(4), 573-581.
- Hackshaw, A.K. and Law, M.R. (1997). A Meta-analysis of cigarette Smoking, bone mineral density and risk of hip fracture: recognition of a major effect. BMJ, 315, 841-845.
- Holmes, S. (1998). Osteoporosis: The hidden illness. Nursing Times, 94 (1), 20-23.

- Joakimsen, K.M., Sogard, A.J., Tollan, A., & Mgnus, J.H. (1996). Osteoporosis: Knowledge and attitudes of the Norwegian population. Tidsskr-Nor-Laegeforen, 166 (17), 2013-2016.
- Jones, D.A. (1982). Health promotion through health teaching. In Jones, D.A., Dunbar, C.F. & Jiroves, M.M. (Eds.), Medical and surgical nursing: A conceptual approach. New York: Mc-Hill Book.
- Kathi,G. (1993). Simple lifestyle changes can prevent osteoporosis. Drug Topics, 137(11). 34-38.
- Krall EA and Hughes BD (1999). Smoking Increases Bone Loss and Decreases Intestinal Calcium Absorption. J Bone and Miner Res, 14 (2), 215-219.
- Kulak, C.A.M., & Bilezikian, J.P. (1998). Osteoporosis: Preventive strategies. International Journal of Fertility, 43(2), 56-64.
- Laitinen, K. & Valimaki, M. (1993). Bone and the comforts of life. Annals of Medicine, 25, 413-425.
- Lappe, J. (1994). Bone fragility: Assessment of risk and strategies for prevention. JOGNN, 23 (3), 260-268.
- Leslie,M. (2000). Issue in the nursing management of osteoporosis. Nursing Clinics of North America, 35 (1), 189-197.
- Limpapayom,K., Taechakraichana,N., Jaisamran,U., Banyavejchevin,S., Chaikittisilpa,S., Poshyachinda,M., et al. (2001). Prevalence of osteopenia and osteoporosis in Thai women. Menopause, 8, 65-69.
- Lindsay, R. (1988). Sex steroids in the pathogenesis and prevention of osteoporosis. In Riggs, B.L. (Ed), Osteoporosis: etiology, diagnosis and management. New York, 333-358.
- Lindsay, R. (1994). Osteoporosis: An update approach to prevention and management. Geriatrics, 44 (1), 45-54.
- Liscum, B. (1992). Osteoporosis: the silent diseases. Orthopedic Nursing, 11(4), 21-25.
- Luisetto, G., et al. (1995). Difference rate of forearm bone loss in healthy woman with early or late menopause. Osteoporosis international, 5 (1), 54-62.
- Mcmahon, M.A., Peterson, C., & Schilke, J. (1992). Osteoporosis: identifying high-risk persons. Journal of Gerontological Nursing, 18 (10), 19-26.

- Martin,U. (1998). The role of the nurse specialist in osteoporosis. Nursing Times, 22(16), 50-51
- Marriner, A. (1994). Nursing theorists and their work. St. Louis: Mosby.
- Peck WA, Buckhardt P, Christansen C, et al. (1993). Consensus development conference : Diagnosis, Prophylaxis and Treatment of osteoporosis The American Journal of Medicine, 94(6), 646-650.
- Pender, N.J. (1987). Health promotion in nursing practice (2<sup>nd</sup> ed.). Connecticut: Appleton & Lannge.
- Pender, N.J. (1996). Health promotion in nursing practice. (3<sup>rd</sup> ed.). Standford, CT: Appleton & Lang.
- Peterson, J.A. (2001). Osteoporosis: overview. Geriatric Nursing, 22 (1), 17-21.
- Piaseu, N. (1994). Calcium Status, Factors Affecting Calcium and Bone Status in healthy Thais Living in Bangkok. Unpublished master Thesis (Nutrition), Mahidol University, Bangkok.
- Piaseu, N., Belza, B., & Mitchell, P. (2001). Causal analysis of exercise and calcium intake behaviors for osteoporosis preventive among young women in Thailand. Health Care for Women International, 23, 364-376.
- Piaseu, N., Schepp, K., & Belza, B. (2002). Testing the effectiveness of an osteoporosis educational program for nursing students in Thailand. Arthritis Care & Research, 45, 246-251.
- Prasitiphol, N. (1999). Effects of the application of health belief model on osteoporosis preventive behavior among premenopausal women in Uthong District, Suphanburi province. Master's thesis in Science (Public Health), Faculty of Graduate Studies, Mahidol University.
- Roach,S.S.(2001). Introductory: Gerontological nursing. Philadephia: Lippincott.
- Rose, L. & Rose, M. (1994). Osteoporosis: The silent epidemic. Sydney: Allen & Unwin.
- Salazar, M. (1991). Comparison of four behavioral theories. AAOHN Journal, 39 (3), 128-135.
- Sedlak, C.A., Doheny,M.O. & Estok, P.J. (2000). Osteoporosis in order men: Knowledge and health beliefs. Orthopedic Nursing, 19, 38-41.

- Speroff, L., Glass, R., & Kaase, N. (1994). Clinical gynecologic endocrinology and infertility (5<sup>th</sup> ed.). Baltimore: Williams & Wilkins.
- Suzhen, L. (1998). Knowledge and lifestyle of Chinese women with osteoporosis. Master's thesis in Science (Nursing), Faculty of Graduate Studied, Chiangmai University.
- Weiss, M., & Sankaran, G. (1998). A health education initiative: Teaching college women about osteoporosis. Nursing Education Quarterly, 37(6), 271-274.
- World Health Organization. (1994). Assessment of fracture risk and its application to screening for postmenopausal osteoporosis. Technical Report Series 843. Geneva: Author.
- Yamane, T. (1973). Statistic: an introductory analysis. (3rd). New York: Harper & Row.
- ชื่น เตชamahachai, โสมพงษ์ สุวรรณเวช, บุญสม ชีระพิบูลย์ (2543). (Chen Tachamahachai et al. B.E.2543). สตรีวัยหมดระดู. พิมพ์ครั้งที่ 1. กรุงเทพมหานคร: สำนักพิมพ์องค์การสงเคราะห์ทหารผ่านศึก.
- ดาวรุ่ง คุณวุฒิคุณากร (2543). (Dawrung Khunawutikunakorn, B.E.2543) ความตระหนักในความสำคัญของแคลเซียมและพฤติกรรมบริโภคอาหารซึ่งมีแคลเซียมของนักเรียนมัธยมศึกษาตอนต้น โรงเรียนสุรศักดิ์มนตรี. วิทยานิพนธ์ปริญญาวิทยาศาสตรมหาบัณฑิต สาขาวิชาเอกโภชนวิทยา บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.
- ประภาเพ็ญ สุวรรณ (2537). (Prapapen Suwan, B.E.2537). พฤติกรรมสุขภาพ. ในเอกสารการสอน ชุดวิชาสุขศึกษาหน่วยที่1-7. พิมพ์ครั้งที่6. กรุงเทพฯ: มหาวิทยาลัยสุโขทัยธรรมมาธิราช, 151-164.
- พรรณภา จิตดำรงขันติ (2540). (Punnapa Jitdamrongkhunti, B.E.2540). ผลการให้คำแนะนำอย่างมีแบบแผน และการให้คำแนะนำปกติต่อพฤติกรรมตรวจเต้านมด้วยตนเองของแรงงานสตรีในโรงงานอุตสาหกรรมขนาดกลาง เขตกรุงเทพมหานคร วิทยานิพนธ์ ปริญญาวิทยาศาสตรมหาบัณฑิต สาขาเอกพยาบาล
- รัชตะ รัชตะนาวิณ (2538). (Rachata Rachatanawin, B.E.2538). ปัญหาเกี่ยวกับโรคกระดูกพรุนในประเทศไทย. ใน ทรงศักดิ์ ศรีอนุชาติ, เนตรนภัส หัสมินทร์, กนกวรรณ รุจิวรรณ. เอกสารประกอบการประชุม “โภชนาการ 38” นำสู่การปฏิบัติ, 35-36.

- วิลาวรรณ ทองเจริญ, สมจินต์ เพชรพันธุ์ศรี, แวนใจ นาคะสุวรรณ, อูษา ชูสังข์. (Wiliwan Tongjareun et al., B.E.2539). รายงานวิจัยปัจจัยเสี่ยง ความรู้และพฤติกรรมป้องกันภาวะกระดูกพรุนของสตรีวัยหมดประจำเดือนและวัยผู้สูงอายุ. มปท : 1-5.
- สุจริต สุนทรธรรม (2544). (Sujarit Sunthontum, B.E.2544). แนวทางเวชปฏิบัติอิงหลักฐาน การตรวจและการเสริมสร้างสุขภาพในประเทศไทย. พิมพ์ครั้งที่ 2. กรุงเทพมหานคร: หมอชาวบ้าน.
- ศิริมา เขมะเพชร (2540). (Sirima Khemapech, B.E.2540) ประสิทธิผลโปรแกรมสุขศึกษาโดยประยุกต์ทฤษฎีความสามารถตนเองร่วมกับแรงสนับสนุนทางสังคมในพฤติกรรมส่งเสริมสุขภาพสตรีวัยหมดระดู คลินิกวัยทอง โรงพยาบาลตำรวจ กรุงเทพมหานคร วิทยานิพนธ์ปริญญาวิทยาศาสตรมหาบัณฑิต สาขาเอกสุศึกษา บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.
- อารีรัตน์ ตโนภาส (2540). (Areerat Tanopas (B.E.2540). การประยุกต์ทฤษฎีความสามารถตนเองร่วมกับแรงสนับสนุนทางสังคม ในการป้องกันโรคความดันโลหิตสูงในผู้สูงอายุ อำเภอโนนรมย์ จังหวัดชัยนาท. วิทยานิพนธ์ปริญญาวิทยาศาสตรมหาบัณฑิต สาขาวิชาเอกสุศึกษา บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.
- อารีรัตน์ สัจจรวงษ์พนา. (2540). (Areerat Sungworawongpana, B.E.2540). โรคกระดูกโป่งบางกับวัยทอง. กรุงเทพมหานคร: ด้านสุขภาพการพิมพ์.



## APPENDIX A

### Consent to Participation in Research Study

My name is Wanipa Tubthieng. I am a graduate nursing student, Nursing Department, Faculty of Medicine, Ramathibodi Hospital, Mahidol University. I am currently conducting research “A study of osteoporosis preventive behavior among village health volunteers.” The research will be beneficial for appropriate planning and effective intervention to prevent osteoporosis among village health volunteers. You are representative of village health volunteers population. You can participate in this research study by filling out the questionnaires for demographic characteristic, knowledge of osteoporosis, perceived self-efficacy of osteoporosis prevention, osteoporosis preventive behavior. All data that you provide will be kept confidential and will be used only to present an overall picture. You can refuse even during the study period at anytime.

Thank you for your cooperation.

Sincerely yours  
Wanipa Tubthieng

## APPENDIX B

### Part 1 Demographic Characteristic

**Direction:** please completes the information or mark / each of following questions.

1.1 Age ..... years

1.2 Marital Status

1 ( ) Single

2 ( ) Couple

1.3 Education Level

1 ( ) None

2 ( ) P.4

3 ( ) P.6

4 ( ) M.3

5 ( ) M.6

6 ( ) Higher M.6

1.4 Occupation

1 ( ) Agriculture .....

2 ( ) Other .....

1.5 Income ..... / Month

1.6 Duration of village health volunteer ..... Years.

## Part 2 Knowledge of Osteoporosis

**Direction:** please indicates by marking the answer most closely related to your knowledge. Please read each question carefully and mark / in the answer blocks

No	Items	Yes	No	Not sure
2.1	One in four women over the age of 60 will develop osteoporosis.*			
2.2	Inactivity increases the risk of osteoporosis. *			
2.3	Heredity dose not plays a role in osteoporosis.			
2.4	Early menopause, such as after a hysterectomy, is risk factors for osteoporosis. *			
2.5	High caffeine intake (more than 2 cups per day) increases the risk of osteoporosis.*			
2.6	A lifetime low intake of calcium will increase the risk of osteoporosis. *			
2.7	Young women need the equivalent in calcium of a glass of milk a day to prevent osteoporosis.			
2.8	Smoking is not a risk factor for osteoporosis.			
2.9	Thin women are more often affected by osteoporosis than heavy women. *			
2.10	Weight-bearing exercises such as walking can help prevent osteoporosis.			
2.11	After age 40, it is too late for people to increase their calcium intake to prevent osteoporosis			
2.12	There is no treatment for osteoporosis once develops it.			
2.13	After menopause, osteoporosis may be slowed down by estrogen. *			
2.14	All individuals loss bone mass after 40 years of age. *			
2.15	Africans have a higher risk of osteoporosis than Asians.			
2.16	Normally, bone loss slows down after menopause.			
2.17	Diet high in calcium throughout life can help prevent osteoporosis. *			
2.18	Women over 40 need about 1,500 mg of calcium. *. <sup>a</sup>			
2.19	There is no way to prevent osteoporosis.			
2.20	White women are less affected by osteoporosis than African-American women.			
2.21	Dairy products are a major source of calcium. *			
2.22	It is normal for bone loss to continue throughout life. * It is normal for bone loss to continue throughout life. *			
2.23	Active women are at higher risk for osteoporosis than inactive women.			
2.24	Alcohol abuse is not linked to the incidence of osteoporosis.			
2.25	Risk factors for osteoporosis is having a mother with it. *			

### Part 3 Perceived Self-Efficacy of Osteoporosis Prevention

**Direction:** please indicates by marking the answer most closely related to your perceived. Please read each question carefully and mark / in the answer blocks

No	Items	Yes	No	Not sure
3.1	I can drink at least 1 glass or 1 box of milk every day.			
3.2	I can eat dried shrimp, small fish, shrimp paste and canned fish at least - 2 times weekly.			
3.3	I can eat egg or fish 3 to 4 times weekly.			
3.4	I can eat green vegetables such as spinach, collard, or a water mimosa every day.			
3.5	I can eat bean curd or monk bean, red bean, peanut 1-2 times per week.			
3.6	I can eat low fat diets.			
3.7	I can eat sesame-black or sesame-white once a week.			
3.8	I can set leisure time to exercise such as brisk walking, jogging, or aerobic dancing.			
3.9	I can exercise at least 3 to 5 times weekly.			
3.10	I can exercise at least 20 to 30 minutes each time.			
3.11	I can exercise to increase heart rate and sweat.			
3.12	I can stop or avoid smoking cigarette.			
3.13	I can stop or avoid alcohol drinking.			
3.14	I can decrease or avoid drinking a lot of coffee			
3.15	I can sleep at least 6 to 8 hours daily			
3.16	I can walk, sit, stand straight.			
3.17	I can lift heavy things from the floor by bending my knees and straight my back.			

## Part 4 Osteoporosis Preventive Behavior

**Direction:** please indicates by marking the answer most closely related to your behaviors. Please read each question carefully and mark / in the answer blocks

No	Items	Always Practice	Sometime Practice	No Practice
4.1	I drank milk, yogurt or skimmilk 1 to 3 glasses a day.			
4.2	I ate 2 to 3 eggs a week.			
4.3	I ate dried shrimps, small fish, shrimp paste, canned fish or crisp-dried fish about 1 to 2 measuring cup (s) a week.			
4.4	I ate dried peanut, soya or peanut products 1 to 2 measuring cup (s) a week.			
4.5	I ate dark-green leafy vegetables such as spinach, collard, or a water mimosa approximately 1 measuring cup (s) a week.			
4.6	I exercised by doing physical exercise, walking, or running.			
4.7	I exercised 20 to 30 minutes at least 3 times a week.			
4.8	I did household chores such as cleaning, washing or sweeping or did hobbies such as gardening for 30 minutes a day continuously.			
4.9	I exercised until you felt tired and heart rate increased.			
4.10	I often changed positions.			
4.11	I got light sunshine in the morning at least 10 to 15 minute a day.			
4.12	I smoked cigarette or tobacco.*			
4.13	I drank 1 to 2 glasses of alcohol a day.*			
4.14	I drank more than 2 glasses a day of coffee or tea. *			
4.15	When I was sick, you bought drugs by yourself. *			
4.16	I had to sit for a long time. *			
4.17	I must bend down to lift heavy objects from the floor. *			

**BIOGRAPHY**

<b>NAME</b>	Miss Wanipa Tubthieng
<b>DATE OF BIRTH</b>	5 June 1972
<b>PLACE OF BIRTH</b>	Trang, Thailand
<b>INSTITUTION ATTENDED</b>	Boromarajchonanee Collage of Nursing, Trang, 1990-1994: Bachelor of Nursing Science. Mahidol University, 2000-2006: Master of Nursing Science (Community Health Nursing)
<b>POSITION &amp; OFFICE</b>	1994-Present, Nursing Department, Huaiyot Hospital, Trang Province, Thailand. Position : Registered Nurse 6.