RISK FACTORS OF CARDIOVASCULAR DISEASE IN RURAL THAI WOMEN

By

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ABSTRACT

Cardiovascular disease (CVD) is a major health problem among women worldwide. In Thailand, risk factors of CVD in rural Thai women have not yet been examined. The purpose of this predictive correlational study was to examine risk factors of CVD in rural Thai women. Non-modifiable risk factors, modifiable risk factors (physiological, behavioral, and psychological risk factors), contextual risk factors, as well as, coping were conceptualized as major variables in this study.

The sample consisted of 149 rural Thai women who had been diagnosed with CVD and resided in rural northern Thailand. A set of questionnaires and physiological measures were used to obtain data. The Chi-square test and the Pearson correlation technique, as well as the Multiple regression were used for data analysis.

The results revealed that age, hypertension, cigarette smoking, stress, depression, and poverty had positive relationships with the severity of CVD. BMI, physical activity, education level, and family income were inversely related to the severity of CVD. However, total cholesterol, diabetes mellitus, menopause status, alcohol consumption, distance to hospital, transportation to health care, and coping had no relationship to the severity of CVD. A few of the physiological and behavioral risk factors were significant predictors of the severity of CVD in rural Thai women. These included high blood pressure, cigarette smoking, and physical inactivity. Notably, psychological stress and the contextual risk factors of income and poverty were also significant predictors of the severity of CVD in these women. Moreover, there were the significant moderator effects in predicting to the severity of CVD: total serum cholesterol and family income, diabetes
and distance to a hospital, BMI and transportation, menopause and income, cigarette smoking and transportation, and depression and poverty.

In conclusion, the findings from this study suggested that few of traditional risk factors of CVD were significant risk factors for CVD. Noteworthy findings demonstrated that psychological stress and contextual risk factors played an important role in contributing to CVD in rural Thai women. It is suggested that specific and effective interventions are needed for these women in order to reduce their morbidity and mortality rates of CVD.
CHAPTER ONE: INTRODUCTION

Statement of the Problem

Cardiovascular disease (CVD) is a major health problem among women worldwide. Research has shown that there are differences between women and men in the epidemiology, presentation, and outcomes of CVD (DeVon & Zerwic, 2003). However, most of the research in CVD is still conducted with men and comparatively few studies are done with minorities and with women. Findings from recent studies show that the development of CVD generally occurs later in women than in men, and women frequently have “atypical” symptoms. Currently, examples of physiological, behavioral, and psychological risk factors of CVD for women in Western countries include high blood pressure, high serum cholesterol, obesity, physical inactivity, smoking, psychological stress, and depression (AHA, 2006; Appel, Harrell, & Deng, 2002; Bittner, 2002; Charney, 2002; McSweeney et al., 2003; WHO, 2004a)

In Thailand, a particularly interesting finding is that Thai women demonstrated a higher morbidity rate of a particular CVD, coronary heart disease (CHD) than Thai men (Tatsanavivat et al., 1998; WHO, 2002b). Unlike Western, epidemiological studies conducted in Thailand also indicated that Thai women tend to have a higher prevalence of physiological risk factors for CVD than Thai men. These physiological risk factors included hypertension, hypercholesterolemia, high blood sugar, diabetes mellitus, body mass index (BMI), and obesity (InterAsia, 2003; Sritara et al., 2003; Tatsanavivat et al., 1998). However, explanations for the higher prevalence of CVD and those physiological risk factors in Thai women are not clearly delineated.
Furthermore, those studies conducted in Thailand indicated that rural populations tended to have significantly less of the traditional physiological and behavioral risks than their urban counterparts. For example, physical inactivity and high-fat diet are significant risk factors for other populations. However, these may not be significant risk factors for rural Thai women as rural Thai women lead an active lifestyle and eat a generally healthy diet (Aekplakorn et al., 2004; InterAsia, 2003; Pothiban, 2000; Punyahotra & Street, 1998). Despite these health habits, rural Thai women are still at greater risk of developing CVD than Thai men. Reasons for this unique observation are unclear.

Since previous studies regarding risk factors of CVD in Thai women mainly focused on physiological risk factors, they failed to include other major risk factors such as behavioral, psychological factors (stress, depression, coping) that have been shown to contribute to poor health and may independently impact cardiovascular health. Thus, it is important to also examine the role of stress, depression, and coping in Thai women’s cardiovascular health. In addition, the sample in the Thai epidemiological study, which indicated the higher morbidity of CVD among women than men, largely represents urban areas and sheds little light on the predictors of cardiovascular disease in rural Thai women, who may experience even greater psychological stress and depression due to a more oppressive socio-cultural environment. Little is known about these psychological factors and their contribution to CVD in Thai population.

Also, socio-economic status (SES) (levels of education and family income) and rural context (greater distance from hospital, lack of health insurance, poverty, and transportation to health care) could cause rural dwellers such as rural Thai women
difficulties in accessing health care, and thus rural Thai women have less preventative care which contributes to CVD among this population group. Significant health disparities exist in CVD mortality and morbidity rates and prevalence of some physiological CVD risk factors among Thai women as compared with Thai men. Thus, rural Thai women are more prone to health disparities compared to their urban counterparts.

In summary, findings regarding risk factors of CVD are primarily from studies with men and developed countries. Studies conducted in developing countries, largely represented urban populations and thus shed little light on rural populations, including those in rural Thailand. Little is known about risk factors for CVD in rural Thai women. Therefore, it is necessary to investigate risk factors for CVD among rural Thai women.

Background and Significance of the Problem

Cardiovascular disease still kills more people in Europe and North America than any other disease. It is the number one cause of death among women and men in the United States and many other developed countries (AHA, 2004; Bittner, 2002; Charney, 2002). The statistics from developing countries paint a similarly bleak picture. In 1999, CVD contributed to a third of all global deaths. As WHO (2002, 2004) indicated, CVD is currently the leading cause of death in all developed countries and in most developing countries. There were approximately 17 million deaths due to CVD in 2003 accounting for one third of all deaths in the world. For example, CHD kills more than 7 million people each year and strokes kill nearly 6 million. Most of these deaths are in developing countries; thus, cardiovascular disease is expected to be the number one cause of death in
developing countries for both men and women (Mackay & Mensah, 2004). However, women seemly received less attention than men in regard to CVD events (Charney, 2002).

There are several reasons why more attention needs to be focused on women and CVD. Cardiovascular disease is often regarded, both by physicians and the general public, as primarily a men’s disease because empirical evidence found in Western countries have indicated that men tend to have higher prevalence of cardiovascular risk factors than women. Worldwide misconceptions persist about CVD. It is often thought to be primarily a disease of middle-aged men. Also, heart attacks are usually seen as striking men who have a combination of stressful occupations and unhealthy lifestyles. All these factors may paint a misleading picture that CVD is less significant in women. However, CVD is the leading cause of mortality among women in the U.S. Approximately one in five women has some form of CVD, and women are more likely to die of cardiovascular disease than men. More women than men have died of CVD every year since 1984 (Charney, 2002). Moreover, many women still believe that they are more at risk for developing cancer than heart disease (AHA, 2006; WHO, 2004a). Cardiovascular diseases in Asia are likely to account for a greater proportion of female deaths in the years to come (WHO, 2002b). Therefore, advances in cardiovascular research in women were of great consequence.

Developing countries, like Thailand are likely to be exposed to a similar experience of ever increasing rates of CVD as they proceed with their socioeconomic development. The burden of CVD has increased dramatically. Presently, CVD has been the second cause of death since 2000 in Thailand after carcinoma. Approximately, four
people per hour are killed by CVD (MOPH, 2005). Thus, CVD is expected to become the number one health problem in Thailand in the near future.

It is important to note that Thai women are at higher risk of CVD than Thai men. According to Tatsanavivat et al (1998), the aged-standardized prevalence rate of CHD among Thai women was higher than among Thai men (women 10.7/1000, men 9.2/1000). Remarkably, women exceed men in the severity of most of these traditional risk factors. This finding is noteworthy as it is contrary to findings from studies in the United States and other countries, particularly for total cholesterol, hypercholesterolemia, fasting blood sugar, hypertension, diabetes mellitus, and obesity (InterAsia, 2003; Tatsanavivat et al., 1998). This finding has also been supported by the Asian organization such as WHO South East Asia indicating that Thai women have higher morbidity of CVD, as well as have higher mortality rates of CVD including cerebrovascular disease (e.g. stroke) and other CVDs than Thai men with the exception of ischemic heart disease mortality rate(WHO, 2002b). Therefore, CVD in Thai women is a significant problem and requires immediate attention.

Risk Factors of CVD

The four most common types of cardiovascular disease are high blood pressure, coronary heart disease (which includes heart attack, and angina pectoris or chest pain), stroke, and rheumatic heart disease (AHA, 2006; WHO, 2004a). Although cardiovascular diseases are different, their risk factors are mainly similar. For example, according to the AHA (2005); WHO (2004); and the National Heart, Lung, and Blood Institute [NHLBI] (2005), risk factors for high blood pressure include age, family history, obesity, physical
inactivity, smoking, high-sodium diet, excessive alcohol, and stress. Meanwhile, risk factors for CHD include advancing age, family history, obesity, physical inactivity, smoking, high blood cholesterol, high blood pressure, and diabetes mellitus. Also, psychological factor (stress, depression) and alcohol consumption have been indicated as risk factors of CHD. Finally, age, personal and family history, high blood pressure, smoking, diabetes mellitus, CHD, high blood cholesterol, physical inactivity, and excessive alcohol have been indicated as risk factors for stroke. Therefore, CVD has been designated as a group of diseases which include coronary heart disease (e.g. coronary artery disease and ischemic heart disease), hypertension, and stroke, which have similar risk factors (AHA, 2006; Appel et al., 2002; Grundy, Pasternak, Greenland, Smith, & Fuster, 1999; InterAsia, 2003; National Heart, 2006; Sritara et al., 2003; WHO, 2004a; Yusuf, Reddy, Ounpuu, & Anand, 2001). Therefore, it is important to study the CVD risk factors that are applicable for risk factors of all cardiovascular diseases.

Risk factors of CVD have been categorized in two major groups--modifiable and non-modifiable risk factors. Recently, contextual factors have been added as risk factors that contribute to CVD. (AHA, 2004, 2006; Appel et al., 2002; Grundy et al., 1999; HSFC, 2003; WHO, 2004a; Yusuf et al., 2001).

Age, genetic family history, race, and gender for CVD have been indicated as non-modifiable risk factors of CVD among men and women. Advancing age is the most powerful independent risk factor for cardiovascular disease, because risk of stroke doubles every decade after age 55. Heredity or family history is an increased risk if a first-degree blood relative has had coronary heart disease or stroke before the age of 55.
years (for a male relative) or 65 years (for a female relative). Another non-modifiable risk factor is race. Evidence shows that there are increased cardiovascular disease deaths noted for South Asians and Black Americans in comparison to their White counterparts. Gender is another risk factor of CVD. There are higher rates of coronary heart disease among men compared to women (pre-menopausal age); however, risk of stroke is similar for men and women. Different from women in other countries, Thai women demonstrated higher prevalence of CVD than Thai men (Tatsanavivat et al., 1998); thus male gender might not be generalized as a risk factor in all populations.

Major modifiable risk factors of CVD include high blood pressure, abnormal blood lipids (high total cholesterol, LDL-C and triglyceride levels, and low levels of HDL-C), tobacco use, physical inactivity, obesity, unhealthy diets, and diabetes mellitus. Other modifiable risk factors include depression, psycho-social stress, alcohol use, use of certain medications (some oral contraceptives and hormone replacement therapy increase risk of heart disease), and lipoprotein (a). In addition, “novel” risk factors have been found to be associated with CVD, including excess homocysteine in blood, inflammatory markers (e.g. elevated C-reactive protein (CRP)), and abnormal blood coagulation.

More recently, it has been identified that not only non-modifiable and modifiable risk factors, but also contextual risk factors can contribute to CVD. Contextual risk factors act as moderators or effect modifiers, e.g., SES and rural context. Contextual CVD risk factors are categorized as internal or individual risk factors and external risk factors or structural components. Internal risk factors include health beliefs, level of education and health information, financial status, cultural background, and household
types. External risk factors involve the health care system, organization norms, community resources, and structure e.g. rural versus urban and residing in a medically underserved geographic location (Appel et al., 2002).

Risk Factors of CVD in Women

Risk factors of CVD between men and women may be different. WHO (2004) asserted that CVD differs significantly among women and men in several ways. For example, CHD affects women approximately 10 years later than men, possibly because of the protective effect of estrogen prior to the onset of menopause. Menopause has no direct effect, but hormone replacement therapy increases the risk of CVD. Stroke accounts for a higher proportion of deaths among women than men, particularly women over age 85. After a first stroke, women are kept in the hospital longer, and remain more disabled than men receiving similar care. Women are less likely than men to survive following a heart attack, and female survivors have an increased risk of re-infarction, heart failure and death.

Moreover, some risk factors may affect women differently than men. For example, diabetes has a two times greater risk of CHD and stroke among women than among men. In addition, high blood triglycerides are an important cause of atherosclerosis in young women, but not in young men. Elevated triglyceride levels are an independent risk factor in women and may be a better predictor of CHD than are LDL cholesterol levels. Tobacco use is more dangerous in women. Women have more risk factors for CHD and stroke than men, including oral contraceptive use in combination with smoking and gestational diabetes that is a risk factor for CHD (WHO, 2004a). To
reduce CVD in women, it is important to better understand and inform women of their risks of CVD, how to respond better to protective health advice, and how to recognize symptoms.

Risk factors of CVD in women can be generally categorized in two major groups: non-modifiable and modifiable risk factors. Non-modifiable risk factors include age and family history of CVD. Major modifiable risk factors include physiological, behavioral, and psychological risk factors (AHA, 2006; Appel et al., 2002; Grundy et al., 1999; InterAsia, 2003; WHO, 2004a; Yusuf et al., 2001). Moreover, contextual factors such as socio-economic factors and geographic (rural or urban) could play an important role in terms of contributing to CVD (Appel et al., 2002). Although risk factors for CVD in women have been indicated, some risk factors are still inconsistent in findings. The contribution to CVD in women from these risk factors is less well researched and requires further study.

**Risk Factors of CVD in Rural Thai Women**

Due to the differences in socio-cultural contexts between urban and rural areas, there are significant differences between urban and rural Thai women in terms of levels of education, occupation, interest in their health, and SES. Rural middle-aged women are in agricultural careers and work side-by-side with their husbands in the field. In general, they have an active lifestyle and eat a healthy diet. However, due to pervasive poverty in rural Thailand, there is little access to health promotion programs and other health services. Consequently, rural Thai women tend to seek health services only when they have a major problem and rarely seek medical help for minor symptoms such as those
related to menopause. The lifestyle, culture and health experience of Thai women are very different from women in Western countries, and their needs may also differ (Punyahotra & Street, 1998).

Another difference between Thai culture and Western culture is the expectation that women should take care of all members of the family, including children, their spouses, and/or parents. Everyone else except the woman in the family comes first. Even if these women have health problems, they are still expected to be responsible for all other members of the family. As Punyahotra and Street (1998) indicated, Thai women experience social and economic pressures that force them to take on additional responsibilities, such as caring for aging parents or grandchildren, in addition to housework. Thus, socioeconomic status, as well as psychological stress and depression, could impact the cardiovascular health of rural Thai women.

Most of rural Thai women (67%) have agricultural occupation, thus there is a concern that the practices with fertilizers and/or pesticides/insecticides in the large agricultural fields can be possibly poisoning workers or even be exposed to other occupational hazards like occupational injuries and mortality. Evidence indicated that overexposure to agricultural pesticides may be linked to severe depression, according to the study of Colorado State University, Ft Collins. Researchers studied 761 farmers and their spouses from eight northeastern Colorado counties between 1992 and 1997. The 69 participants who reported being sickened by pesticide poisoning were 5.8 times more likely to score high on tests measuring depression level compared to participants who reported they had not been poisoned by pesticides. The study shows that long-term
effects of pesticide poisoning can include anxiety, irritability, restlessness, and depression. Other findings from this study indicated that female farm residents in poor physical health are more susceptible to depressive symptoms (Bohlander, 2002). Thus study of depression in rural Thai women is important.

In addition, there are health disparities between people who live in urban areas and rural areas. These include, but are not limited to, the quality and quantity of health care services available and transportation for accessing these facilities. Overall, rural Thai women are more likely than their urban counterparts to experience socio-psychological stress and have difficulties of health care access, causing poor health, due to these SES and geographical factors.

As delineated previously, rural Thai women have high level of stress and depression due to their socio-cultural oppression. Also, stress and depression could affect rural Thai women’s cardiovascular health. However, stress and depression among rural Thai women has not been clearly described. Some studies asserted only that during menopause Thai women have reported high levels of stress (Punyahotra, Dennerstein, & Lehert, 1997 1997). Coping could also mediate the relationships between stress or depression and other factors which contribute to CVD. In rural Thai women, coping has not been clearly indicated and whether it has an effect on the contributions of stress, depression and other risk factors to CVD.

Thai women have a higher prevalence of CVD than Thai men. Little is known about the cause of this difference. Also, to date, little attention has been paid to psychological risk factors such as stress and depression. There has not been any study in
rural Thai women that investigated whether stress and depression are associated with cardiovascular health in this population. Moreover, other major risk factors, which are non-modifiable and modifiable, including physiological risk factors (hypercholesterolemia, hypertension, diabetes mellitus, obesity, and menopause status), behavioral risk factors (physical inactivity, cigarette smoking, and alcohol consumption) were examined in the present study since they are significantly associated with cardiovascular disease in women generally. Contextual risk factors such as SES and rural context could play an important role leading to CVD in this population as well. Thus, it was important to explore all non-modifiable, modifiable, and contextual risk factors of cardiovascular disease in rural Thai women since little is known about this information.

Ultimately, there are many suitable reasons for conducting research on risk factors for CVD in rural Thai women. First, studies of CVD conducted in Thailand indicate Thai women have higher prevalence of CHD morbidity and risk factors for CHD than Thai men. Numerous studies have demonstrated the risk factors for CVD in women, but their results were based on Western subjects. It is possible that Thai women may demonstrate different relationships among risk factors for CVD. Second, although evidence from the US and other Western countries demonstrate that stress and depression play an important role in contributing to CVD among women, little is known about psychological risk factors for CVD in rural Thai women. Finally, the studies on CVD in Thailand have been conducted to understand the development and risk factors of CVD in Thai population both men and women, rural and urban. However, their results were based on major physiological risk factors and largely represent urban people and shed little light on rural people. Thus, it is important to conduct research that targets rural Thai women more specifically.
Significance of the Study

This study addressed a phenomenon of interest to nursing science since it would expand the theoretical perspectives of significant major risk factors for CVD in women, in particular rural Thai women. It provided an explanation of major risk factors for CVD in this population based on cultural perspectives. Results from this study were expected to provide necessary information encouraging health care providers to conduct appropriate and effective interventions for at least 9 millions rural Thai women. For the policy makers, this knowledge could be utilized to reduce personal, policy, and environmental barriers that contribute to health disparities among rural Thai women. Interventions could be formulated for the prevention and control of CVD before they emerge as a public health problem in Thailand. Also, this study provided basic information that could be compared with findings in other countries and for guiding the direction of future studies.

Statement of Purpose

The purpose of this study was to examine risk factors of CVD in rural Thai women. The specific aims of the present study were: (1) To assess the relationships among non-modifiable, modifiable, and contextual risk factors and the severity of CVD in rural Thai women, (2) To explore risk factors of CVD in rural Thai women, and (3) To examine moderator/interaction effects of the relationships between major risk factors and contextual risk factors in contribution to the severity of CVD in rural Thai women.
Research Questions

Research questions for this study included:

1. What are the relationships among non-modifiable, modifiable risk factors, and contextual risk factors and the severity of CVD in rural Thai women?

2. What are risk factors of CVD in rural Thai women?

3. What factors moderate or contribute indirectly to severity of CVD in rural Thai women?

Summary

This study focused on major risk factors for CVD in rural Thai women that were conceptualized as non-modifiable, modifiable, and contextual risk factors. The best way to control CVD is to know its risk factors. Although a large body of studies has already indicated risk factors of CVD in both men and women, those among the Thai population were unclear. Differences in genders, demographics, and cultures are significant in terms of risk factors of CVD. The studies of CVD in Thailand focused exclusively on urban population and therefore shed little light in the rural population, in particular rural Thai women. Knowing risk factors for CVD in these women helps nurses or health care professionals plan health promotion and/or prevention programs for them. As well as, these interventions will encourage rural Thai women to consider and practice health promotion/prevention for their cardiovascular health. Therefore, CVD in rural Thai women must be considered as a critical health issue since CVD is the leading cause of death in developed countries and causes a great amount of suffering and disruption in the lives of individuals and their families. It is a major contributor to health care costs.
CHAPTER TWO: LITERATURE REVIEW

This chapter will focus on current research and knowledge about the risk factors for CVD of women, in particular rural Thai women. Also it provides theoretical aspects related to the study of CVD risk factors. Overall, numerous studies have been conducted to explain the development of CVD risk factors. These were discussed within three major clusters: non-modifiable, modifiable, and contextual risk factors. This chapter discusses what these risk factors are within each cluster and how they could impact rural Thai women’s health, particularly cardiovascular health. The conceptual framework guiding the present study of CVD risk factors is also provided.

Cardiovascular Disease

Definitions of Cardiovascular Disease

WHO (2004) defined types of CVD to include coronary heart disease, stroke, inflammatory heart disease, rheumatic heart disease, hypertensive heart disease, and other CVDs such as tumors of the heart or vessels. CVD, as defined by AHA (2004), included: coronary heart disease (coronary artery disease and ischemic heart disease), stroke, high blood pressure, and rheumatic heart disease. Whereas, the Heart and Stroke Foundation of Canada (HSFC) (2003) indicated that cardiovascular diseases were defined as all diseases of the circulatory system, including acute myocardial infarction, ischemic heart disease, valvular heart disease, peripheral vascular disease, arrhythmias, high blood pressure, and stroke. In Thailand, CVD has been defined as coronary heart disease (e.g. coronary artery disease and ischemic heart disease), hypertension, and stroke. Since there are several definitions for CVD, it is important to define CVD in an appropriate
way consistent with the concept of this study. Thus, CVD in this study was defined based on AHA and MOPH (2005) that included coronary heart disease (e.g. coronary artery disease and ischemic heart disease), hypertension, and stroke.

Epidemiology of Cardiovascular Disease

Cardiovascular disease is the number one cause of death among women and men in the United States (US) and many other developed countries (AHA, 2006; Bittner, 2002; Charney, 2002; Grundy et al., 1999; Mackay & Mensah, 2004). As WHO indicated, CVD is currently the leading cause of death in all developed countries and in most developing countries. There were approximately 17 million deaths due to CVD in 2003—one third of all deaths in the world (Mackay & Mensah, 2004). Also, CHD kills more than 7 million people each year and strokes kill nearly 6 million. Most of these deaths are in developing countries, thus heart disease is expected to be the number one cause of death in developing countries for both men and women (WHO, 2004a).

In a developing country like Thailand, in the year 1999, 126 people/day (5.3/hour) died from strokes; from other CVDs, 54 people (2.3/hour) die each day; and from diabetes, 55 people/day (2.3/hour) die. Thus, in Thailand CVD killed 236 people/day, 10 people/hour, or 1 person every 6 minutes (MOPH, 2002). In 2005, the morbidity rate of stroke of the Thai population is 77.4 per 100,000 (MOPH, 2005). Interestingly, empirical evidence has demonstrated that Thai women have a higher morbidity rate than Thai men (Tatsanavivat et al., 1998). Remarkably, findings of studies conducted in Thailand revealed that women exceed men in the severity of most of these risk factors (Tatsanavivat et al., 1998). These findings are noteworthy as this conclusion is contrary
to findings from studies conducted in the United States and other Western countries. In particular, total cholesterol, hypercholesterolemia, fasting blood sugar, hypertension, diabetes mellitus, and obesity were higher among Thai women than men (Grundy et al., 1999; InterAsia, 2003; Pothiban, 2000; Sritara et al., 2003; Tatsanavivat et al., 1998)

A meta-analysis of the three studies of risk factors for CVD among Thai adults, including the National Health and Education Survey (NHES) I (1991), NHES II (1997), and InterASIA (2003) studies, were done by Sritara et al. (2003). Findings revealed that the prevalence of high blood pressure and smoking decreased in 2000. However, some risk factors such as diabetes, high cholesterol, overweight, and obesity increased among Thai adults in the year 2000 (see Table 1). When compared the prevalence of risk factors between women and men, consistent findings have indicated that total cholesterol, body mass index (BMI), high blood pressure (HTN), diabetes (DM), obesity appeared greater among women than men. However, the findings regarding fasting blood glucose (FBG) were inconsistent; it is unclear whether FBG is higher among Thai women (see Table 2). Between rural and urban populations, urban populations had higher prevalence of most risk factors of CVD than their rural counterparts (see Table 3).

Therefore, for physiological risk factors, Thai women have a greater risk for CVD than Thai men. Also, urban populations have greater risks than rural populations. For behavioral risk factors, the prevalence of smoking was much higher among men than women and among rural men than their urban counterparts. Alcohol consumption was higher in rural than urban populations and in men than women. The trend of drinking alcohol increased from past years. However, other cardiovascular risk factors which are
non-modifiable risk factor (family history of CVD), other physiological risk factors (abdominal obesity, and menopause status), some behavioral factors (physical inactivity and alcohol consumption), psychological factors (stress, depression, and coping), and some contextual factors such as SES (education levels and family income), and rural context have not been included as risk factors for CVD in the studies of Thai population.

Table 1

Meta-analysis of Risk Factors for CVD in Thai Adults

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Criteria</th>
<th>NHESI1991 (%)</th>
<th>NHESII 1997 (%)</th>
<th>InterAsia2000 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTNor Hx*</td>
<td>≥ 140/90, Hx.</td>
<td>27.0</td>
<td>28.0</td>
<td>20.5</td>
</tr>
<tr>
<td>DM</td>
<td>≥ 126, Hx.</td>
<td>3.1</td>
<td>8.1</td>
<td>9.6</td>
</tr>
<tr>
<td>Overweight</td>
<td>&gt; 24</td>
<td>20.0</td>
<td>25.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Obesity</td>
<td>&gt; 30</td>
<td>5.0</td>
<td>8.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>≥ 240</td>
<td>14.0</td>
<td>19.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Smoking</td>
<td>Yes</td>
<td>37.0</td>
<td>29.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Note. * Hx. = history or treatment (s)
Table 2

*Gender Differences in Prevalence of Risk Factors for CVD*

<table>
<thead>
<tr>
<th>Studies</th>
<th>Sample</th>
<th>Women &gt; men</th>
<th>Men &gt; women</th>
<th>No difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidemiology study (1994)</td>
<td>≥ 30</td>
<td>Total cholesterol, BMI, DBP, smoking</td>
<td>SBP</td>
<td>FBG, HTN, DM, obesity</td>
</tr>
<tr>
<td>InterASIA (2000)</td>
<td>≥ 35</td>
<td>Total cholesterol, BMI, DBP, smoking</td>
<td>FBG, SBP</td>
<td>HTN, DM, obesity</td>
</tr>
<tr>
<td>Lipid study in Elderly (2000)</td>
<td>≥ 60</td>
<td>BMI, cholesterol, LDL</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 3

*Geographic Differences and Risk Factors for CVD*

<table>
<thead>
<tr>
<th>Studies</th>
<th>Sample</th>
<th>Urban &gt; rural</th>
<th>Rural &gt; urban</th>
<th>No difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHES II (1997)</td>
<td>≥ 20-59</td>
<td>Overweight, obesity</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>InterASIA (2003)</td>
<td>≥ 35</td>
<td>Total cholesterol, Smoking</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMI, FBG, HTN, DM, obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pothiban (2000)</td>
<td>≥ 60</td>
<td>Physical inactivity, Hypertension</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>total cholesterol, DM, smoking, obesity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Sex Differences on CVD**

Worldwide, misconceptions persist about heart disease, often thought to be primarily a disease of middle-aged men. WHO (2004) claimed that cardiovascular disease affects as many women as men, even though it occurs at an older age. AHA (2004) indicated that CVD killed 505,661 women compared with 440,175 men in 2001. Women represent 53.5% of deaths from CVD. However, many women still believe that they are more at risk for cancer than for heart disease (WHO, 2004a). For example, although the majority of risk factors for CVD are similar for both men and women, tobacco use is more dangerous in women. Likewise, diabetes has a two times greater risk of CHD and stroke among women than among men. In addition, high blood triglycerides, another CVD risk factor, are the cause of atherosclerosis in young women but not in young men. Therefore, because elevated triglyceride levels are an independent risk factor in women, they may be a better predictor of CHD than LDL cholesterol levels. Even though menopausal symptoms have no direct effect on women developing CVD, a CVD risk factor unique to women is hormone replacement therapy, a treatment for menopausal symptoms. Similarly, oral contraceptive use in combination with smoking and gestational diabetes is a risk factor for CVD unique to women.

Another issue contributing to the prevalence of CVD among women is that heart disease is under-detected in women, particularly younger women. Also, because physicians may lack of awareness of CVD in women since women have been largely excluded from CVD clinical trials, resulting in unclear diagnostic criteria and treatment for women with CVD. Also, physicians may not categorize women’s atypical syndrome
of CVD. Physicians may be more likely to maximize CVD symptoms in women and attribute them to emotional issues (Seil, Friedman, & Schulman, 2001). In developed countries, women are less likely to be referred to a heart specialist, to be hospitalized, to be prescribed medicine, to receive invasive treatment, and to be referred for a stress test or echocardiography. Consequently, women are more likely to enter the healthcare system with the diagnosis of a second heart attack. Thirty-eight percent of women who have heart attacks will die within one year, compared with 25% of men. Furthermore, women have an increased risk of stroke or second heart attack within 6 years of the first heart attack. After stroke, women are hospitalized longer and remain more disabled than men receiving similar care (Society for Women’s Health Research, 2003). In terms of heart disease and stroke, there are differences between women and men in several ways. For example, CHD affects women approximately 10 years later than men, possibly because of the protective effect of estrogen prior to the onset of menopause (WHO, 2004a).

Since there are differences of cardiovascular risk factors between men and women, WHO (2004) classified men’s and women’s risk factors as following:

1. Risks or prevalence are higher in women than men. In women, there are greater risks compared to men such as tobacco use (higher risk), high triglyceride levels (higher risk), diabetes (more prevalent), obesity (more prevalent), and depression (more prevalent).
2. Risks are similar in men and women. Risk factors that are similar in both men and women include high blood pressure, high total cholesterol, low HDL-cholesterol, combined hyperlipidemia, unhealthy diet, physical inactivity, and stress.

3. Risks are indicated for women only. Oral contraceptive use, and HRT are also considered as risks to CVD for women. Studies conducted when doses of estrogen and progesterone in oral contraceptives were higher than they are now indicated that users had an increased risk of CVD, particularly if they were heavy smokers (Eaker et al., 1993). Also, evidence has shown that risk of heart attack is highest early in each menstrual cycle. Therefore, women are special cases that have higher risks for CVD than men and could make women more vulnerable to cardiovascular disease.

The Severity of CVD

Severity of CVD can be identified in several ways. One way is the study of CVD severity among patient survival with continuous peritoneal dialysis indicated that CVD severity was calculated by scoring from 0 to 4 with each of the defining items (angina or myocardial infarction, stroke, amputation for vascular disease, or congestive heart failure) contributing one point (Churchill, Thorpe, Vonesh, & Keshaviah, 1997). However, this study focused only on renal patients. Another method to indicate the severity of CVD is using angiography as follows: grade 0, no disease; grade 1, plaque disease of <20% stenosis; grade 2, 25–50% stenosis; grade 3, 50–74% stenosis; grade 4, 75–95% stenosis; grade 5, >95% stenosis; grade 6, totally occluded (citation). The cardiovascular index (CVI) has also been used to indicate CVD severity. CVI is scored ranging from 0 to 15, based on a semi-quantitative estimation of grossly notable
cardiovascular pathology at autopsy. The heart weight, atherosclerosis, thrombus/embolus or any lesions in vessels, and any pathology of the heart muscle are noted and scored (Alafuzoff et al., 1999). However, these above criteria/methods are complicated and may not be applicable to a study conducted in community or small provincial hospitals.

One of the strongest predictors of severity of CVD is functional capacity. The New York Heart Association (NYHA) criteria are the most widely used classification for this purpose (Tenenbaum et al., 2003). The NYHA (1994) classified functional capacity of patients with cardiac disease based on clinical severity and prognosis. The four classifications of the functional capacity have been indicated as follows: Class I is defined as cardiac disease without resulting limitation of physical activity or no evidence of CVD. Class II is defined as slight limitation of physical activity or minimal CVD. Class III is defined as marked limitation of physical activity or moderate severe CVD. Finally, Class IV is defined as resulting in inability to carry on any physical activity without discomfort, and it is also called the most severe CVD (The Criteria Committee of the NYHA, 1994). To evaluate CVD severity, the NYHA functional capacity is particularly useful because it is widely accepted and applicable for urban and rural community. The NYHA functional capacity has also been used by physicians and other health care professional in Thailand.
Rural Thailand

According to the National Statistics Organization (NSO), the total population of Thailand was estimated to be 64.8 million, of whom 45.2 million people (69.8%) live in an area defined as “rural.” Among those, 69.3% are women residing in rural areas since some men migrate to work in the big city. This is due to economic necessities (NSO, 2005). In Thailand, rural versus urban has been designated by non-municipal and municipal areas, where "urban" refers to municipal areas and "rural" refers to non-municipal areas. Municipal areas are defined by the Municipal Act in 1980 that states “A municipal area is either where the city hall is located or the areas which have at least 10,000 residents. Also, where the density of populations is more than 3,000 people per square kilometers is defined as a municipal area.” (p. 1). Rural areas are the areas that do not meet those criteria (Municipal Act, 1980). A rural village is where most Thai live. Generally they were extended family, consisting of several generations living under one roof, or perhaps several dwellings within the same compound. The father is regarded as the leader, but the mother also plays a significant role, particularly in the family’s finances and education and rearing of the children (Booranasanti, 2004).

Rural communities are more likely to have less resource and their populations often are less educated and have lower incomes than urban populations. Unemployment contributes to poverty and out-migration. In Thailand, the rural-urban out-migration started in the 1980s. Traditionally, rural villagers were only engaged partly and temporarily in non-farm employment. This was normally found in the dry season when planting crops is not possible in the rain-fed farming areas. Rural laborers temporarily
migrated to the urban area, mainly Bangkok, for short-term employment (Hanpongpanhdh, 2001). Most of out-migrants are men, thus women stay home and take care of the housework and the agrarian responsibilities to sustain the family. Due to this workload falling solely on the women, stress or depression of rural Thai women is a critical concern issue. Stress or depression could contribute to poor health in various diseases such as CVD, which has been found increasingly in this population.

Rural Thai Women

Rurality or rural context could play an important role in terms of contribution to CVD risks. As in many other countries, women are regarded as the resource persons of the family and society. They serve as resource persons through their multiple roles in the family (Puavilai & Stuifbergen, 2000). The role of women in Thai society is determined by custom and culture. The expectation in the traditional Thai family is that women will work in the home for example, taking care of family members, housework, and child rearing. While men work outside the home, earning an income and communicating with others in society. The husband assumes the role and status of leader.

Patriarchy has traditionally been dominant in Thai society. Women have to do both housework and work outside the home. Thai women in rural areas spend an average of 1,644 hours a year working in agricultural production, but housework increases the women’s total work burden to 3,894 hours per year. On the other hand, men spend an average of 2,294 hours per year working in the fields and make no contribution to housework. Also, education levels are unequal between women and men. Thai women generally have lower levels of education than men (Bennett, 2001). More than 60% of
women attained only a primary school education. In 1995 the illiteracy rate among females age 15 and over was 8.4%, more than double that of men, which was 4% (Bennett, 2001). Illiterate women tended to have low self-esteem and very little self-confidence in public, inhibiting their thinking and their perceptions. This may cause stress and depression among rural Thai women.

Furthermore, despite being the primary caretaker of the household and children, women’s positions are not equal to men. A number of studies have found that women do not have an important role in the family and that they experience difficulties in making decisions about important family issues. These situations are readily found in rural areas where the traditional concept of family is dominant and a woman’s role is limited to fulfilling her responsibilities as wife and mother. This is consistent with findings from previous research demonstrating negative association among SES, education, status in family, and health. A Turkish study reveals that women’s decision-making rates were lower than those of men, especially in regard to children’s education and authority in public and official matters (Erci, 2003). Thai women have similar unequal positions in comparison to Thai men in the family and may experience some of the same stressors as women in the Turkish study. Punyaholtra and Dennerstein (1997) also indicated that the roles of Thai women have now changed and that both men and women make decisions concerning marital and family problems. However, these findings may reflect a sampling bias, since study subjects were living in Nonthaburi province adjacent to Bangkok, the capital of Thailand. These communities are not typical of rural areas in which most Thai live.
There are health potential disparities between people, especially Thai women who live in urban areas and rural areas. These include, but are not limited to, education levels, social status, poverty, the quality and quantity of health care services available and transportation for accessing these facilities. Overall, rural Thai women are more likely than their urban counterparts to experience socio-psychological stress and depression due to socio-cultural factors.

Risk Factors of CVD

As delineated previously, Thai women demonstrated a higher risk for CVD than Thai men. Rurality and rural context could play an important role in contributing CVD risks. A focus on rural Thai women who have developed CVD is important to examine risk factors in this population. An examination of risk factors of CVD in rural Thai women may focus on conventional or major risk factors which include three main categories—non-modifiable, modifiable, and contextual risk factors. Non-modifiable risk factors include age and family history of CVD. Modifiable risk factors include physiological, behavioral, and psychological risk factors. Physiological factors involve high blood pressure, abnormal blood cholesterol (elevated total cholesterol, triglycerides, LDL-C, and low HDL-C levels), diabetes mellitus, obesity, and menopause status (pre- and post-menopause). Behavioral factors include cigarette smoke, physical inactivity, and alcohol consumption. Stress, depression, and coping are discussed as psychological factors. However, coping has been seen as a moderator or stress and depression. Contextual factors including SES and rural context could play an important role in contributing to CVD. Details are presented in Figure 1.
Major Risk Factors of CVD

Non-Modifiable Risk Factors
- Advancing age
- Family history of CVD

Physiological factors
- High blood pressure
- Abnormal serum cholesterol
- Diabetes mellitus
- Obesity
- Menopause status

Socioeconomic status
- Education levels
- Family income
- Rural context
- Distance
- Transportation

Contextual Risk Factors

Behavioral factors
- Cigarette smoking
- Physical inactivity
- Alcohol consumption

Psychological factor
- Stress
- Depression
- Coping

Figure 1. Major Risk Factors of Cardiovascular Disease
Non-Modifiable Risk Factors

Advancing Age

Advancing age is the most powerful independent risk factor for cardiovascular disease. Evidence showed that risk of stroke doubles every decade after age 55 (AHA, 2004). Increased age is the dominant risk condition for heart disease and stroke. These are true among both men and women. However, it has been indicated that women aged over 55 years or after experience menopausal have a greater risk for CVD. This is caused by estrogen hormone which protects women from CVD during the younger age (AHA, 2004). In Thailand, women have higher mortality rates of CVD than men, except for MI which is greater among men than women (NSO, 2005). Thus, age must play a major role in leading to CVD among rural Thai women.

Family History

Family history of CVD has been indicated as a non-modifiable risk factor for CVD. In the background of most diseases lies genetic inheritance. The biological makeup of each individual differs from all others (except in identical twins). To some extent one inherits tendencies which in part determine levels of blood pressure, cholesterol, blood glucose, clotting tendencies, body build and response to all internal and external stresses including responses to all aspects of existence. HSFC (2003) indicated that a family history of CVD, particularly CAD is an important risk factor for CVD. It is also an independent risk factor for stroke. The factors that contribute to this association may include familial factors, lifestyle and molecular defects in vascular physiology, which render the vessel wall more susceptible to atherosclerosis. This may be caused by
variations in genetic make up. Also, McSweeney et al. (2003) asserted that one of the most frequencies of risk factors for CVD, in particular myocardial infarction (MI), among women was family history of CVD. Family history cannot be modified. It is possible to mitigate one’s inherited tendencies through protective behaviors. Thus, those with a positive family history can gain enormous advantage by moderating their fat and food intake, by being active and by not smoking. Even though studies from the US and other countries indicated that family history is a major risk factor for CVD, studies conducted in Thailand were inconclusive that family history is a risk factor for CVD among Thai population.

Modifiable Risk Factors

Physiological Risk Factors

High blood pressure.

Although high blood pressure or hypertension is part of CVD, it is in turn a remarkable risk for other cardiovascular diseases. AHA (2006) indicated that high blood pressure is a leading cause of stroke. High blood pressure is one of the most important preventable causes of premature death worldwide and has been correlated with other cardiovascular risk factors. Even though a blood pressure at the top end of the normal range, it increases risk for CVD (Thom et al., 2006; WHO, 2004a). According to WHO, high blood pressure is defined as a systolic blood pressure (SBP) above 140 mmHg and/or a diastolic blood pressure (DBP) above 90 mmHg. In most countries, up to 30% of adults suffer from high blood pressure and a further 50% to 60% would be in better health if they reduced their blood pressure, by increasing physical activity, maintaining
an ideal body weight and eating more fruits and vegetables. In people aged up to 50 years, both DBP and SBP are associated with cardiovascular risk; above this age, SBP is a far more important predictor (WHO, 2004a).

Blood pressure usually rises with age, except where salt intake is low, physical activity is high, and obesity is largely absent. Dietary salt increases blood pressure in most people with hypertension, and in about a quarter of those with normal blood pressure, especially with increasing age. A high intake of salt independently increases the risk of CVD in overweight persons. In addition to lifestyle changes, effective medication is available for control of high blood pressure (HSFC, 2003; WHO, 2004a). High blood pressure also increases overall cardiovascular risk by 2 to 3 times. Individuals who have excess weight, are physically inactive, use alcohol heavily, or have excessive salt intake are more likely to develop high blood pressure. High BP is commonly associated with other metabolic cardiovascular risk factors such as insulin resistance, obesity, hyperuricemia, and dyslipidemia (HSFC, 2003).

A comparison between men and women showed that high blood pressure is a cause of death for more women than men (Pearson et al., 2002). The prevalence of high blood pressure is two to three times more common in women taking oral contraceptives, especially those who are older and obese, than in women not taking them. AHA (2004) also indicated that more men than women have high blood pressure until age 55. From age 55 and older, the percentage of women with high blood pressure continues to increase. Women have a greater risk of developing high blood pressure if they are overweight by 20 pounds or more, have a family history of high blood pressure, are
pregnant, take certain contraceptive pills, or are menopausal. High blood pressure affects 60% of women ages 65 to 74 (AHA, 2004).

High blood pressure is also highly prevalent in Thai populations. Studies of CVD risk factors among Thai people indicated that Thai women demonstrated a higher prevalence of hypertension than Thai men (Tassanavivat et al., 1998; InterASIA, 2003; Sritara et al, 2003). However, the results related to SBP are still controversial since two other studies revealed no evidence of differences in the prevalence of systolic blood high pressure between Thai men and women (InterAsia, 2003; Tatsanavivat et al., 1998). Whether high blood pressure is a predictor of CVD in rural Thai women needs to be further investigated.

Abnormal serum cholesterol.

Abnormal blood cholesterol has been suggested as a strong cardiovascular risk factor. High levels of total and LDL-C, and other abnormal lipids (fats), are risk factors for cardiovascular disease (AHA, 2006; Anonymous, 1987; Mosca et al., 1999; WHO, 2004a). A high level of LDL-C can lead to clogging of the arteries, increasing the risk of heart attack and ischemic stroke, while a high level of HDL-C reduces the risk of coronary heart disease and stroke (AHA, 2006; Mackay & Mensah, 2004; WHO, 2004a).

When compared between women and men, women’s cholesterol is higher than men’s cholesterol from age 55 and beyond (AHA, 2004). Also beginning at age 45, a higher percentage of women than men have total blood cholesterol of 200 mg/dL or higher (levels between 200 and 239 mg/dL are considered borderline high.) The risk of heart attack in both men and women is highest when they have lower HDL-C levels
(below 40 mg/dL) and higher total cholesterol levels (above 240 mg/dL). Higher level of triglycerides which is the most common type of fat in the body often go with higher levels of total cholesterol and LDL-C, lower levels of HDL-C and increased risk of diabetes. High triglycerides may increase the risk of CVD for women more than men (AHA, 2004; Kannel & McGee, 1979). Dyslipidemia may also put women at greater risk than men, as elevated levels of triglycerides and low levels of HDL are more strongly correlated with CHD in women (Mosca et al., 1999). In Thailand, hypercholesterolemia in Thai population is defined as fasting serum cholesterol ≥ 6.2 mmol/l (240 mg/dL). Results from studies conducted in Thailand also revealed that Thai women have higher prevalence of total serum cholesterol levels than Thai men (InterAsia, 2003; Tatsanavivat et al.).

*Diabetes mellitus.*

Diabetes is one of determinant risk factors of CVD. Diabetes is a disorder of carbohydrate metabolism and a risk factor for CVD. Insulin is a hormone produced by the pancreas and used by the body to regulate glucose. Diabetes occurs when the body does not produce enough insulin, or cannot use it properly, leading to too much sugar in the blood. Symptoms include thirst, excessive urination, tiredness, and unexplained weight loss. The majority of people with diabetes have type II diabetes, in which insulin is produced in smaller amounts than needed or is not properly effective. This form of diabetes is preventable, because it is related to physical inactivity, excess calorie intake and obesity (Mackay & Mensah, 2004).
There are evidence relating diabetes and mortality from CVD. As AHA (2004) and the NHLBI (1994) indicated, two-thirds to three-fourths of people with diabetes will die of some form of heart or blood vessel disease. Adults with diabetes have heart disease death rates about two to four times higher than those for adults without diabetes. The risk for stroke is two to four times higher as well. The age-adjusted prevalence of major cardiovascular disease for women with diabetes is twice that for women without diabetes. The age-adjusted major cardiovascular disease hospital discharge rate for women with diabetes is almost four times the rate for women without diabetes. According to HSFC (2003), adult onset diabetes is a significant risk factor for the development of high blood pressure, CVD, particular in women. Diabetes not only increases the incidence of CVD but adversely influences outcome as well. Individuals with diabetes have higher mortality rate from CVD. Diabetics frequently have high blood pressure and high cholesterol and are overweight, increasing their risk of CVD even more (AHA, 2004). Maintaining a healthy weight through healthy diet and regular physical activity can prevent diabetes. Effective management of diabetes can decrease the risk of CVD (HSFC, 2003).

In addition, diabetes mellitus is associated with 3 to 7-fold increase in risk for developing CHD in women compared to a two three-fold elevation risk in men. The reason for this gender difference is not fully established, but it may be the result of a more deleterious effect of diabetes on blood pressure and lipids in women (Mosca et al., 2002). Therefore, women with type 2 diabetes have a higher risk of heart disease, heart attack and stroke than non-diabetic same-aged women. It doubles the risk of second heart attack in women but not in men (AHA, 2004). Diabetes is more prevalent in developed
countries, but modernization and lifestyle changes are likely to result in a future epidemic of diabetes in developing countries (WHO, 2004a).

In Thailand, evidence has indicated that Thai women have higher prevalence of diabetes defined as fasting blood glucose ≥ 7.8 mmol/l (140 mg/dl) than Thai men (3.7% in women, 2.4% in men) (Tatsanavivat et al., 1998). However, the other national study indicated that the prevalence of diabetes (fasting blood glucose ≥ 7.0 mmol/l (126 mg/dl) or previous diagnosis of diabetes) among women was a little higher than men (10% in women, 9% in men) (InterAsia, 2003). These two national studies had different definitions of diabetes and results. The latter demonstrated that Thai women had a much higher prevalence between genders than the former. Prevalence rate of diabetes mellitus in Thai population has increased over time (see Table 2). This might be caused by major socio-demographic change over time since Thailand is a developing country.

**Obesity.**

Obesity is one of significant risk factor of CVD. According to WHO (1999; 2004), being overweight has been defined by utilizing the Body Mass Index (BMI), a measure of weight in relation to height. BMI is commonly used for classifying overweight and obesity. A BMI that is as low as 21 may be associated with the greatest protection from CHD death among women. The BMI for observed risk in different Asian populations varies from 22 to 25 kg/m². Although BMI cannot distinguish fat mass from lean mass, it is relatively constant for subjects of the same degree of body fat regardless of height, thus providing a reliable measure of obesity. The fatter the person, the more likely the cholesterol is high, the blood pressure raised and the blood to clot. Clots are
less likely to be removed by normal bodily processes. BMI provides a simple, convenient measurement of obesity.

BMI has also been related to other cardiovascular risk factors such as diabetes and high blood pressure. The risks of cardiovascular disease and type II diabetes tend to increase on a continuum with increasing BMI. But for practical purposes a person with a BMI of over 25 is considered overweight, while someone with a BMI of over 30 is obese. WHO (2004) claimed that obese smokers live 14 fewer years than nonsmokers of normal weight. Also, HSFC (2003) indicated that being overweight or obese among individual aged between 18 and 64 years is one of the most common factors influencing the development of high blood pressure and diabetes. These conditions are, in turn, two important risk factors for the development of CVD. In general, healthy nutrition and regular physical activity can reduce excess weight and obesity. Thus, obesity may impact directly and indirectly through other risk factors in contributing to CVD.

In Thailand, there was evidence indicating that more than a quarter of Thai adults were considered to be overweight (Aekplakorn et al., 2004). BMI is higher among women than men (InterAsia, 2003; Tatsanavivat et al., 1998) and among populations living in urban compared with rural areas. BMI is related to age—greatest in the age 45-54 year-aged group in both sexes and both in urban and rural populations (InterAsia, 2003). Since Thailand is undergoing rapid economic development, lifestyle and socio-demographic change must play an important role in contributing to CVD. Thais adopt the Westernized life style, thus there is an increased rate of overweight and obesity in Thailand, in particular urban populations. Reductions in physical activity and changes in
diet may account for some trends of overweight and obesity. Rural Thai women who generally have active lifestyle and eat healthy diet are less likely overweight and obese (Punyahotra & Street, 1998). However, the mortality of CVD is still high in this population. It is important to examine obesity and its contribution to CVD among rural Thai women. Also, central obesity, both waist measurement and WHR, have not been indicated whether or not they are related to CVD in this population.

*Menopause status.*

Menopause can be a modifiable risk factor of CVD among women (Bittner, 2002; Grundy et al., 1999; WHO, 2004a). Menopause is a life transition women experience. It has been classified into two terms: pre-menopause and post-menopause. Pre-menopause is defined as the period immediately prior to menopause, outlining at least one year after menopause (Anonymous, 1987). The actual age at which menopausal Change begins varies considerably from woman to woman; the norm is 45, with a normal range of 35 to 55. During these pre-menopausal years, menstrual periods may become noticeably different (closer together, farther apart, scantier, more profuse). Night sweats or hot flashes come, if at all, only occasionally and are usually blamed on too many blankets or a rich meal (Stewart, 2005).

Post-Menopause is defined as dating after the final menstruation period (FMP) occurs at least one year after menopause. They may have diminished symptoms of menopause such as flashes, flushes, and night sweats may be frequent; palpitations, emotional sensitivity, and sleeplessness are common. Depending on the individual
woman and her circumstances, other physical and emotional changes may come with the change, or she may experience next to nothing (Stewart, 2005).

Menopause has been correlated with CVD. Women who are over 55 or experience menopausal periods tend to be at higher risk for CVD and women between the ages of 40 and 59 are at greater risk for developing CVD (AHA, 2006; Mackay & Mensah, 2004). Menopause has also been identified as a mediator associated with stress and cardiovascular disease and may be a unique risk factor in women since post-menopausal women have greater risk of developing CVD than pre-menopausal women of the same age (Mosca et al., 2002).

In Thailand, evidence showed that peri-menopausal Thai women have the most occurrences of joint aches/pain, hot flashes, depression, and insomnia as compared to women of other age groups. Women who are older than 50 years of age with several children and minimal education, and who are housewives or landowners are most likely to experience these symptoms. These women also appeared to have poorer health and higher rates of health care utilization (Punyahotra et al., 1997). However, menopause in Thai women has not been studied whether or not it has a link to CVD.

Behavioral Risk Factors

Cigarette smoking.

Cigarette smoking has been well documented as a major-behavioral risk factor of CVD. Cigarette smoke contains many chemicals, including nicotine and carbon monoxide. Some of these chemicals and/or the carbon monoxide damage the inner layer of the arteries. That damage permits more rapid entry of cholesterol into the artery wall.
Cigarette smoking also leads to blood clotting in the arteries, leading to heart attack (Goble, 2005). The InterHeart study defined current smokers as individuals who smoked any tobacco in the previous 12 months and included those who had quit within the past year (Yusuf et al., 2001). Furthermore, cigarette smokers have been defined as individuals are considered to be daily smokers if they regularly smoke at least one cigarette per day. Current smokers include both daily and occasional smokers (HSFC, 2003). Former smokers were defined as those who had quit more than a year earlier (Yusuf et al., 2001).

Tobacco use, other than smoking, and passive smoking are also implicated as CVD risks. Smoking promotes CVD through several mechanisms. It damages the endothelium lining of the blood vessels, increases cholesterol plaques (fatty deposits in the arteries), increases clotting, raises LDL-C and lowers HDL-C, and promotes coronary artery spasm. Nicotine accelerates the heart rate and raises blood pressure. A gene has been discovered that increases smokers’ risk of developing coronary heart disease by up to four times. Around a quarter of the population carries one or more copies of this gene (WHO, 2004a). When compared between women and men, women smokers are at particular risk, with a higher risk of heart attack than male smokers. Women who smoke only three to five cigarettes a day double their risk of heart attack, while men who smoke six to nine cigarettes a day double their risk (Mackay & Mensah, 2004).

In Thailand, evidence has been indicated that the prevalence of cigarette smoke in Thai men was much higher than women (InterAsia, 2003; Tatsanavivat et al., 1998). Although the government policy has passed the bill of prohibited smoking in public and
increased tobacco sales tax, the prevalence of smoking is still high in particular among men (rural men smoke more than their urban counterparts). Tassanavivat et al. (1998) asserted that 65% of Thai men smoked compared with 8.5% of those women. According to the InterASIA study (2003), 48% of Thai men smoked compared with 3% of Thai women. This is due to Thai culture that the view of women smokers is negative. Thus, rural women and their family are susceptible to be second-handed smokers since their spouses smoke.

*Physical inactivity.*

Physical inactivity is estimated to cause two million deaths worldwide annually. Globally, it is estimated to cause about 22% of ischemic heart disease. Estimated attributable fractions are similar in men and women. Appropriately regular physical activity is a major component in preventing the growing global burden of chronic disease, e.g., CVD and diabetes. Opportunities for people to be physically active exist in the four major domains of their day including work, recreation, exercise, and sport activities (Mackay & Mensah, 2004).

The AHA asserted that physical inactivity increases risk of heart disease and stroke by 50%. It has been indicated that industrialization, urbanization and mechanized transport have reduced physical activity, even in developing countries, so that currently more than 60% of the population worldwide are not sufficiently active. Physical exercise is linked to longevity, independently of genetic factors. Physical activity, even at an older age, can significantly reduce the risk of coronary heart disease, diabetes, high blood pressure, and obesity, help reduce stress, anxiety and depression, and improve lipid
profile. It also reduces the risks of colon cancer, breast cancer and ischemic stroke. Those who are inactive are more likely to have heart attacks, heart disease and early death than those who are generally active. The inactive are more likely to have higher cholesterol, raised blood pressure, to be overweight and even to smoke. However, there are other mechanisms. It may be related to mechanisms of blood clotting and clot removal, but there are many other possibilities. Exercise of any sort has been repeatedly shown to protect against developing heart disease.

In 1997, WHO defined physical activity as all movements in everyday life. Inactivity is generally higher amongst girls and women (Mackay & Mensah, 2004). Physical activity is defined as all taking at least 2.5 hours per week of moderate exercise or 1 hour per week of vigorous exercise. Opportunities for people to be physically active exist in the four major domains of their day-to-day lives: at work (especially if the job involves manual labor); for transport (walking or cycling to work); in domestic duties (housework or gathering fuel); or in leisure time (participating in sports or recreational activities)(WHO, 2002a). In this report, physical inactivity is defined as doing very little or no physical activity in any of these domains.

The health benefits of regular physical activity are many. At least 30 minutes of moderate physical activity, for example brisk walking, is enough to bring many of these effects. Regular physical activity reduces the risk of dying from heart disease or stroke and the risk of developing heart disease up to 50%. Also it reduces the risk of developing type II diabetes 50%; helps to prevent / reduce hypertension; promotes psychological well-being, reduces stress, anxiety and feelings of depression and loneliness; and helps
control weight and lower the risk of becoming obese by 50% compared to people with
sedentary lifestyles (Mackay & Mensah, 2004).

Findings from the US demonstrated that physical inactivity is more prevalent
among women than men. People who are older and are lower SES are less likely to be
physically active (AHA, 2006). This might not generalize to Thai society, especially rural
areas since rural Thai women are physically active. However, rural Thai women tend to
have high prevalence rate of CVD. Studies of cardiovascular events in Thailand have not
emphasized on physical inactivity as a risk factor for CVD thus little is known about the
contribution of physical inactivity to CVD in the Thai population, in particular rural Thai
women.

Alcohol consumption.

Alcohol consumption/drinking can damage the heart and blood vessel system and
is one of significant risk factors for CVD in both developed and developing countries
(WHO, 2004a). However, the finding from risk status of CVD by D'Agostino et al (2000)
revealed that there is a slight relationship between alcohol consumption and CHD.

In women, studies have shown that the risk of heart disease in women who drink
average of one drink per day is lower than for non-drinkers (AHA, 2006), however,
drinking is not encouraged as a strategy for reducing CVD risk due to the risks involved
with alcohol use, including alcoholism, high blood pressure, stroke, cancer, liver disease,
accidents, and fetal alcohol syndrome (Krauss et al., 1996).

Alcohol related problems have increased considerably in Thailand in recent years.
The national survey in Thailand in 1991 which found the prevalence of frequent and
regular drinking was at its peak (17.6%) in males aged between 35 and 39 years. The rate tended to decline after this age and was lowest in the group aged over 70 years (6.6%) (Chuprapawan, 2001). Patterns of alcohol consumption in Thai population are classified by Assanangkornchai et al. (1999), including (1) non-drinkers, infrequent or light drinkers; (2) hazardous or harmful drinkers; (3) alcohol-dependent drinkers. The non-drinkers, infrequent or light drinkers included either total abstainers or persons who drank less than once a month or less than 30 g in a drinking day. The hazardous drinkers were those who drank at least 30 g in a drinking day and at least 2 days/month. The harmful drinkers were subjects who drank at least 2 days/month and fulfilled at least one criterion of harmful drinking in the past year (WHO, 2004b). The cut-off of 30 g/drinking day was chosen on the basis of the observation of general patterns of alcohol consumption in Thai people and expert opinion. Thirty grams of ethanol are approximately equivalent to one bottle of Thai beer (650 cc, 4.5% alcohol) or two 50-cc cupfuls of Thai whisky (35% alcohol), which are generally accepted as the amount of intake on a social drinking occasion for Thai people, particularly Thai men (Assanangkornchai, Saunders, & Conigrave, 2000). Thailand also has several traditional alcoholic beverages such as Satoh. Satoh production is carried out by using three kinds of rice: white sticky rice, red sticky rice and non-polished rice, yielding 29% ethanol (WHO, 2004b). One and a half cupfuls of Satoh can be counted as 30 g ethanol.

Drinking among women is not common in Thailand since social values, norms, religion, knowledge, and beliefs about drinking behaviors are all co-influence alcohol consumption in Thai population (Assanangkornchai et al., 2000). However, some rural
Thai women drink alcohol often or occasionally. Whether or not alcohol consumption has an impact on rural Thai women’s cardiovascular health was unclear.

**Psychological Risk Factors**

Even though the studies of risk factors for CVD in Thailand have not addressed psychological components in assessing major risk factors for CVD, recent studies provided evidence that psycho-social factors (e.g. stress and depression) are potential psychological or mediators of cardiovascular disease, (AHA, 2006; Appel et al., 2002; Bittner, 2002; Kaplan & Keil, 1993; Rozanski, Blumenthal, & Kaplan, 1999; WHO, 2004a; Yusuf et al., 2001). However, the association between these two factors and cardiovascular disease is inconclusive and their impact on the development of CVD requires further study (Bittner, 2002).

The contributions of psychological factors to CVD have been indicated by Hemingway & Mamot (1999). They claimed that evidence of mechanisms linking psychosocial factors with coronary heart disease is important in making causal inferences and therefore in designing preventive interventions. Psychosocial factors may act alone or combine in clusters and may exert effects at different stages of the life course. Broadly, three interrelated pathways may be considered. Firstly, psychosocial factors may affect health related behaviors such as smoking, diet, alcohol consumption, or physical activity, which in turn may influence the risk of coronary heart disease. If such behaviors do lie on the causal pathway between psychosocial factors and coronary heart disease, then treating them as confounding variables, as some studies do, must be questioned. Secondly, psychosocial factors may cause direct acute or chronic patho-physiological changes.
Thirdly, access to and content of medical care may plausibly be influenced by, for example, social support (but there is little direct evidence for this). The following sections will provide information, theoretical perspectives, and discussion of psychological risk factors for CVD such as stress, depression, and coping (Hemingway & Marmot, 1999).

**Stress.**

Stress is a part of life. The stressor may be something actually or potentially unpleasant. If it is perceived as a threat, a sensation of stress is felt. This is coupled with stimuli which lead to multiple bodily responses which could be regarded as mechanisms to increase our capacity for flight or fight – to run or to overcome (Brehm, 1998). People might have not confront or cope with the stress. If stresses continue or multiply, they may overwhelm them, inducing a sense of despair, hopelessness or depression (Gopalan, 1998). With the growing recognition by medical professionals that stress management is an appropriate preventive treatment for CVD, and with the scientific evidence showing the association between stress and CVD, the scientific community has acknowledged stress as a contributing risk factors to CVD (AHA, 2006; Appel et al., 2002; Grundy et al., 1999; Mackay & Mensah, 2004; Rozanski, Blumenthal, & Kaplan, 1999; Yusuf et al., 2001). Stress and other psychosocial factors are not considered independent CVD risk factors since the exact role stress plays in development of CVD is not clearly understood (AHA, 2004). In the next part, stress theories, physiological responses to stress, injury theory, and stress and CVD were discussed.
Theories of stress.

Stress is a multidimensional phenomenon and conceptualized in several ways. It has been studied from three major perspectives: 1) stress as a response, 2) a stimulus, and 3) a relation (Lazarus, 1984).

1) Stress as a response: According to Hans Selye (1976), stress is defined as "the non-specific response of the body to any demand made upon it." Moreover, stress is a state or condition of the body produced by diverse nocuous agents and manifested by a syndrome of changes. The agents that produced stress are called stressors and can be a wide variety of mental, emotional, and other psychological events (Selye, 1970). Selye also identified three structural changes which he labeled the general adaptative syndrome (GAS). The GAS occurs in three stages: the alarm stage, the stage of resistance or adaptation, and the stage of exhaustion. Selye (1976) also identified three components of physiologic stress that are the stressor, the physiologic or chemical disturbance produced by the stressor, and the body’s adaptative response to the stressor (Shelby and McCance, 2000).

Based on this perspective, the stress response is marked by the secretion of catecholamines, which speed up the heart rate and increase blood pressure, blood sugar levels, respiration, and circulation to skin and muscles. These physiologic changes are thought to ready individuals for the fight-or-flight response. Stress is not only a response to a stressor, but is also a process that maximizes the organism to maintain its functions appropriately. Also, stress usually defends body against pathogens, injury or a threatening event. Desirable stressors which lead to pleasure are called “eustress” and undesirable
stressors which lead to displeasure are called “distress” (Selye, 1970). Thus response definitions, which have been prevalent in biology and medicine, refer to a state of stress; the person is spoken of as reacting with stress, being under stress.

2) Stress as a Stimulus: Stimulus definitions focus on events in the environment such as natural disasters, noxious conditions, illness, or being laid off from work. This approach assumes that certain situations are normatively stressful but does not allow for individual differences in the evaluation of events (Lazarus, 1984). Furthermore, Beare and Myers (1990) as cited by Meephol (2000) assert that critical assumptions underlying the stimulus model of stress include: life change events are normative and result in a similar impact across time and across people; a person’s perception of the event as positively toned or negatively toned is irrelevant; and there is a common threshold beyond which disruption occurs (Meephol, 2000).

3) Stress as a transaction: Lazarus & Folkman (1984) claimed that both response and stimulus definitions have limited utility, because a stimulus gets defined as stressful only in terms of a stress response. Adequate rules are still needed to specify the conditions under which some stimuli are stressors. They have defined stress as a relationship between the person and the environment. Lazarus conceives stressful encounters as a person-environment transactional process, with two ways of gathering information, trying to answer the questions “What is at stake?” (primary appraisal) and “What can be done about it?” (secondary appraisal), and two ways of trying to manage the problem, eliminating or reducing the source of stress (problem-focus coping) and calming upset feelings (emotion-focus coping). The two coping functions specified by
Lazarus, solving problems and managing emotions, are generally recognized to be fundamental.

The core assumptions of the transaction approach include: stress is not measurable as a singular concept and the person’s cognitive appraisal of the situation mediates stress experiences. People are more than passive recipients of stress and are not merely unthinking reactors to the events around them. The person’s interpretation of the event must be considered, and the meaning given to the event by the person determines the perception of stress. Stress occurs only when a person appraises a situation as a stressful (Lazarus & Folkman, 1984). Furthermore, stress has been associated with the deterioration of the immune-related health outcomes, such as decreased resistance to infection and onset of worsening of autoimmune diseases. Stress appears to have important implications for the progression of chronic disease such as cancer, cardiovascular disease, and other illnesses. In recent years stress has been more usefully defined as transactional concept that stress is viewed as the state of affairs arising when a person relates to situations in certain ways. People are not disturbed by situations per se but by the ways they appraise and react to situation (McCance and Huether, 2001).

**Stress and CVD.**

As delineated previously, stress responses involve nearly every system. Physiological and psychological stress responses result from the sympathetic nervous system (SNS) directly and by the way of endocrine system. Numerous factors have effects on stress responses—individual physical and mental conditions, age, sex, heredity, socioeconomic status, and perceived experience of similar stressors (Thibodeau & Patton,
Stress can lead to not only many stress-related disorders such as gastritis, ulceratives, irritable bowl syndrome, rheumatoid, asthma, headache, anxiety, and depression, etc., but also chronic disease/illness such as CVD (Tortora and Grabowski, 2000). However, the exact role of stress on health or in those diseases is not known yet.

The hypothesis of the contribution to stress to CVD has been indicated by Tortora and Grabowski (2000). The cardiovascular system circulates blood to every cell delivering oxygen fuel, hormones, and removing waste products. The sympathetic arousal causes increased higher heart rate by the SNS itself and catecholamines secreted from the adrenal medulla. Another major effect of stress on cardiovascular system is high blood pressure. Sympathetic arousal and the stress hormones make the heart beat harder and faster, thus blood flow is redistributed, blood volume increases, and blood pressure rises. When excess stress becomes chronic situation, the neural and hormonal stimulation may cause blood pressure to become chronically elevated.

Furthermore, according to Brehm (1998), stress could increase cardiovascular risk in many ways, both directly and indirectly. It can increase blood cholesterol level, blood sugar, lead to hemoconcentration and faster blood clot rate, cause irregular heart beats. Stress contributes to high blood pressure, in turn the CVD risk factor. Stress hormones and high blood pressure damage the lining of arteries causing atherosclerosis. Stressful time always accompanies by bad lifestyle such as alcohol consumption, smoking, sedentary lifestyle contributing to CVD. Stress can also interact with personality factors such as type A behavior, anger/hostility, low self-confidence, etc. to increase CVD risks. High blood pressure, carbonmonoxide from smoke, high blood cholesterol and sugar can
contribute to damage the lining of the artery. Elevated of the stress hormone such as cortisol may also damage the artery lining that attracts white blood cells attempting to repair the problem. This causes atherosclerotic plaques, rough surface that cause platelets leading to blood clots and more cell growth (Brehm, 1998).

Stress has also been linked to menopause since many studies indicate that women experience psychological stress during this time (Bosworth, Bastian, Rimer, & Siegler, 2003 and Siegler, 2003; Sunsern, 2002). A study of coping styles and personality related to menopausal stress in 170 women aged 45 to 54 indicated that menopausal stress is associated with individual personalities and coping styles (Bosworth et al., 2003 and Siegler, 2003). Menopause could contribute to CVD indirectly through the contribution of psychological stress, depression, and copi ng. Stress is significant for CVD, however, little is known about stress and CVD in Thai population.

**Depression.**

Friedman, H. (1991) defined depression as generally involves feelings of sadness, tiredness, indecisiveness, and worthlessness. Depressed people tend to be aware of their problems, and are likely to be prone to excessive stress which manifests itself in a disruption of hormonal systems that are used to maintain internal homeostasis. Another perspective of depression defined by Rozanski et al. (1999) is that episodes of major depression are characterized by the presence of a depressed mood and markedly decreased interest in all activities, persisting for at least 2 weeks and accompanied by at least 4 of the following additional symptoms: changes in appetite, sleep disturbance,
fatigue, psychomotor retardation or agitation, feelings of guilt or worthlessness, problems concentrating, and suicidal thoughts (Rozanski et al., 1999).

*Theoretical perspectives of depression.*

**Beck Cognitive Theory of Depression:** The cognitive theory described by Beck (Beck, 1993) evolved from his empirical observation of depressed patients’ descriptions of their thought content through verbalization. Although there are many components of cognition that are important to cognitive depression theory, Beck focused on the cognitive constructs called cognitive distortions. The conjoint presence of cognitive distortions and a major life stressor, however, is expected to increase the likelihood of a depressive episode. Following from this conceptualization, cognitive distortions should be higher in depressed individuals. Cognitive distortions are proximal causes for depression. People must precede the depressive episode (Davidson, Rieckmann, & Lesperance, 2004).

**Behavioral theory of depression:** The predominant behavioral theory of depression postulates that major life stressors can result in a depressive episode because they disrupt normal behavior reinforcement patterns. Antonuccio (1998) asserted that the behavioral theory views depression as the consequence of a lack of or decrease in the efficiency of positively reinforced behavior and perhaps overt punishment for behavioral initiation. This may be a result of a decrease in the availability of reinforcing events, one’s personal skills to act on the environment, the impact of certain types of events, or a combination of these. In addition, the mobilization of support from family and other social networks may result in a negative feedback loop of social reinforcement for
depressive behaviors (social withdrawal, positive social reinforcement for withdrawal, further withdrawal). In other words, in times of major stress from unexpected events, people may experience a low rate of positive reinforcement for mood-enhancing behavior and a higher rate of positive reinforcement for depressive behavior. The behavioral treatment that derives from this theory of depression involves helping patients increase their frequency and quality of pleasant activities. It has been found that depressed patients have low rates of pleasant activities and obtained pleasure.

*Depression and CVD.*

There has long been an interest in the contribution of psychosocial factors to CVD risk. Specific psychosocial risk factors including hostility, depression, and social isolation have been shown to have predictive value (Mosca et al., 1999). Numerous studies have established that depression predicts the incidence of CHD in previously healthy people (Davidson et al., 2004). In recent years, depression has emerged in the discussion on the impact of psychological aspects on coronary risks (AHA, 2006; Davidson et al., 2004; Rozanski et al., 1999; Rugulies, 2002; WHO, 2004a). Several prognostic studies have shown that depression is a predictor for survival after myocardial infarction (Davidson et al., 2004; Rozanski et al., 1999; Rugulies, 2002) Major depression is associated with a 4-fold increase in the risk of mortality during the first 6 months after acute MI, and its prognostic significance is comparable to that of left ventricular dysfunction and history of MI. Depression predicts the development of CHD in initially healthy people. Depression was found to be a better predictor for CHD outcome than hostility, anger, or anxiety (Rugulies, 2002).
Recent epidemiological studies evaluating the relationship between depression and CAD among healthy and CAD populations consistently demonstrated a significant prospective relationship between the occurrence of major depression episodes and the incidence of cardiac events. Two additional findings are notable. First, the presence of depressive symptoms, in the absence of diagnosed major depression episodes, is also associated with an increased risk for cardiac events. Second, a number of studies support an incline between the magnitude of depression and future cardiac events. Together, these data suggest that risk for CAD associated with depression exists along a continuum, according to the magnitude of depressive symptoms (Rozanski et al., 1999). In addition, numerous studies indicated that depression also worsens the prognosis and increases the risk of coronary disease in women, as it does in men. The results of the Stockholm Female Coronary Risk study (1991-1994) in provided evidence that depressive symptoms are twice as common in women with coronary disease. Marital stress is also significantly associated with depressive symptoms (Balog et al., 2003).

In addition, it has been shown that depressed subjects are at greater risk of dysregulation of the autonomic nervous system and the hypothalamic–pituitary–adrenal axis. These dysregulations affect the cardiovascular system through the release of catecholamines and corticosteroids, and they have been found to be associated with hemodynamic changes, tachycardia, intima injuries, and metabolic changes. Recently, it has also been shown that depressed subjects are more likely to have diminished heart rate variability and increased platelet activation. Reduced heart rate variability has been found to be a risk factor for myocardial infarction and sudden cardiac death. Increased platelet
activation can cause vascular damage, progression of atherosclerosis, and thrombus formation. Thus, it is concluded that depression predicts the development of CVD.

**Depression and other cardiovascular risk factors.**

There is substantial evidence that depression is associated with known cardiovascular disease risk factors, particularly cigarette smoking (Rugulies, 2002). 22 out of 25 studies reporting the frequency of cigarette smoking in depressed versus non-depressed people found increased rates of cigarette smoking in the depressed. Additionally, depressed subjects are less successful in attempts to quit smoking (Glassman et al., 1990). In the 9-year follow-up study, depressed smokers were 40 percent less likely than non-depressed smokers to have quit smoking (Anda et al., 1990).

A meta-analysis of 11 cohort studies by Rugulies in 2002 indicated that an explanation for the association between depression and CHD could be a higher prevalence of biomedical coronary risk factors in depressed subjects. While there is little evidence for an association between depression and elevated cholesterol levels (Horsten, Wamala, Vingerhoets, & Orth-Gomer, 1997), depressed subjects have a higher risk of hypertension (Davidson et al., 2004) and are more likely to show poor health behaviors, such as smoking and lack of leisure-time physical activity. However, most of the studies in this review adjusted for smoking and blood pressure and did not find a substantial change of depressed subjects.

**Stress and depression in women.**

A good deal of what women experience as stress and depression is caused by what researchers call “role conflicts.” Women do not have the liberty to abandon a role to
adopt another one. For example, women experience role conflicts between their families and careers (Lortie, 2003). Furthermore, women’s positions are not equal to men. A number of studies have found that women do not have an important role in the family and that they experience difficulties in making decisions about important family issues.

Evidence suggested that women may experience greater psychological stress than men. As Hallman, Perski, Burell, et al. (2002) indicated, women generally reported a higher level of perceived external stress than men. Different demographic groups, such as women with upper secondary school educations and women in white-collar positions, reported significantly higher values of perceived external stress than men, and these connections should be further investigated (Hallman, Perski, Burell, Lisspers, & Setterlind, 2002). In addition, Burt and Stein (2002) asserted that women are at an increased risk for the first onset of major depression from early adolescence until their mid-50s and have a lifetime rate of major depression approximately two to three times greater than that for men. There is accumulating evidence that certain reproductive-related hormonal changes place women at increased risk for depression. These findings are consistent with other studies (Burt & Stein, 2002; Hammen, 2003; Hammen & Mazure, 2003; Mazure & Maciejewski, 2003), which revealed that women are well-known to be more afflicted with depression than men in nearly every country. It is also increasingly understood that depression in women most commonly occurs in the child-rearing years and takes an enormous toll on families, affecting marital and parental functioning. Hamman (2003) also indicated that the lives of depressed women appear to
be stressful. Recurrence of depression is a predictable consequence of highly stressful and largely persisting circumstances in which depressed women are embedded.

Causes of the observed higher mortality rate of CVD in women than in men are not well understood and may include not only standard risk factors, but also psychological factors such as stress, depression, and coping style. Thus, depression is a risk factor for cardiac morbidity and mortality in patients with CVD. In Thailand, depression has been considered to be one of the major mental health problems. The prevalence of depression in both genders was 10% in the year 1997 (MOPH, 2005). The study of predictors for depression in Thai women by Sangon (2004) indicated that Thai depressed women have higher stressful life events, parental role strain, interpersonal conflict, and perceived stress; and significantly lower interpersonal resources, perceived social support, and sense of belonging. Only family history of depression, perceived stress, and sense of belonging predicted depression in Thai women. Perceived stress had the strongest direct effect on severity of depression. The study focused on only the predictors of depression in urban Thai women who experienced depression. However, the study did not focus on rural Thai women.

Although women are more likely experience stress and depression than men, little is known about the prevalence of stress and depression and whether and how these psychological factors increase risk for CVD in rural Thai women. Based on the transaction theory of stress, coping is another significant aspect that could play an important role leading to CVD. In the next part, definitions of coping, theoretical perspectives, and the relation to stress and depression were discussed.
Coping.

Coping has been defined as “constantly changing cognitive and behavioral efforts to manage specific external and internal demands that are appraised as taxing or exceeding the resources of the person” (Lazarus & Folkman, 1984 p. 141). Lazarus (1993) outlined coping in two approaches, one emphasized style. That is, it treats coping as a personality characteristic; and the other emphasizes process. That is, efforts to manage stress that change over time and are shaped by the adaptational context out of which it is generated.

Coping serves two major functions: to regulate distress (emotion-focused coping) and to do something to change for the better the stressful encounter (problem-focused coping). Examples of emotion-focused forms of coping are using social comparisons and doing relaxation exercises to make oneself feel better. Examples of problem-focused forms of coping are problem-solving strategies and seeking information. Neither emotion-focused nor problem-focused forms of coping are superior in terms of their adaptative values. However, when an encounter is appraised as unchangeable, emotion-focused coping strategies are likely to be predominantly used. In contrast, when an encounter is appraised as changeable, problem-focused coping strategies are likely to be predominantly selected over emotion-focused ones (Folkman et al., 1991).

According to Lazarus & Folkman (1984), the regulation of emotional distress, or emotion-focused coping, is preventive and involves managing the physical and psychological components of stress so that destruction of morale or social functioning does not occur. The eight coping modes described in the sensitizing theory as follows: 1)
Confrontive coping involves aggressive efforts to alter a situation and it suggests some degree of hostility and risk-taking. 2) Distancing is the use of cognitive efforts to detach oneself and to minimize the significance of the situation. 3) Self-control includes efforts to regulate one's feelings and actions. 4) Seeking social support is identified by efforts to seek informational support, tangible support, and emotional support. 5) Accepting responsibility which includes acknowledging one's own role in the problem with a concomitant theme of trying to put things right. 6) Escape-avoidance is wishful thinking and the use of behavioral efforts to escape or avoid the problem. 7) Planful problem solving integrates the use of deliberate problem-focused efforts to alter a situation combined with an analytic approach to solving the problem. 8) Positive appraisal involves efforts to create a positive meaning by focusing on personal growth along with the incorporation of a religious dimension.

_Stress, depression and coping._

Depression has been conceptualized as the outcome of stress, which has been conceptualized in various ways, but the most comprehensive theoretical framework proposed by Lazarus & Folkman (1984) is the transactional model. Stress and coping in this model called “stress-coping theory” are conceptualized as a transactional process influenced by context and individual perception. This model is built on the assumption that stress depends on a number of subjective cognitive judgment. Stress can be defined as a person-situation interaction which the individual appraises as relevant to his or her well-being and as taxing his or her coping resources. Moreover, no event or situation is considered to be inherently stressful. Rather, the individual’s subjective judgment of the
situation as threatening or harmful is what defines as stressors. Appraisals also address judgments of the resources available to the individual (Lazarus, 1984).

Based on this stress-coping theory, stress is defined as “a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus & Folkman, 1984, p. 21). This cognitive-relational definition of stress is based on two processes: cognitive appraisal and coping. The appraisal and coping processes rely upon five major concepts: event, appraisal, coping, immediate effects, and long-term effects. The event corresponds to the occurrence of a potential stressor in the person’s constructed reality. The perception of this encounter represents the starting point of the appraisal and coping processes. The perceived frequency and severity of the encounter are relevant empirical indicators of the event (Lazarus & Folkman, 1984). The appraisal process brings meaning and emotional quality to the encounter. This process is subdivided into two interdependent components: primary and secondary appraisals. Through primary appraisal, the person determines the significance of a specific encounter on his or her well-being. The central issue for the person is to clarify “What do I have at stake in this encounter” (Folkman & Lazarus, 1988)( p. 310). Resulting from the primary appraisal, a “potential” stressor may then be perceived as a “real” stressful one.

The secondary appraisal is concerned with the person’s evaluation of the resources and options that are required for coping with the encounter. The main concern for the person is then: “What can I do? What are my options for coping and how will the environment respond to my actions?” (Folkman & Lazarus, 1988) (p. 310). Therefore, the
notions of perceived ability to cope and changeability of the encounter are relevant to the evaluation of secondary appraisal (Folkman et al., 1991). The appraisal of the encounter is influenced by antecedent person characteristics and environmental variables (Folkman & Lazarus, 1988). Environmental variables refer to the nature, nearness, ambiguity and duration of the encounter and to the availability of resources to facilitate with coping (Folkman & Lazarus, 1988). Among them are social resources (e.g., perceived social support), material resources (e.g., person’s income), and institutional and political resources (e.g., health care agencies, consumer groups). Finally, an encounter first appraised as unchangeable or stressful may be reappraised as changeable or benign, and vice versa (Folkman et al., 1991). This is based on the assumption that the person “constantly evaluates changes in the person-environment relationship” (Folkman et al., 1991) (p. 245). The process of reappraisal is then likely to be influenced by changes in the person (e.g., acquisition of new skills) or changes in the environment (e.g., lack of accessibility to support services).

As delineated previously, stress has an impact on cardiovascular disease among women. Stress among rural Thai women has not been clearly described, but some studies assert that during menopause Thai women have reported high levels of stress (Punyahotra et al., 1997). This stress may be caused by menopausal symptoms and socio-cultural factors. Rural Thai women are at significant risk of developing cardiovascular disease. Also, there is some evidence to suggest that psychological stress may be a factor contributing to the higher rate of cardiovascular disease in Thai women. Rural Thai women may experience greater stress levels because they are expected to take care of
their immediate and extended families and also work side by side with their husbands in the fields. The literature supports the findings that rural Thai women have a much higher workload than men. Furthermore, studies indicate that Thai women do not have much decision making authority in families, and that lack of control can contribute to greater psychological burden (Punyahotra et al., 1997). Despite an active lifestyle and generally healthy diet, rural Thai women are at greater risk of developing heart disease than Thai men. However, to date, little attention has been paid to the role of stress. There has not been any study in rural Thai women that investigated whether stress is associated with cardiovascular health in this population. Therefore, it would be important to explore the relationship between stress, depression, and cardiovascular disease. Also, coping should also be examined whether it has an effect on stress, depression, and other risk factors for CVD in rural Thai women.

**Contextual Risk Factors**

Not only have modifiable and non-modifiable risk factors been delineated as risk factors for CVD, but also contextual risk factors have been claimed as the factors that contribute to CVD in human (Appel et al., 2002). Contextual factors in the present study include SES (education level, family income) and rural context (distance to hospital, transportation, poverty).

**Socioeconomic Status**

*Education level.*

Education or formal education level is the most widely used measure of SES in epidemiologic studies. Of the studies of chronic disease, in which measures of SES were
used, education was used by 45% as a surrogate measure of SES (Liberatos, Link, & Kelsey, 1988). According to Elderman & Menz (1996), rural dwellers showed lower educational attainment than their urban counterparts. At present, the Thai education system is divided into four levels supervised by the Ministry of Education: pre-primary education (ages 3-5 years old), followed by six years of primary education, three years of junior high school and three years of high school. The Ministry of University Affairs supervises higher education, which offers an associate degree, a four-year bachelor's degree, and a two to five-year postgraduate degree. A useful method of category of educational levels would be: primary education, junior high school, high school, associate degree and/or higher. According to NSO (2005), Thai women have double-higher illiteracy rate than Thai men (women 2.4% and men 1.4%). However, rural populations have lower levels of education than their urban counterparts. For example, the percentage of rural people that obtained primary education or lower was 67.3%, high school was 22.1%, and bachelor degree was 5.6% when compared to 57.8%, 29.9%, and 18.3% respectively of their urban counterparts (NSO, 2005). This information should be considered since rural Thai women tend to have low levels of education and high risk for CVD. Thus, the education level is important to study whether it has an effect on cardiovascular health in rural Thai women since little is known about this.

*Family income.*

There is evidence indicating that rural residents have lower income than their urban counterparts (Edelman & Menz, 1996), which may have an effect on their health. Measures of income are obviously an important marker of SES. Income provides access
to goods and services, including quality education and medical care that may protect against disease. However, lower income may reflect the influence of poorer health. A measurement of income level is complex. For example, individual or family income can be measured. Family income can be adjusted for family size. Income can be compared to poverty levels. Sources of income other than wages can be included. Non-cash benefits such as food stamps or Medicare can be included, and income levels may vary over time. It may also be important to measure wealth, which includes total assets. Income was reported in only 15% of the articles published in the American Journal of Epidemiology that included measures of social class (Liberatos et al., 1988). The Turkish study of CHD events indicated that family income was not predictive of overall mortality; however, it was strongly predictive of future CHD events (Keles et al., 2003). In Thailand, the family income could be classified as three categories that are: low (≤ 3,000 Baht/month), average (3,001 – 7,000 Baht/month), and high (≥ 7,000 Baht/month) (Pothiban, 2000). Thus, whether or not family income has an effect on CVD in Thai population had not clearly delineated.

Socioeconomic status and CVD.

Current evidence appeared to support the argument that SES is an important factor in the etiology and progression of cardiovascular disease (Kaplan & Keil, 1993). The pathways by which SES might affect cardiovascular disease include lifestyle and behavior patterns; health care access, and chronic stress. Some intriguing gender differences have also been documented. For example, low socioeconomic position and lower educational level are known to be risk factors for CHD in women (Haynes et al.,
SES has also been correlated with CVD risk factors. There is substantial evidence for an inverse relationship between SES and almost all the cardiovascular disease risk factors, with the possible exception of cholesterol level. Probably most of the evidence for an inverse relation between SES and CVD risk factors has to do with hypertension. There is consistent and substantial evidence that low SES is related to both the prevalence and incidence of hypertension. There seems to be an inverse relation between SES and cigarette smoking, obesity, and some haemostatic factors such as fibrinogen, diabetes, and physical activity. The literature has mostly addressed the influence of socioeconomic indicators on individual risk factors, but some studies have examined multiple risk factors (Kaplan & Keil, 1993).

Some association between lower social-class status and depression is also found. Moreover, prospective studies have shown that people in lower social classes have an increased risk for developing both major depression and depressive symptoms. Since lower social class is obviously associated with an increased likelihood of chronic, adverse life experiences (e.g., job insecurity, unemployment, or economic hardships), it seems reasonable to assume that people of lower social classes may experience more negative emotions, such as desperation or hopelessness, and that they may be more prone to develop depressive mood or even clinical depression. It is also very well established that people in lower social-class positions have a substantially higher risk for CHD (Davidson et al., 2004). Most of rural populations engage poverty worldwide. Thus, they are more likely to develop depression which is in turn a conditional risk factor for CVD.
Therefore, SES is a significant factor in contributing to CVD. However, little is known whether SES (educational levels, family income) increased risk of CVD among rural Thai women.

*Rural Contexts*

The term rural is not easy to define because it means different things to different people. A standardized definition of rural is needed for a more coordinated approach to describe clinical problems and address health care delivery issues in those settings. Most individuals include geographic and population factors, as well as subjective perceptions in their definitions of rural compared to urban residency (Bushy, 2004).

Common definitions for rural often refer to the geographic size of a community relative to population density; for example, number of people living in a square mile. A definition often used by some policy-makers is metropolitan and non-metropolitan. A metropolitan area (SMSA) is defined as a city or adjacent area having a total of 50,000 or more residents (Census, 2002; Ricketts, 1999). The Bureau of Census (2002) defines urbanized areas as areas of population with a density of 1,000 people or more per square mile and can cover parts of several counties. People living in or near an urban areas with a population of 2,500 or more is considered urban; less than a population of 2,500 is considered rural. Other federal entities differentiate the terms urban and rural areas. In this case, the Office of Rural Health Policy (2003) defined rural as an area having less than 99 persons per square mile, thus an urban area is having more than 99 persons per square mile. Other definitions of rural take into consideration the distance to services and/or ‘time to access services’ (greater than 30 minutes or more than 20 miles). Koehler
(1998) defined the term “rural” as geographically large sparsely populated. It is a community with a population no larger than 10,000 located at least 15 miles away from a city with a population of 50,000 or greater. In Thailand, rural versus urban has been designated by non-municipal and municipal areas, where "urban" refers to municipal areas and "rural" refers to non-municipal areas. Municipal areas are defined by the Municipal Act in 1980 that states “A municipal area is either where the city hall is located or the areas which have at least 10,000 residents. Also, where the density of populations is more than 3,000 populations per square kilometers is defined as a municipal area.” The rural areas are the areas that do not meet those criteria (MunicipalAct, 1980). All definitions and characteristics of rural communities are critical because the inconsistent designation of urban versus rural can affect the effectiveness of health problems of rural people. These designations affect receiving funds for healthcare or the professional staff. Access to healthcare can also be affected by the main highway system as money for highways. Family and community support, severe accidents can happen on unpaved road (Ricketts, 1999).

CVD is one of chronic illness that has been indicated high prevalence among rural adults (Gamm & Hutchison, 2003). In general, compared with urban populations, rural people are not as healthy. Rural adults are less likely than urban counterparts to engage in preventive behaviors such as regular blood pressure checks, other physical check-up, or health promotion programs. Higher percentages of rural adults engage in high-risk lifestyle behaviors such as smoking, not wearing seat belts and not engaging in regular exercise – all of which have implications for a person’s health status. Some speculate that
these pervasive behaviors among rural residents are associated with inadequate health promotion education that often is delivered by inadequately prepared health professionals. Other experts propose that the health promoting information that is disseminated may not be culturally appropriate for rural consumers. Both of these factors can contribute to not modifying risky lifestyle behaviors.

Rurality and rural context have been indicated as factors that impact rural dwellers’ health. The primary impact of being rural is distance to specialty health services and some routines services. Other impacts of rurality on the populations’ health include health insurance coverage, poverty, and transportation. These are all rural context are related to access to health care. In general, significant differences in demographic characteristics and various indicators of access to health care. Next part, indicators of access to health care in rural areas, including distance to health care, health insurance, rural poverty, and transportation, were discussed.

*Rural health care services.*

There are two issues of concern regarding health care services in rural community: availability and accessibility of services. Availability refers to the existence of services and sufficient personnel to provide those services. In rural areas, there are fewer physicians and nurses in general, as well as fewer family practice physicians, nurse practitioners, and specialists, especially obstetricians, pediatricians, psychiatrists, and social service professionals. Economically speaking, a sparse population limits the number and array of services in a given region. The per-capita cost of providing special services to a few people often becomes prohibitive (Gamm & Hutchison, 2003).
Accessibility refers to whether a person has the means to obtain and afford needed services. Accessibility to health care by rural families may be impaired by the following: Long travel distances, lack of public transportation, lack of telephone services, a shortage of health care providers, unpredictable weather conditions, inability to obtain entitlements (Gamm & Hutchison, 2003). In rural communities, both accessibility and availability issues of services and providers must always be considered.

Several reasons exist for the poorer health outcomes for rural residents. Health care access continues to be an important concern. Rural areas lag behind urban areas in health status and have had poorer quality of health care. Most small towns in the region have rural hospitals served by physicians in general practice and nurses who are considered generalists. For specialized services such as cardiovascular disease and cancer, however, referrals are made to the regional center (Ballantyne, 1998). Moreover, in-availability of health care services and mal-distribution of healthcare professionals (e.g. physicians, specialists, nurses, etc) also make rural residents vulnerable, as well as, availability of specialized equipment may also differentially affect rural residents making it more difficult for them to get chronic disease such as CVD diagnosed early (Ricketts, 1999; Stamm, 2003). Evidence indicates that rural populations are more likely than their urban counterparts to rate their health status as fair or poor and to die higher rates from chronic diseases such as CVD and diabetes. The lower population density/ size in rural areas limits effective market demand for structurally safe housing, fresh food, health care, and job offering group health insurance benefits. In this study, the issue of accessibility to
health care (distance and transportation to hospital) was focused. Moreover, poverty could play an important role in terms of accessibility to health care among rural dwellers.

Distance to hospital.

Distance is significant to define areas whether or not they are rural communities. However, long distance to health care is an important factor which affects access to care. In health care, the distance of the patient from the health care facility often influences the delivery and receipt of services. Henson and Walton (1998) indicated three attributes of distance: mileage or total number of miles traveled, time or measurement in minutes it takes to travel from one place to another, and perception or variation in awareness of data that is different from others. Long distance increases travel time for healthcare services. Long distance could also be seen as a disadvantage more in an emergency situation. Lack of a convenience of public and personal transportation affects health care access. Moreover, distances coupled with lack of local care services and specialists contribute to poor health of the population (Lee, 1998). In this case, rural Thai women have to travel over an hour to get to the specific services. Generally, there are health centers and community hospitals that provide health care services for rural populations. However, since those are limited to resources (specialists and health care technology), the rural patients have to be referred to provincial hospitals located in the city, in which farther from where they live. Distance to health care causes patients (e.g., CVD patients) with high-risk care or follow-up care may have difficulty keeping appointment and obtaining medication. Understanding the concept of distance and how it affects rural residents’ health helps clarify the assessing the influence of distance on patients and their care. With
this information, nurses can help patients use available resources to reduce the impact of distance. The location of residents is regard to existing transport routes. Thus, measuring the distance to care as one of rural context, which has an effect on health care access, is important to examine as one of the contextual risk factors for CVD.

*Transportation to hospital.*

Issues of transportation and travel times may have particular significance in rural settings. It is related as much to access to health care as distance. Evidence indicates that rural residents have greater transportation difficulties and often travel longer distances to receive health care (Edelman & Menz, 1996). A study of access to transportation and health care utilization in a rural area indicated that people who have a driver’s license had 2.29 times more health care visits for chronic care and 1.92 times for regular checkup than those who did not. Also, respondents who have family members, relatives, or friends that could provide transportation had 1.58 times more visits for chronic care than those who did not. Those who use public transportation had four more chronic care visits per year than those who don’t (Arcury, Preisser, Gesler, & Powers, 2005). Therefore, transportation is a significant issue in terms of accessing health care in rural areas. Transportation is characterized by personal transportation (driving, having family members, friends, or relatives who provide transportation), public transportation (daily availability of transportation to the hospital via public bus), or paid transportation (any transportation that the participant individually requests and pays for such as a taxi cab).
**Health insurance.**

The Institute of Medicine—IOM (2004) indicated that lack of health insurance was the most significant barrier in accessing healthcare (Institute of Medicine, 2004). There are also less likely to have insurance coverage, a number of visiting a specialists, and usual sources of care among rural residents (Ricketts, 1999). In Thailand, there are four main categories of health insurance which cover about 70% of the population: a public assistance program, civil servant medical benefit scheme, compulsory health insurance, and voluntary health insurance (MOPH, 2002). The public assistance program helps low-income groups, underprivileged people (elderly, children age 0-12 years, and people with disabilities), veterans, and Buddhist monks. An individual or family can buy voluntary health insurance or a health card program issued by government. In 1991, the Social Security Act implemented compulsory insurance to provide sickness, disability, maternity, and death benefits for workers in firms that employed 10 or more workers. Employees can select their provider, public or private. New government policy launched the "30 baht" medical scheme in 2001. A yearly budget of 1202 baht (US $24.02) per person is allocated to hospitals and health centers to provide services for people in their area (MOPH, 2002). Each person pays 30 baht (~US $0.75) per service. This scheme enables people who are not covered by any health insurance program to access affordable health care.

**Poverty.**

Poverty is a significant barrier in accessing healthcare (IOM, 2004) since rural residents have lower incomes than do their urban counterparts (Edelman & Menz, 1996).
Poverty is multi-dimensional in its causes as well as in its cures. Limited employment, low income, and low levels of literacy make rural dwellers become poverty. Rural residents are more likely living in poverty than do their urban counterparts. Thus poverty has an impact on rural residents’ health status.

In Thailand, family income has been used as an indicator of poverty. The optimized income is 20,000 Baht (~$500/year). Based on the National Statistic Organization’s (2002) data, which show that the rate of Thai population living below poverty line is 14.4% (rural 18.5% and urban 5.5%). Thus, rural residents are poorer than their urban counterparts. Little is known whether or not poverty is predictive of CVD in rural Thai population, in particular rural Thai women (NSO, 2005).

In conclusion, generally, resources in the rural community may not provide services that can adequately meet the client’s need. If the client is motivated to seek health care beyond the immediate boundaries of the community, not only distance and transportation to health care are problematic to access health care, but also finances or poverty and health insurance could become important issues.

Socioeconomic Status, Poverty, and Rural Vulnerability

Socioeconomic status and poverty are the demographic variables that contribute to poor health among rural Thai populations. The health status of individuals is a very important issue in provision of and access to health care and a community that is extremely rural is greatly susceptible to health problems that are linked with SES. Poverty makes rural populations vulnerable. Low SES and poverty together adversely impact health because people are unable to afford basic utilities, transportation, adequate
and appropriate diet, preventive health services, or adequate housing. As we know, rural population tends to be poorer than urban counterparts and thus have many of illness associated with poverty or low socioeconomic status. Further more, rural dwellers engaged economically depressed due to their low SES and poverty. Research shows that rural residents do not access public assistance with the same frequency as urban counterparts. This is coupled with low SES or poverty causing stress or depression in rural populations. In Thailand, it is suggested by the previous research (Chirawatkul, Patanasri, & Koochayisit, 2002; Jongudomkarn & West, 2004) that low-income women in Thailand are vulnerable to poor health. They struggle against multiple problems in their everyday life and have to work hard to survive. They also have indispensable work roles both to maintain the household and earn money for the family. Thus, SES, poverty, and rurality additionally worsen poor health and cause economical stress and depression among rural Thai populations, in particular rural Thai women.

Different cultures may have different lifestyles causing different risk determinants for CVD. In general, Thai women have higher prevalence of risk factors of CVD than Thai men. Rural Thai women tend to have higher a morbidity and mortality rates of CVD. Rural context could play an important role in terms of the contribution to CVD or its risk factors. Little is known about the contribution of rurality on cardiovascular health among rural Thai women.

The following tables are the summary of the studies about CVD in Thai population which include authors and sources, purpose, design and sample, measurements, definitions of risk factors for CVD, and results.
## The Studies Relevant to Risk Factors for CVD among Thai Populations

### Table 4 Summary of Cardiovascular Risks Factors among Thai Populations

<table>
<thead>
<tr>
<th>Author/ Source</th>
<th>Purpose</th>
<th>Design &amp; Sample</th>
<th>Measurements</th>
<th>Definitions of Risk Factors</th>
<th>Results</th>
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<tbody>
<tr>
<td>Chuprapawan, Cardiovascular Epidemiology Meeting, 2001</td>
<td>- To investigate national mortality causes among Thai population from 1999 to 2000</td>
<td>- Cohort study (interview with Relatives of death people &amp; secondary data from the hospitals, death certificates)</td>
<td>- Death causes</td>
<td>- N/A</td>
<td>- 40% death from CVD - 70% heart failure - CVD deaths among women were found in aged at least 45 years - In the subgroup of CVD death, women died from stroke and ischemic heart disease, respectively</td>
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Table 4 (continued).

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<tr>
<th>Author/ Source</th>
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<tr>
<td>Sritara et al. 2003/ International Epidemiology J.Cardiovascular Meeting, 2001</td>
<td>- To describe 12-year changes in vascular risk factors</td>
<td>- Cohort study of 3,499 Thais EGAT employees aged 35–54 years between 1985 and 1997</td>
<td>- Risk factors of CVD e.g SES, comorbidity, behaviors, treatments, BMI, BP, total cholesterol, HDL-C, triglycerides</td>
<td>- BP ≥ 140/90 mmHg, or currently taking medications</td>
<td>- ↑ mean levels of SBP and DBP, BMI, total cholesterol and HDL-C</td>
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<tr>
<td></td>
<td>- To determine the associations between baseline risk factors levels and the risk of vascular death.</td>
<td>- 2,967 (2,252 male and 715 female) were resurveyed in 1997</td>
<td></td>
<td>- High if cholesterol ≥ 6.2 mmol/l</td>
<td>- ↑ the prevalence of diabetes but current smokers</td>
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<td></td>
<td>- DM if FBS ≥ 7.0 mmol/l</td>
<td>- CVD was the most frequent cause of death, associated with age, SBP, DBP, smoking, diabetes, male sex, total cholesterol, and negatively associated with HDL-C</td>
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<td></td>
<td>- Obesity if BMI ≥ 25 kg/m²</td>
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<td>- Diabetes: diagnosed</td>
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Note. BP = Blood pressure, SBP = Systolic blood pressure, DBP = Diastolic blood pressure, FBS = Fasting blood sugar
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<tbody>
<tr>
<td>Tassanavivat et al. (1998). International Journal of Epidemiology, 27, 405-409</td>
<td>- Explore prevalence of and risks factors of CHD</td>
<td>- A cross-sectional survey in a multistage random sample of 3822 men and 4967 women aged ≥30 years residing in rural and urban areas</td>
<td>- Prevalence of CHD and its major risk factors e.g. BMI, BP, total cholesterol, HDL-C, FBS, smoking, diabetes, and obesity</td>
<td>- BP ≥ 160/95 mmHg, - High if cholesterol ≥ 6.2 mmol/l - DM if FBS ≥ 7.8 mmol/l and diagnosed - Obesity if BMI ≥ 25 kg/m²</td>
<td>- Prevalence rate of CHD, total cholesterol, hypercholesterolemia, fasting blood sugar, hypertension, diabetes mellitus, and obesity. were higher in women than men - SBP, DBP were not different, but smoking was much higher in men</td>
</tr>
<tr>
<td>Author/ Source</td>
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<tr>
<td>InterASIA 2000 in European Journal of Cardiovascular Prevention and Rehabilitation 2003, 10:249–257</td>
<td>- To obtain precise estimates of cardiovascular risk factor levels</td>
<td>- A complex sample survey with 5305 individuals aged ≥ 35 years residing in rural and urban areas</td>
<td>- Questionnaires, brief physical examination, and a blood sample</td>
<td>- BP ≥ 140/90 mmHg./on antihypertensive drugs</td>
<td>- No difference in SBP and BS by gender</td>
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<td></td>
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<td></td>
<td></td>
<td>- High if cholesterol ≥ 6.2 mmol/l</td>
<td>- DBP and smoking were higher in men</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- DM if FBS ≥ 7.0 mmol/l and diagnosed</td>
<td>- Total cholesterol levels, diabetes, BMI were higher in women than men and among individuals living in urban than rural</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- Obesity if BMI ≥ 30 kg/m²</td>
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<tr>
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</tr>
</thead>
</table>
| Aekplakorn et al. J Med Assoc Thai Vol. 87 No.6 2004 | - To describe the prevalence of overweight and obesity and examine their relationship with socio-demographic factors in Thai adults | - Using data from a cross-sectional survey, the NHESII  
- 3,220 Thai adults aged 20-59 years | - BMI  
- Socio-demographics | - Obesity if BMI $\geq 30$ kg/m$^2$  
- Overweight if BMI $\geq 25$ kg/m$^2$  
- Educational level: primary, and post secondary  
- Occupation: agricultural, skilled laborer, professional and unemployed | - The prevalence of overweight and obesity was higher prevalence for women than for men and greater among older compared to younger people and among residents of urban compared to rural |
<table>
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</thead>
</table>
| Aekplakorn et al. *Diabetes Care* 26:2758–2763, 2003 | - To determine in Thai adults aged ≥35 years the prevalence and management of diabetes and the associations of diabetes with cardiovascular risk factors | - A complex sample survey (part of the InterASIA study) of 5,105 adults aged ≥35 years | - BP ≥ 140/90 mmHg./on antihypertensive drugs  
- High if cholesterol ≥ 6.2 mmol/l  
-DM if FBS ≥ 7.0 mmol/l and diagnosed | - The prevalence of diabetes in Thai adults was 9.6%  
- Diabetes was associated with greater age, BMI, WHR, SBP, total cholesterol, and serum creatinine levels.  
- 82% were taking oral hypoglycemic therapy.  
- 67% had concomitant hypertension |
Table 4 (continued)

<table>
<thead>
<tr>
<th>Author/ Source</th>
<th>Purpose</th>
<th>Design &amp; Sample</th>
<th>Measurements</th>
<th>Definitions of Risk Factors</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>Pothiban et al. (2000) Nursing and Health Science, 2(2) 2000</td>
<td>- describe the prevalence of risk factors for CHD, risk status, and perceived risk for CHD among Thai elderly, compared with between urban and rural subjects.</td>
<td>- Descriptive design - 460 Thai elderly (≥ 60 years old), 220 from urban area and 240 from rural area</td>
<td>- Interview, blood pressure, bodyweight and height; and serum glucose, and total, and HDL–C</td>
<td>- BP ≥ 160/90 mmHg, - High if cholesterol ≥ 240 mg/dL -DM if BS ≥ 140 mg/dL and/or diagnosed - Obesity if BMI ≥ 27.8 kg/m²(men), 27.3 kg/m²(women)</td>
<td>- Physical inactivity, hypercholesterolemia, hypertension, cigarette smoke, obesity, and diabetes were the respectively prevalent risk factors for CHD in Thai elderly - Prevalence of all risk factors, except hypertension, were greater among urban elderly than urban counterparts</td>
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Table 4 (continued)

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<td>- Smoking: non-smoker, ex-smoker, current smoker (any type of tobacco ≥ 1 cigarette/day)</td>
<td>- Age, gender, family income, and education level were the significant predictors for CHD risk score ($R^2 = 0.35$, $F = 61.99$, $P &lt; 0.01$)</td>
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<td>- Physical inactivity: energy expenditure at leisure time of less than 2000 kcal</td>
<td>- Perceived CHD risk of the elderly was at low level</td>
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Note. $R^2 = R$-Square
Table 4 (continued)

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<tr>
<td>Moleerergpoom et al. J Med Assoc Thai 2004; 87(6): 674-8</td>
<td>To evaluate serum fasting homocysteine, folate and B12 levels whether they are associated with CAD</td>
<td>A cross-sectional study of suspected CAD patients (195 men, 106 women)</td>
<td>Serum fasting homocysteine, folate and B12</td>
<td>BP $\geq$ 140/90 mmHg./on antihypertensive drugs</td>
<td>No significant correlations between homocysteine and folate and B12 levels</td>
</tr>
<tr>
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<td>Rattarasarn, et al. <em>Metabolism,</em> Vol 52, No 11 (November), 2003</td>
<td>- To determine the relationships of body fat distribution and insulin sensitivity and CV risk factors in lean and obese-type 2 diabetic women, 9 lean and 11 obese</td>
<td>- Cross-sectional study - 9 lean and 11 obese Thai type 2 diabetic women</td>
<td>- Age, BMI, total body fat (TBF) and total abdominal fat (AF), subcutaneous (SAF), Visceral abdominal fat areas (VAF) - Plasma glucose and insulin, SBP and DBP, lipid profile, fibrinogen, and uric acid</td>
<td>- Visceral abdominal fat areas (VAF) was a strong determinant of insulin sensitivity and several cardiovascular risk factors in both lean and obese Thai type 2 diabetic women</td>
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<tr>
<td>Yamwong P, Assantachai P, Amornrat A. Southeast Asian J Trop Med Public Health. 2000 Mar;31(1):158-62</td>
<td>- To determine the prevalence of dyslipidemia in the elderly who live in the rural areas of Thailand</td>
<td>- Cross-sectional study - 80 men, Eighty men and 123 women, aged 60-87 years old</td>
<td>Total cholesterol, triglycerides, HDL-C, and LDL-C</td>
<td>- Cholesterol $\geq 240$ mg/dl and LDL-C $\geq 160$ mg/dl. Twenty-five percent had HDL-C $\leq 35$ mg/dl</td>
<td>- Prevalence of dyslipidemia was very high in Thai rural elderly (70%) - Women had significantly higher body mass index, cholesterol and LDL-C levels than men</td>
</tr>
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</table>
Conclusion

The literature review has specified the importance and significance of the study of risk factors for CVD in rural Thai women. Major risk factors had not been indicated. Also, the best predictors of CVD in rural Thai women, as well as, non-modifiable (family history), other physiological risk factors (obesity and menopause status), some behavioral risk factors (physical inactivity and alcohol consumption), psychological risk factors (stress, depression, and coping), SES (education levels and family income), and rural context had not been included as risk factors for CVD in Thai population. Therefore, it is important to examine the predictors of CVD in rural Thai women since this information is limited.

Conceptual Framework

The conceptual framework guiding the present study was developed based on physiological theory of CVD, psychological theories, and other conceptual models on CVD. The study focused on major risk factors for CVD that were categorized as non-modifiable, modifiable, and contextual risk factors. Non-modifiable risk factors included advancing age and family history of CVD. Modifiable risk factors included physiological (high blood pressure, abnormal serum cholesterol, diabetes mellitus, obesity, and menopause), behavioral (cigarette smoking, physical inactivity, alcohol consumption), and psychosocial (stress, depression) risk factors. In addition, contextual factors including SES (education level, family income), rural context (distance to hospital, transportation, poverty), as well as coping, were included as moderators of the relationships between major risk actors and the severity of cardiovascular disease. These contextual risk factors and coping may also have direct relationship with the severity of CVD. The conceptual framework of this study is presented in Figure 2.
Figure 2. Conceptual framework.

Non-Modifiable Risk Factors
- Advancing age
- Family history of CVD

Modifiable Risk Factors

Physiological factors
- High blood pressure
- Abnormal serum cholesterol
- Diabetes mellitus
- Obesity
- Menopause status

Behavioral factors
- Cigarette smoking
- Physical inactivity
- Alcohol consumption

Psychological factor
- Stress
- Depression

Contextual Risk Factors
- Socioeconomic status
  (education levels and family income)
- Rural context (distance, transportation, health insurance, and poverty)

Coping

The severity of CVD in rural Thai women
CHAPTER THREE: METHODOLOGY

This chapter discusses the methodology of this study, including the research design, the sample (target population, research settings, inclusion criteria, sampling method, and sample size), protection of human subjects, instruments, procedures, and data analysis plans.

Research Design

This study employed a predictive correlational design that aimed to predict the value of one variable based on values obtained for other variables, or predict relationships between and among variables (Burns & Grove, 2005). This study considered the relations among the independent/predictor variables of cardiovascular risk factors (Non-modifiable, modifiable, contextual risk factors) and the criterion/outcome variable of the severity of cardiovascular disease. It was also of interest to examine how risk factors themselves correlated to each other and how they contributed to CVD.

The Sample

Target Population

Rural Thai women with cardiovascular disease, including high blood pressure, coronary heart disease (CHD), and stroke, were recruited from community hospitals in rural Thai areas and provincial hospitals to which the CVD patients had been referred. Only participants residing in rural areas were recruited for this study. Rural areas in this study were defined as non-municipal areas in which the density of population is fewer than 3,000 people per square kilometer or there was no city hall located in the community (NSO, 2005).
Research Settings

This study was conducted in community hospitals located in rural areas and provincial hospitals in the Northern regions of Thailand. A community hospital is located in a district or sub-district with 10 to 150 inpatient beds, covering a population of 10,000 or more. There are doctors and other health professionals. Generally, services provided are mostly curative care. The upper level of service is a general or provincial hospital which is equipped with 200 to 500 beds and medical specialists in all fields.

Inclusion criteria

Based on the 2005 Thai National Population and Housing Census, the total population of Thailand was estimated to be 64.8 million, of whom 25.0 million people were aged 35 years or older. Among those aged 35 years or over, the mean age was 50.3 years. Fifty-two percent of those were female and sixty nine percent of the population lived in rural areas (NSO, 2005). Some evidence claimed that members of the Thai population who were aged over 35 years were at risk for CVD. Most studies of CVD conducted in Thailand focused on adults over 35 years old (InterAsia, 2003). Thus, in this study, rural Thai women age 35 years and over, who have been diagnosed with cardiovascular disease (CHD, high blood pressure, stroke) residing in rural communities in the Northern regions of Thailand, were included in this study.

Sampling Method

The multistage sampling method was utilized to select the settings. The investigator first randomly selected three provinces and then randomly selected two districts. Then, community hospitals within the randomly selected districts were chosen.
At this level, all CVD patients who fit the criteria for this study were recruited. Personal contacts had been made with the directors and head nurses of the community hospitals to ensure their cooperation for this study.

Most of the CVD patients from community/rural hospitals had hypertension and few had cardiac diseases such as CHD, MI, hypertensive heart disease, and stroke. Those with cardiac diseases and stroke were generally referred to the provincial hospitals since rural hospitals were limited in capacity and resources. Also, there were no specialist professionals such as cardiologists, nurse specialists, and specific technology for cardiac patients in the community hospitals. Some cardiac patients go to the community hospitals to get only routine physical check-up. In order to prevent potential sampling bias that would ensue by recruiting mostly from community hospitals that primarily had hypertension patients, subjects were also recruited from the provincial hospitals. This was to ensure an adequate representation of the target population was included.

Within the community and provincial hospitals, a letter of interest describing the study and the reasons for seeking voluntary participation, and the IRB approval document were sent to the directors of each hospital to get permission to conduct the study.

**Sample Size**

A power analysis was used to determine the sample size. For this study, the sample size was calculated as a function of relevant effect size in regression analysis. The difficulty in setting a reasonable a priori value to the sample size in multiple regression analysis had led to the creation of several rules of thumb related to sample size. Conventionally, in a power analysis, the value of alpha was set at 0.05. The effect size in
regression analysis was indicated by the $R^2$ and L value that was determined by Cohen & Cohen (1983) as a function of power and number of predictor variables at a given level of alpha. L was obtained by using the L table. Using Cohen’s advocated 0.80 as the level of power, $R^2 = 0.02$ small effect; $R^2 = 0.13$ medium effect; and $R^2 = 0.26$ as larger effect (Cohen & Cohen, 1983).

Cohen (1983) provided a formula for determining sample size as follows:

$$N^* = \frac{L(1 - R^2) + K + 1}{R^2}$$

*Where* $N^*$ = total sample size

$L$ = effect size index

$K$ = number of predictor variables

With seventeen predictor variables in the current study, in multiple regression analysis with an alpha of .05, L value of 19.27, and a power of .80, a sample size of 147 was required to have sufficient power to detect a medium effect size.

Protection of Human Subjects

The Institutional Review Board (IRB) approval from the College of Nursing and The University of Arizona Human Subjects was sought prior to conducting this study. Informed consent was performed in this study for the protection of human subjects. Participants were clear about the intent of the research and how the information from this study was used. The IRB reviewed the study to assess confidentiality, safety issues and potential risks associated with the study. Protocols, instruments, and consent forms were submitted to the IRB for approval. Once approved, participants were informed that this
study was approved by the IRB, and they were required to read a consent form or listen to the investigator who read that for them to participate.

Subjects were assured there would be no penalty for withdrawal. A statement concerning the right to withdraw was included within the consent form and the subjects were also verbally informed that they could withdraw at any time. Participants were also informed that the questionnaires were self-administered. In case the participants could not read, the investigator read the questionnaires and the participants answered; no names were included on the questionnaires. Code numbers were used to assure confidentiality. Anonymity was also assured by reporting of group data. The benefits and compensations related to each subject were explained to each participant. Subject enrollment and data collection began after the IRB approval. All protection of human subjects document are detailed in Appendix A.

Instruments

To answer the research question of what were risk factors of CVD in rural Thai women, data were collected using five questionnaires and physiological measures. Non-modifiable, modifiable, and contextual risk factors of CVD and measurements of the severity of CVD were gathered. Instruments used for this present study included the following: a personal information questionnaire to collect demographic information, behavioral factors, and rural context; the Thai Stress Inventory (Department of Mental Health, in Phattharayuttawat, 2005) to measure stress levels; the Thai-version of the Center for Epidemiologic Studies of Depression Scale (CES-D) (Radloff, 1977) to measure depression; the Thai version of the Brief Coping Orientations to Problems
Experienced Inventory [Brief COPE] (Caver, 1997) to measure coping strategies; and the NYHA functional capacity (NYHA, 1994) to measure the severity of CVD. The standard sphymomanometer, the Detecto weight and height scale, and measuring tape were used to measure physiological data, including blood pressure, weight, height, and waist and hip circumferences. The questionnaires mentioned above were chosen because they had been used in Thai adults and have high reliability and some evidence of validity in prior studies. All instruments used for physiological measures were calibrated every week to ensure the precision of the results. In this study, there were five instruments and measurements: personal information, physiological measures, physical activity, psychological measures, and severity of CVD. All study instruments are detailed in Appendix B.

The Personal Information Questionnaire

Demographic characteristics, family history of CVD, health behavior, and rural context factors that could pose a risk for CVD, were obtained by using the personal information questionnaire based on Thai culture developed by the investigator.

Demographic Characteristics

Demographic characteristics included age and SES (education level, family income). Educational levels were operational defined as illiteracy, primary education, high school, and associate degree and/or higher. Family income were classified as three categories including low ($\leq 3,000$ Baht/month), average ($3,001 – 7,000$ Baht/month), and high ($\geq 7,000$Baht/month) (Pothiban, 2000).
Family History

Family history of any cardiovascular disease included hypertension, heart disease, and stroke.

Behavioral Factors

Cigarette smoking.

Cigarette smoking was measured and indicated by three categories: Current smokers, previous smokers, and non-smoker. Operationally, current smoking was defined as individuals who smoked any amount of tobacco in the previous 12 months. Previous smoking was defined as those who had quit, and non-smokers who were defined as who did not smoke at all.

Alcohol consumption.

In this study, alcohol consumption was assessed by questioning the subjects about their drinking behavior during the month before the interview. The subjects were asked about their average frequency (days per month) and amount (in ml) of alcoholic beverages ingested on a typical occasion or during a typical day. For the analysis, the subjects were divided into 3 alcohol consumption groups: non-drinkers, current drinkers, and former drinkers. Operationally, current drinkers were defined as individuals who drank any amount of alcohol in the previous 12 months. Previous drinkers were defined as those who had quit drinking, and non-drinkers were defined as who did not smoke at all.
Contextual Factors

Rural context.

Rural context was one of contextual factors for CVD in this present study. Rural context in this study included distance to health care services, transportation, health insurance, and poverty. Distance to health care was calculated in kilometers, from the participant’s location (Tam-bon or sub-district and Moo-ban or village) to the community or provincial hospitals. Transportation was characterized by personal transportation (driving, having family members, friends, or relatives who provide transportation), public transportation (daily availability of transportation to the hospital via public bus or paid transportation). Health insurance was categorized into the following groups: a public assistance program, civil servant medical benefit scheme, compulsory and voluntary health insurance, and 30-Baht health insurance (MOPH, 2002). Data from this present study showed that all of rural Thai women had insurance coverage. Most of them were under the policy of 30-Baht health insurance. Thus, lack of health insurance was excluded from this study. Finally, poverty was classified as family income $\leq 20,000$ Baht/year or $\leq 1,667$ Baht/month. In this study, poverty was indicated by income $878$/month/person (NSO, 2005).

The Physiological Measures

Blood Pressure

In this study, blood pressure was measured by following the 1999 WHO International Society of Hypertension Guidelines. Blood pressure was obtained by using a mercury sphygmomanometer with the patient in a sitting position and placing the
sphygmomanometer cuff at heart level. The subjects were allowed to sit several minutes before measuring the blood pressure using a standard cuff with a bladder that is 12±13 cm by 35 cm, with a larger bladder for larger arms (Anonymous, 1999). Also, blood pressure was taken according to American Heart Association recommendations with systolic and diastolic pressures taken as the first and fifth Korotkoff sounds were heard, respectively (AHA, 2006). The cut-off for high blood pressure was mean systolic blood pressure ≥140 mmHg and/or mean diastolic blood pressure ≥90 mmHg. The cut-off point for high blood pressure was significant based on a number of studies (Anonymous, 1999). Also, hypertension was indicated by a chart review in case of controlled hypertension. The chart review included a diagnosis of hypertension and/or treatment with antihypertensive medication during the previous 2 weeks.

**Abnormal Serum Cholesterol**

Abnormal serum cholesterol, including high total cholesterol was obtained from the patient charts from the hospitals in which the investigator recruited subjects. The subjects and the directors of the hospitals were asked for permission to use patients’ information from the charts. For this study, the cut-off for high total cholesterol was fasting serum cholesterol ≥ 240 mg/dl and/or treatment with lipid-lowering drugs during the previous 2 weeks. These criteria were based on those used in the Thai components of the InterAsia study (2003). The cut-off for high level of LDL-C is fasting serum LDL-C ≥ 130 mg/dl and high triglyceride levels is serum triglyceride ≥ 150 mg/dl, whereas, the cut-off of low level of HDL-C is fasting serum HDL-C ≤ 35 mg/dl (Grundy, 1999;
Thus, all cut-off points of abnormal serum cholesterol are significant in the Thai population.

*Diabetes Mellitus*

As with the procedure for obtaining abnormal cholesterol, the subjects and directors of target hospitals were asked for written permission to use the data from the patients’ charts. For this study, the fasting plasma glucose $\geq 126$ mg/dl or a previous diagnosis of diabetes had been indicated as high blood glucose or diabetes mellitus. This cut-off of blood glucose had been indicated by studies in Thai populations (InterAsia, 2003).

*Obesity*

Each participant’s weight and height were measured by the trained assistant to indicate obesity and overweight status. Weight and height were measured by using the Detecto balance beam scale that was calibrated by the technician weekly to ensure the reliability. Obesity were indicated by BMI which was expressed in percent of weight (in kg) over height (in meter) squared. For this study, body weights were currently defined according to BMI as follows: normal weight 18.5–24.9 kg/m$^2$; overweight 25–29 kg/m$^2$; obesity $\geq 30.0$ kg/m$^2$ (obesity class I 30.0 –34.9, class II 35.9 –39.9, class III $\geq 50$ kg/m$^2$) (Mackay & Mensah, 2004).

*Menopause Status*

Menopause was indicated by a self-reported status, including pre- menopausal, and post-menopausal, which can be identified by menstrual period and menopause symptoms. In this study, rural Thai women who were pre-menopausal were those who
have the menstrual period prior to menopause and outlining at least one year after menopause. They might or might not experience menstrual periods become noticeably different (closer together, farther apart, scantier, more profuse), night sweats, or hot flashes. After 12 consecutive months of amenorrhea, rural Thai women were classified as post-menopause. They might or might not have menopause symptoms (Stewart, 2005). Finally, participants who had not experienced both categories above were defined as non-menopause.

*Measure of Physical Activity*

*The International Physical Activity Questionnaire (IPAQ)*

The present study used the IPAQ developed by the IPAQ (2002) in order to provide a common instrument that could be used internationally to obtain comparable estimates of physical activity participation from surveillance system data. The IPAQ had been translated and used in to many languages and modified with culturally relevant examples of vigorous and moderate activities. The IPAQ instruments have acceptable measurement properties, at least as good as other established self-report instruments (International Physical Activity Questionnaire, 2005). The overall, the results from the study of reliability and validity of the IPAQ in 12 countries indicated that the IPAQ produced repeatable data with Spearman’s Rho clustered around 0.8. Criterion validity had a median of about 0.30 to .60, which was comparable to most other self-report validation studies (Craig et al., 2003).

For this study, the IPAQ was translated to Thai language and was used for measuring physical activity of the sample. The adaptation of Brislin’s Translation Model
for cross-cultural research (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001) was used to forward-backward translate the IPAQ to Thai version. Also, the IPAQ translation guidelines indicated by the IPAQ were considered as the guidelines for translating the questionnaire. First, two independent translations were made from English to Thai language by two bilingual experts simultaneously. Second, each target Thai version was blindly back-translated to English by two new bilingual experts. Third, the four experts met with the investigator to review the back-translations, identify differences in meaning, and adapt the translated Thai version of IPAQ to achieve the most accurate cultural equivalent meaning. Four, the new version was back-translated independently by two more bilingual experts. A second meeting of two bilingual experts to review the new back-translations was conducted. The team agrees on the culturally equivalent meaning in the English- and Thai- versions of the IPAQ. Finally, the valid IPAQ questionnaire was used with the sample.

Scoring of the IPAQ.

Scores were categorized in three levels of physical activity as follows:

1. Category 1 was inactive that is the lowest level of physical activity. The participants who did not meet criteria for categories 2 or 3 are considered inactive.

2. Category 2 was minimally active. Participants who were in this category should meet the following 3 criteria: three or more days of vigorous activity of at least 20 minutes per day; five or more days of moderate-intensity activity or walking of at least 30 minutes per day; or five or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week.
3. Category 3 was HEPA (health-enhancing physical activity) active which of the following 2 criteria: vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week or 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week.

The IPAQ was also calculated as a continuous score as follows:

The score was expressed as MET-min per week: MET level * minutes of activity * events per week

$$\text{Total MET-min/week} = (\text{Walk METs}\times \text{min}\times \text{days}) + (\text{Mod METs}\times \text{min}\times \text{days}) + \text{Vig METs}\times \text{min}\times \text{days})$$

In this study, IPAQ score was calculated both categorized score and continuous score in order to present physical activity levels of rural Thai women.

Measure of Psychological Factors

The Thai Stress Inventory (TSI), developed by the Department of Mental Health, Ministry of Public Health, Thailand, was used as the instrument to measure stress in this study. The main reason in choosing this instrument, although they are relatively new and still not widely used instruments, was to reduce problems concerning cultural and language barriers, since the instruments were developed specifically to measure stress and depression in Thai people. Also, the Center for Epidemiologic Studies of Depression Scale (CES-D) by Randoff (1977) was utilized to measure depression. The CES-D has been translated in Thai for years and utilized for screening depression among various population such as adolescent and adult with chronic illnesses. It has been indicated as an
appropriate tool to measure depression among Thai population with high reliability and good validity (Kuptniratsaikul, Chulakadabba, & Ratanavijitrasil, 2002). In addition, coping was measured using the Brief COPE (Caver, 1997) since it has been translated to Thai language and used in Thai women with good reliability and good validity. The permission was obtained before starting data collection.

Measure of Stress

*The Thai Stress Inventory (TSI).*

For this study, stress were obtained by using The Thai Stress Inventory (TSI), developed by the Department of Mental Health, Ministry of Public Health, Thailand, was used to measure stress in this study. The TSI was used for self-evaluation of stress in Thai population. It consists of 20 items which describe psychomotor and psychological symptoms in relation to events occurring in daily life of Thai population. Each item could be rated on a 4-point rating scale, ranging from never (0) to most of the times (3). The respondents were asked to check √ in the column corresponding to the symptoms, behaviors, or feelings that has applied best to them during the past 2 months. To calculate scores, total scores of 0-5 represented very low level of stress. Scores of 6-17 represented normal or good stress. Scores ranged from 18 to 25 and 26 to 29 indicated a little-high level of stress and a moderate-high level of stress, respectively. Finally, scores of 30-36 indicated a very-high level of stress. The construct validity of this instrument had been tested. The sensitivity and specificity of the TSI were 70.4 and 64.6. The reliability coefficient for the Cronbach’s alpha coefficient was .086 (Phattharayuttawat, 2005).
Measure of Depression

The Center for Epidemiologic Studies of Depression Scale (CES-D).

The CES-D scale was originally developed as a general screening measure for depression (Radloff, 1977). It is a 20-item self-report instrument designed by the Center for Epidemiologic Studies to measure current level of depressive symptomatology, and especially depressive affect. The items were chosen (from 5 previously used depression scales) to represent all major components of depressive symptomatology. These included: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, loss of appetite, sleep disturbance, and psychomotor retardation. Items were rated on a 4-point scale indicating the degree of their occurrence during the last week. The scale could distinguish between clinical groups and general community groups. Although it was usually scored continuously, there were various cut-off scores for clinical depression, with reasonable associations between cut-off scores and a clinical diagnosis (Beals, Manson, Keane, & Dic, 1991).

CES-D has been utilized by similar CVD studies. For example, the CES-D was the standard scale used in numerous large scale studies including the Honolulu Heart Program, the Inter-Tribal Heart Project (The Strong Heart Study, 2006). Reliability and Validity the CES-D has been found to both adequate test-retest reliability, and internal consistency. The internal reliability (Cronbach’s Alpha) of the CES-D was .89.

In Thailand, the CES-D scale has been translated in Thai for years and utilized for screening depression among various population such as adolescent and adult with chronic illnesses. It has been indicated that CES-D is more appropriate for screening for
depression in Thai population than the Thai Depression Inventory (TDI) (Kuptniratsaikul et al., 2002). The study conducted in Thai populations both normal people and psychiatric patients aimed to establish the optimal cut off point for Thai people, using the CES-D to evaluate depression. It was performed among 69 medical personnel of Siriraj Hospital and 30 psychiatric patients from the Department of Psychiatry. The finding shown the scores of 19 or higher were considered indicative of depression with the sensitivity of 93.3 %, specificity of 94.2 %, and reliability of 0.91. The CES-D could be one of the most useful instruments for screening of depression (Kuptniratsaikul et al., 2002).

The CES-D was designed for self-administration, or interview format. There were twenty items are rated on a four-point Likert scale, ranging from “rarely, or not at all” scored as 0, to “most of the time” scored as 3. Four items were reversed when scored: numbers 5, 9, 13, and 17 so that 0 and 1 scores are changed to 3 and 2 respectively. Item scores were then summed for a total depression score. Thus, scores were range from 0-60, with higher scores indicating the increased severity of depression. Upon completion of the survey, the investigator summed the item scores, taking into account the reverse scored items. The cut-off point for Thai population was 19. The CES-D was included in the appendix part.

Measure of Coping

The Brief COPE.

Coping was measured using Carver’s (1997) brief situational format of the COPE inventory (Caver, 1997). Carver and colleagues developed the COPE as a flexible
multidimensional coping inventory for a broad range of applications in applied psychology. The brief COPE was designed to assess 14 different coping strategies: Self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. In the Brief COPE, 28 items were presented in the form of a coping statement and respondents were asked to rate whether they had or had not been using each way of coping on a fully anchored four-point scale ranging from ‘I haven’t been doing this at all’ to ‘I’ve been doing this a lot’. Rural Thai women were asked to consider the extent to which they used each coping strategy to deal with stress in their lives. The Brief COPE had 14 subscales representing a broad range of coping strategies. The Brief COPE was chosen in preference to other coping questionnaires for four main reasons: (1) it encompassed a broad range of coping strategies; (2) it could be presented in a situational rather than a trait format and thus one could explore coping specifically associated with the demands of a child with autism; (3) it was shorter and therefore quicker to administer than the full version of the COPE; and (4) it had been used in Thai women.

Score of each of the coping strategies was obtained by summing the scores on the respective two items. The scores for each coping strategy subscale ranged from 2 to 8. The higher scores indicated the subjects used more of the coping strategy. The brief COPE has shown adequate validity and reliability and had been widely used in women in multi-ethnic groups (Caver, 1997; Hastings et al., 2005; Kritpracha, 2004; Meyer, 2001). Also, the brief COPE had been translated into Thai language for obtaining coping
strategy in Thai women with breast cancer. The internal consistency (Cronbach Alpha) of the total scale of the Thai-brief COPE was .72 (Kritpracha, 2004).

The Severity of CVD

Measurement of CVD Severity

The NYHA Functional Capacity Classification.

The NYHA (1994) classified the functional capacity of patients with cardiac disease based on clinical severity and prognosis. The functional capacity evaluation was used to identify classification of each subject. There were four classifications of the functional capacity as follows (NYHA, 1994):

Class I: Patients with cardiac disease but without resulting limitation of physical activity. Ordinary physical activity did not cause undue fatigue, palpitation, dyspnea or anginal pain.

Class II: Patients with cardiac disease resulting in slight limitation of physical activity. They were comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.

Class III: Patients with cardiac disease resulting in marked limitation of physical activity. They were comfortable at rest. Less than ordinary activity caused fatigue, palpitation, dyspnea or anginal pain.

Class IV: Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure or the anginal syndrome might be present even at rest. If any physical activity was undertaken, discomfort increases. (p. 254).
Procedure

*Phase I: Contact Target Hospitals (community hospitals)*

In the first week, the director of each community hospital (5 total) was re-approached to remind them of the study and to coordinate the start of recruitment and data collection. The letter from the University of Arizona College of Nursing and the IRB approval document were sent to each hospital one week prior to this contact. Then, the heads of out-patient departments (OPDs) were asked to assist the investigator in recruiting potential participants and providing a room for data collection.

*Phase II: Data Collection from Community Hospitals*

In week two, the investigator recruited subjects at the OPDs in each hospital. The subjects were approached by the investigator and asked about their willingness to participate in the study. Four to five people were recruited each day from each of the five hospitals. They were informed about the purpose and procedure of the study, and obtained their verbal consent. Also, they were asked to sign a consent form. The participants were asked to sit and rest for at least 10 minutes before measuring blood pressure, height, weight, and waist and hip circumferences. Secondary data for biological risk factors including abnormal serum cholesterol (total cholesterol, triglycerides, LDL-C, and HDL-C), blood glucose, and/or any diagnosis/treatment of high blood pressure, hypercholesterolemia, and diabetes mellitus, were obtained from the patients’ charts. Then, the participants were given five questionnaires. The demographic data, non-modifiable risk factors such as age and family history, other modifiable risk factors, which were menopause status, behavioral risk factors, psychological risk factors, and
contextual factors, were obtained using the questionnaires as delineated previously. Since the beginning of data collection stage, some of rural Thai women were not able to read the questionnaires due to their poor eyesight according aging. They were read all questionnaire items by the investigator.

The data collection was conducted in a separate room to prevent distractions from noise or other patients and to protect their privacy and confidentiality. The average time for consenting and completing the data collection was approximately 1 hour for each participant.

Phase III: Contact Target Hospitals and Data Collection (provincial hospitals)

In this phase, the investigator contacted the director of each provincial hospital, to which some of CVD patients had been referred, asking for permission to recruit subjects and collect data in the hospital. The IRB Approval document and the letter from the University of Arizona College of Nursing were sent to the directors 1 week prior to this personal contact. The head nurses of the out-patient department in each hospital were also contacted to provide a secured place for collecting data. All data collection procedures indicated in phase II were repeated in the provincial hospitals as in the community hospitals.

Phase IV: Data Preparation for Analysis

During data collection and entry, all questionnaires were checked for completeness. The advantage of face-to-face data collection was that the investigator could immediately check for incomplete data and if anything was found missing, the investigator could ask the subjects to complete the forms during the data collection phase. Only subjects that had completed information were included in the data analysis. Data
were prepared for statistical analysis through measures to ensure that the data were accurate and internally consistent, using data cleaning. Data cleaning procedures were performed prior to analyzing the data. First, it was determined whether there was an error on the questionnaire or a data entry error. If it was a data entry error, it was changed. If other errors were found, the original questionnaires were referred to ensure the correction of data entry. For values considered to be outliers, the investigator decided how to include the case in the analysis. If the outliers could not be included, the data were excluded from analysis. Also, testing of multicolinearity was performed in the process of data cleaning.

Data Analysis

Data were analyzed using SPSS for Windows version 14. Within this study, the sample characteristics, considered risk factors of CVD, and the outcome were described.

Description of the Sample

Description of the sample includes sample characteristics and study variables. Variables measured at the nominal level such as family history of CVD, hypertension, diabetes mellitus, cigarette smoking, alcohol consumption, transportation, and poverty were described using frequencies and percentages. Those measured at the ordinal level such as family income, menopause status, categories of physical activity, education levels, and the severity of CVD were also described using frequencies and percentages. The interval as well as ratio variables in this study include age, blood pressure (SBP and DBP), total cholesterol, BMI, physical activity, stress, depression, coping, and distance to hospital described using statistical measures including mean and standard deviation.
Risk Factors of CVD

To answer Research Question 1 (What are the relationships among non-modifiable, modifiable risk factors, and contextual risk factors and the severity of CVD in rural Thai women?), Pearson’s correlation technique, which is a measure of the strength of the associations, was used to examine the relationships among predictor variables which were measured at interval and ratio levels (age, physical activity, blood pressure, total cholesterol, BMI, stress, depression, coping, distance to health care) and the outcome (the severity of CVD) of this study. In this study, the Pearson’s correlation coefficient (r) was also utilized to indicate the direction (positive or negative) of relationships.

Chi square statistic was also utilized to describe the correlations between each of the predictor variables and the severity of CVD. The predictor variables, which fall into nominal and ordinal levels, include non-modifiable risk factors (family history of CVD), other modifiable risk factors (high blood pressure, diabetes mellitus, obesity, menopause, cigarette smoking, alcohol consumption), and contextual risk factors (education levels, and family income, transportation, poverty).

To answer Research Question 2 (What are risk factors of CVD in rural Thai women?), variables that were hypothesized as predictor variables of CVD were analyzed using hierarchical regression. In a multiple regression analysis, the investigator decided how many predictors to enter and all the predictors are entered simultaneously into the regression model. For one criterion variable or outcome, the most two popular methods for multiple regression (MR) include hierarchical MR and stepwise MR.
In a hierarchical MR, the investigator will decide not only how many predictors to enter but also the order in which they are entered. Usually, the order of entry is based on logical or theoretical considerations. Compared to the stepwise MR, the predictor variable that has the highest correlation with the criterion variable is entered into the equation first. The rest of the variables are entered into the equation depending on the contribution of each predictor. That is not always the most important predictor. The number of predictors to be selected and the order of entry are both decided by statistical criteria. Stepwise MR is mostly used in exploratory research in which the investigator does not know the order of variables to put in the model. Since all predictor variables included into this present study are based on theoretical and empirical perspectives, hierarchical MR is the most logical and best suitable for data analysis in this study.

For this present study, non-modifiable variables including age and family history of CVD were entered first, based on prior research findings and literature which show that they are the most powerful major risk factors for CVD in Thai women. Then, modifiable risk factors including biological (high blood pressure, abnormal cholesterol, obesity, diabetes mellitus, menopause status), behavioral (physical inactivity, smoking, drinking alcohol), and psychological (stress, depression) risk factors were added in the regression model. Finally, contextual factors (SES, rural context), as well as coping, were added into the model.

To answer Research Question 3 (What factors moderate or contribute indirectly to CVD in rural Thai women?), the interactions or moderator effects among variables were examined since there are some indirect correlations among variables. Interaction effects
are sometimes called moderator effects, because the interacting third variable is a moderator variable which changes the original relationship (Garson, 2005). To examine the interaction in terms of this study, the moderators, which were contextual risk factors and coping, were added to the model to incorporate the joint effect of two other variables. Interaction or moderator variables were added into the model as cross-products of the standardized independents and/or dummy independents, placing them after the simple "main effects" independent variables in the model.

**Outcome Variable: the Severity of CVD**

The severity of CVD obtained by the NYHA Functional Capacity was described using frequencies and percentage since it was categorized as an ordinal level.

**Summary**

The methodology selected for this study was predictive, correlational design. This chapter had presented the target population, setting and criteria for selecting the sample, the IRB Approval process, instruments, and data collection methods. Data analysis based on the research questions and some limitations of these had been discussed. Using correlation analyses allowed for examination of the relationships among variables. Hierarchical multiple regression analysis allowed for predictions of the outcome variable (the severity of CVD in rural Thai women) from a set of predictor variables (risk factors of CVD).
CHAPTER FOUR: RESULTS

Results of the data analysis are presented in this chapter. The findings are presented in three sections as follows: 1) a description of the sample including demographic and all study variables; 2) reliability testing of study instruments; 3) results of the research questions. The purpose of this study was to examine risk factors of the severity of cardiovascular disease.

Statistical analyses were carried out using SPSS for Windows version 14. Both descriptive and inferential statistical methods were employed. All tests were set at a statistical significance of $p = 0.05$. Chi-square statistic was used to evaluate the association between categorical variables and Pearson correlation coefficients were used to evaluate the association between ordinal and/or continuous variables. Also, multiple regression analysis was employed to obtain coefficients for independent variables and to identify independent predictors in a multivariate model. The findings of each statistical test are presented.

Description of the Sample

Preliminary descriptive statistics was employed to describe the sample in terms of demographic, CVD risk, and the severity of CVD. All subjects were recruited from five public hospitals (two provincial, three community) located in Northern Thailand. Subject participation was voluntary and confidential. A total of 164 subjects participated and answered the questionnaires. Of 164 questionnaires, fifteen were discarded due to missing information on serum lipids and blood glucose, thus resulting in 149 questionnaires suitable for use in this study.
The frequency and percentage for data collection sites are presented in Table 5.

Table 5

*Frequency Distribution and Percentages for Data Collection Sites*

<table>
<thead>
<tr>
<th>Data Collection Sites (Hospitals)</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phrae</td>
<td>54</td>
<td>36.2</td>
</tr>
<tr>
<td>Soongmen</td>
<td>13</td>
<td>8.7</td>
</tr>
<tr>
<td>Denchai</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>Lampang</td>
<td>55</td>
<td>36.9</td>
</tr>
<tr>
<td>Sunpathong</td>
<td>19</td>
<td>12.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>149</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 6 displays the description of non-modifiable risk factors of CVD: age and family history of CVD.

Table 6

*Description of Sample on the Non-modifiable Risk Factors for CVD (N=149)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>61.9</td>
<td>10.3</td>
<td>35-80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family history of CVD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td></td>
<td></td>
<td></td>
<td>42.3</td>
</tr>
<tr>
<td>Yes</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
<td>57.7</td>
</tr>
</tbody>
</table>

Note. SD = standard deviation
Table 7 displays the description of the sample on physiological risk factors of CVD. Most of the sample had hypertension (76.5%). The average systolic blood pressure (SBP) was 130.1 (SD 18.9) and the average diastolic blood pressure (DBP) was 78.9 (SD 11.5). Eighteen point one percent of the sample had high total serum cholesterol (higher than 240 mg/dl). Meanwhile, the average of total serum cholesterol was 196.8 mg/dl (SD 52.7). Also, 34.9% of the participants were diagnosed with diabetes mellitus.

In this study, obesity was indicated by body mass index (BMI). A BMI of over 25 and 30 were designated as overweight and obesity respectively. Results show that the average BMI was 23.5 kg/m$^2$ (SD 4.5), with 8.1% of the sample categorized as “obese” and 27.5% as “overweight.”

The last physiological risk factor for this study is menopause status. Eighteen point one percent of the samples were pre-menopausal. Eighty one point nine percent of those were post-menopausal.

Table 7

*Description of Sample on the (Modifiable) Physiological Risk Factors for CVD (N=149)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>35</td>
<td></td>
<td>23.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>114</td>
<td></td>
<td>76.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure (SBP)</td>
<td>130.1</td>
<td>18.9</td>
<td>100-190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure (DBP)</td>
<td>78.9</td>
<td>11.5</td>
<td>50-120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High total serum cholesterol (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>122</td>
<td></td>
<td>81.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27</td>
<td></td>
<td>18.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total serum cholesterol</td>
<td>196.8</td>
<td>52.7</td>
<td>88-361</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7 (continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Mellitus (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>97</td>
<td>65.1</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td>52</td>
<td>34.9</td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>23.5</td>
<td>4.5</td>
<td>11.48-37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight status (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low: BMI&lt;18.5</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>10.1</td>
</tr>
<tr>
<td>Normal: BMI 18.5 – 24.9</td>
<td></td>
<td></td>
<td></td>
<td>81</td>
<td>54.4</td>
</tr>
<tr>
<td>Overweight: BMI 25-29.9</td>
<td></td>
<td></td>
<td></td>
<td>41</td>
<td>27.5</td>
</tr>
<tr>
<td>Obesity: BMI ≥ 30</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>8.1</td>
</tr>
<tr>
<td>Menopause status (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-menopausal</td>
<td></td>
<td></td>
<td></td>
<td>27</td>
<td>18.1</td>
</tr>
<tr>
<td>Post-menopausal</td>
<td></td>
<td></td>
<td></td>
<td>122</td>
<td>81.9</td>
</tr>
</tbody>
</table>

Description of cardiovascular risk behaviors are presented in Table 8. The percentage of current smoking and previous smoking were 3.4% and 11.4%, respectively. All samples were physically active (high 90.6% and moderate 9.4%). The average total METs of physical activity was 7405.2 (SD 3833.2). Also, the percentage of current drinking was 2% and 2.7% reported they had stopped drinking.

Table 8

Description of Sample on the (Modifiable) Behavioral Risk Factors for CVD (N=149)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarette smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non smoking</td>
<td></td>
<td></td>
<td></td>
<td>127</td>
<td>85.2</td>
</tr>
<tr>
<td>Current smoking</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td>Previous smoking</td>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>11.4</td>
</tr>
<tr>
<td>Total METs physical activity</td>
<td>7405.2</td>
<td>3833.2</td>
<td>933-24024</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8 (continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity categories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>14</td>
<td>9.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>135</td>
<td>90.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non drinking</td>
<td>142</td>
<td>95.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current drinking</td>
<td>3</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous drinking</td>
<td>4</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 presents the psychological risk factors including the Stress Test Inventory scores and the CES-D or depression scores. The average of stress score was 17.8 (SD 8.8). The stress scores were categorized into 5 levels including low, normal, a little high, high, and very high (Phattharayuttawat, 2005). Forty four point nine percent of the sample were stressed which included a little high stress (28.2%), high stress (6.0%), and very high stress (10.7%). For depression, the average score of the CES-D was 16.4 (SD 6.8). The cut-point of 19 indicated depression (Kuptniratsaikul et al., 2002), thus 45% of the sample were depressed in this study.

Table 9

Description of Sample on the (Modifiable) Psychological Risk Factors for CVD (N=149)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>17.8</td>
<td>8.8</td>
<td>3-43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>8</td>
<td></td>
<td></td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>74</td>
<td></td>
<td></td>
<td>49.7</td>
<td></td>
</tr>
<tr>
<td>A little high</td>
<td>42</td>
<td></td>
<td></td>
<td>28.2</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td></td>
<td></td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Very high</td>
<td>16</td>
<td></td>
<td></td>
<td>10.7</td>
<td></td>
</tr>
</tbody>
</table>
Table 9 (continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>16.4</td>
<td>6.8</td>
<td>1-38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>82</td>
<td></td>
<td></td>
<td>55.0</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>67</td>
<td></td>
<td></td>
<td>45.0</td>
<td></td>
</tr>
</tbody>
</table>

Contextual risk factors such as socioeconomic status (education level and family income) and rural context (distance to hospital, transportation to hospital, and poverty) are presented in Table 10. Most of the sample had less than a high school education (89.3%). Only 4.7% had an associate degree or higher education. Family income was lower than 3000 baht per month (43.6%). Based on the NSO indicators of the poverty line, 47.7% of the sampled women were defined as existing at “poverty” level. The average of distance from home to hospital was 16.4 kilometer (SD=20.2), ranged from 1 to 90 kilometer. 74.5% had personal transportation which meant either the individual drove or had a relative or friend who could provide transportation.

Table 10

Description of Sample on the Contextual Risk Factors for CVD (N=149)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of formal education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>34</td>
<td></td>
<td>22.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>99</td>
<td></td>
<td>66.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>9</td>
<td></td>
<td>6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate degree or higher</td>
<td>7</td>
<td></td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income (Baht per month)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 3000</td>
<td>65</td>
<td></td>
<td>43.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3001- 7000</td>
<td>46</td>
<td></td>
<td>30.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 7000</td>
<td>38</td>
<td></td>
<td>25.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coping was assessed using the modified-Thai version of Brief Coping Orientations to Problems Experienced Inventory (Brief COPE) (Caver, 1997). In this study, the Thai-version Brief COPE, which was translated and used by Charuwan Kritpracha in 2004, was slightly modified few items, in order to fit the study sample. The Brief COPE Inventory includes 14 sub-scales which are different coping strategies: active coping, planning, positive reframing, acceptance, humor, religion, use of emotional support, use of instrumental support, self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame. Scores of each sub-scale indicate how much subjects use each coping strategy. Scores for participants in this study ranged from 2 to 8 on each coping strategy, with a higher score indicating increased use by the participant.

Table 11 presents mean, standard deviations, and range for coping scores total and each sub-scale. The coping strategies used most frequently across subjects were: use of emotional support (mean 6.7, SD 1.2), self-distraction (mean 6.6, SD 1.0), and acceptance (mean 6.6, SD 1.0). The coping strategy employed least frequently by the sample was substance use (mean 2.9, SD .58).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to hospital (kilometer)</td>
<td>16.4</td>
<td>20.2</td>
<td>1-90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation to hospital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal</td>
<td>111</td>
<td>74.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>38</td>
<td>25.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>78</td>
<td>52.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>71</td>
<td>47.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11

Description of Sample on the Coping Scores (N=149)

<table>
<thead>
<tr>
<th>Coping</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping total</td>
<td>73.0</td>
<td>5.6</td>
<td>59-84</td>
</tr>
<tr>
<td>Self-distraction</td>
<td>6.6</td>
<td>1.0</td>
<td>3-8</td>
</tr>
<tr>
<td>Active coping</td>
<td>6.3</td>
<td>1.1</td>
<td>3-8</td>
</tr>
<tr>
<td>Denial</td>
<td>3.0</td>
<td>1.4</td>
<td>2-6</td>
</tr>
<tr>
<td>Substance use</td>
<td>2.1</td>
<td>.58</td>
<td>2-6</td>
</tr>
<tr>
<td>Use of emotional support</td>
<td>6.7</td>
<td>1.2</td>
<td>2-8</td>
</tr>
<tr>
<td>Use of instrumental support</td>
<td>5.5</td>
<td>1.4</td>
<td>2-8</td>
</tr>
<tr>
<td>Behavioral disengagement</td>
<td>4.2</td>
<td>1.8</td>
<td>2-8</td>
</tr>
<tr>
<td>Venting</td>
<td>6.0</td>
<td>1.3</td>
<td>2-8</td>
</tr>
<tr>
<td>Positive reframing</td>
<td>5.9</td>
<td>1.2</td>
<td>2-8</td>
</tr>
<tr>
<td>Planning</td>
<td>5.9</td>
<td>1.1</td>
<td>2-8</td>
</tr>
<tr>
<td>Humor</td>
<td>3.2</td>
<td>1.2</td>
<td>2-6</td>
</tr>
<tr>
<td>Acceptance</td>
<td>6.6</td>
<td>1.0</td>
<td>2-8</td>
</tr>
<tr>
<td>Religion</td>
<td>6.4</td>
<td>1.4</td>
<td>2-8</td>
</tr>
<tr>
<td>Self-blame</td>
<td>4.6</td>
<td>1.9</td>
<td>2-8</td>
</tr>
</tbody>
</table>

The frequency distribution of percentages for the severity of CVD defined by the 4-class NYHA Classification of Functional Capacity is shown in Table 12. Forty point nine percent of the sample were in class I (less severe); 26.8% were in class II; 17.5% were in class III; and 14.8% were in class IV (most severe).

Table 12

Frequency Distribution and Percentages for the Severity of CVD (N = 149)

<table>
<thead>
<tr>
<th>Classifications</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>61</td>
<td>40.9</td>
</tr>
<tr>
<td>Class II</td>
<td>40</td>
<td>26.8</td>
</tr>
<tr>
<td>Class III</td>
<td>26</td>
<td>17.5</td>
</tr>
<tr>
<td>Class IV</td>
<td>22</td>
<td>14.8</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Reliability of Study Instrument

Reliability is concerned with the precision of the instrument in an effort to minimize error relative to a true score. In this study, Cronbach’s alpha coefficients were calculated to assess the internal reliability for the Thai Stress Test Scale, Thai-version CES-D, and the Thai-version Brief COPE. Table 13 summarizes the reliability of all instruments utilized for this study.

Table 13

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Coefficient Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress Test</td>
<td>.90</td>
</tr>
<tr>
<td>CES-D</td>
<td>.84</td>
</tr>
<tr>
<td>Brief COPE total</td>
<td>.64</td>
</tr>
<tr>
<td>Self-distraction</td>
<td>.77</td>
</tr>
<tr>
<td>Active coping</td>
<td>.70</td>
</tr>
<tr>
<td>Denial</td>
<td>.74</td>
</tr>
<tr>
<td>Substance use</td>
<td>.82</td>
</tr>
<tr>
<td>Use of emotional support</td>
<td>.78</td>
</tr>
<tr>
<td>Use of instrumental support</td>
<td>.83</td>
</tr>
<tr>
<td>Behavioral disengagement</td>
<td>.84</td>
</tr>
<tr>
<td>Venting</td>
<td>.84</td>
</tr>
<tr>
<td>Positive reframing</td>
<td>.82</td>
</tr>
<tr>
<td>Planning</td>
<td>.85</td>
</tr>
<tr>
<td>Humor</td>
<td>.83</td>
</tr>
<tr>
<td>Acceptance</td>
<td>.84</td>
</tr>
<tr>
<td>Religion</td>
<td>.66</td>
</tr>
<tr>
<td>Self-blame</td>
<td>.95</td>
</tr>
</tbody>
</table>
Results of the Research Questions

Question One

What are the relationships among non-modifiable, modifiable, and contextual risk factors and the severity of CVD in rural Thai women?

Tables 14 to 22 display the univariate correlations among major study variables, also between those variables and the severity of CVD.

Non-Modifiable Risk Factors

Age was positively and significantly related to the severity of CVD ($r = .240$, $p<.01$), but was negatively and significantly related to BMI ($r = -.287$, $p<.001$), physical activity, ($r = -.543$, $p<.001$), and education levels ($r = -.327$, $p<.001$). Family history of CVD was not found to be a statistically significant correlation with the severity of CVD. Also, there was no statistically correlation between family history of CVD and other risk factors.

Modifiable Risk Factors

Physiological Risk Factors

Results show that high blood pressure was positively and significantly related to the severity of CVD ($\chi^2 = 16.576$, $r = .290$, $p<.001$). Also, high blood pressure was positively and significantly related to diabetes ($r = .306$, $p<.001$) and menopause ($r = .233$, $p<.01$). Total serum cholesterol showed no correlation with the severity of CVD, but was positively and significantly related to BMI ($r = .219$, $p<.01$). BMI itself was negatively and significantly related to the severity of CVD ($r = -.253$, $p<.01$). Also, BMI was negatively and significantly related to stress ($r = -.218$, $p<.01$), depression ($r = -.175$,
p<.05), and distance to hospital (r = -.203, p<.05). In contrast, there was a positive relationship between BMI and physical activity (r = .209, p<.05). Diabetes mellitus and menopause status both showed non significant correlations with the severity of CVD. However, diabetes was significantly associated with menopause (r = .233, p< .01).

**Behavioral Risk Factors**

Cigarette smoking and physical activity were significantly related to the severity of CVD, but alcohol consumption was not significantly related to the severity of CVD. Cigarette smoking was positively and significantly related to the severity of CVD (r = .277, p<.01). Also, cigarette smoking was significantly correlated with alcohol consumption (r = .603, p<.001), depression (r = .210 p<.05), education levels (r = .289, p<.001), and family income (r = .224, p<.01). Results show that physical activity was negatively and significantly related to the severity of CVD (r = -.487 p<.001), age (r = -.543 p<.001), and depression (r = -.195, p<.01). However, physical activity was positively and significantly related with BMI (r = .209, p<.05) and education levels (r = .223, p<.01). When physical activity was categorized as physical activity category (low, moderate, and high), the results also show that the physical activity category was negatively and significantly related to the severity of CVD (r = -.665, p=.000). The other behavioral risk factor, which is alcohol consumption, was not significantly related to the severity of CVD, but positively related to age (r = .580, p<.05), cigarette smoking (r = .603, p<.001), depression (r = .136, p<.05), and poverty (r = .216, p<.05).
Psychological Risk Factors

The Pearson correlation coefficient between stress and the severity of CVD was positive and significant ($r = .393$, $p < .001$). Stress had a positive and strong correlation with depression ($r = .768$, $p < .001$). Also, there was a positive and significant relationship between stress and distance to hospital ($r = .208$, $p < .05$). In contrast, stress was negatively and significantly related to BMI ($r = -.218$, $p < .01$), education levels ($r = -.328$, $p < .001$), family income ($r = -.283$, $p < .001$), and coping ($r = -.242$, $p < .01$). Similarly, depression was positively and significantly related to the severity of CVD ($r = .292$, $p < .001$), also was positively related to alcohol consumption ($r = .136$, $p < .05$) and distance to a hospital ($r = .164$, $p < .05$). However, depression was negatively and significantly related to BMI ($r = -.175$, $p < .05$), physical activity ($r = -.195$, $p < .01$), education levels ($r = -.310$, $p < .001$), family income ($r = -.369$, $p < .001$), and coping ($r = -.307$, $p < .001$).

Contextual Risk Factors

Socioeconomic status including education levels ($r = -.250$, $P < .01$) and family income ($r = -.161$, $p < .01$) were negatively and significantly related to the severity of CVD. Education levels were also negatively and significantly related to age ($r = -.327$, $p < .001$), stress ($r = -.328$, $p < .001$), and depression ($r = -.310$, $p < .001$), but positively related to physical activity ($r = .223$, $p < .01$), family income ($r = .338$, $p < .001$), poverty ($r = .250$, $p < .05$), and coping ($r = .195$, $p < .05$). Moreover, there was a positive and significant correlation between family income and cigarette smoking ($r = .224$, $p < .01$) and poverty ($r = .847$, $p < .001$), but family income was negatively and significantly related to stress ($r = -.283$, $p < .001$); and depression ($r = -.369$, $p < .001$).
Rural context including poverty was positively and significantly related to the severity of CVD \((r = .249, p<.05)\). Poverty was also positively related to alcohol consumption \((r = .216, p<.05)\) and education levels \((r = .250, p<.05)\). However, other rural context variables, which are distance to a hospital and transportation to hospital, were not statistically related to the severity of CVD. As well as, total coping score was not significantly related to the severity of CVD. However, coping sub-scales such as self-distraction \((r = -.272, p<.001)\), positive reframing \((r = -.196, p<.05)\), and acceptance \((r = -.167, p<.05)\) sub-scales were negatively and significantly related to the severity of CVD (see Table 21, 22).

Table 14

*Relationships between Major Risk Factors and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th>Major Risk factors</th>
<th>(\chi^2)</th>
<th>(r)</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-modifiable risk factor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family history</td>
<td>5.507</td>
<td>.151</td>
<td>.138</td>
</tr>
<tr>
<td><strong>Physiological risk factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>16.576</td>
<td>.290</td>
<td>.001</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>6.169</td>
<td>.160</td>
<td>.104</td>
</tr>
<tr>
<td>Weight status</td>
<td>20.651</td>
<td>-.195</td>
<td>.014</td>
</tr>
<tr>
<td>Menopause status</td>
<td>6.561</td>
<td>.016</td>
<td>.087</td>
</tr>
<tr>
<td><strong>Behavioral risk factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigarette Smoking</td>
<td>17.122</td>
<td>.277</td>
<td>.009</td>
</tr>
<tr>
<td>Physical activity category</td>
<td>26.435</td>
<td>-.665</td>
<td>.000</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>3.207</td>
<td>.145</td>
<td>.783</td>
</tr>
</tbody>
</table>

Note. \(\chi^2\) = Chi square, *P = Significant level
Table 15

*Relationships between Contextual Risk Factors and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th>Contextual Risk factors</th>
<th>$\chi^2$</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation to hospital</td>
<td>.676</td>
<td>.004</td>
<td>.879</td>
</tr>
<tr>
<td>Poverty</td>
<td>9.809</td>
<td>.249</td>
<td>.020</td>
</tr>
</tbody>
</table>

Note. $\chi^2$ = Chi square

Table 16

*Intercorrelations among Non-Modifiable Risk Factors and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Family history</th>
<th>Severity of CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.000</td>
<td>.174</td>
<td>.240**</td>
</tr>
<tr>
<td>Family history</td>
<td>1.000</td>
<td></td>
<td>.151</td>
</tr>
<tr>
<td>Severity of CVD</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * p<.05, ** p<.01, *** p<.001

Table 17

*Intercorrelations among (Modifiable) Physiological Risk Factors, and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th></th>
<th>Hypertension</th>
<th>Cholesterol</th>
<th>Diabetes</th>
<th>BMI</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>1.000</td>
<td>.116</td>
<td>.306***</td>
<td>.187</td>
<td>.290***</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>1.000</td>
<td>.030</td>
<td>.219***</td>
<td>-.085</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.000</td>
<td>.086</td>
<td>.160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>1.000</td>
<td></td>
<td></td>
<td>-.253**</td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * p<.05, ** p<.01, *** p<.001
Table 18

*Intercorrelations among (Modifiable) Behavioral Risk Factors and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th></th>
<th>Smoking</th>
<th>Physical activity</th>
<th>Drinking</th>
<th>Severity of CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>1.000</td>
<td>.177</td>
<td>.603***</td>
<td>.277***</td>
</tr>
<tr>
<td>Physical activity</td>
<td>1.000</td>
<td>.071</td>
<td>-.487***</td>
<td></td>
</tr>
<tr>
<td>Drinking</td>
<td></td>
<td>1.000</td>
<td>.145</td>
<td></td>
</tr>
<tr>
<td>Severity of CVD</td>
<td></td>
<td></td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

Note. *** p<.001

Table 19

*Intercorrelations among (Modifiable) Psychological Risk Factors and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th></th>
<th>Stress</th>
<th>Depression</th>
<th>Severity of CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>1.000</td>
<td>.768***</td>
<td>.393***</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td>1.000</td>
<td>.292***</td>
</tr>
<tr>
<td>Severity of CVD</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note. * p<.05, ** p<.01, *** p<.001
Table 20

*Intercorrelations among Contextual Risk Factors, Coping, and the Severity of CVD (N=149)*

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Income</th>
<th>Distance</th>
<th>Transport</th>
<th>Poverty</th>
<th>Coping</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>1.000</td>
<td><strong>.338</strong>*</td>
<td>-0.014</td>
<td>0.117</td>
<td>0.250*</td>
<td>0.195*</td>
<td>-0.250**</td>
</tr>
<tr>
<td>Income</td>
<td>1.000</td>
<td>-0.107</td>
<td>0.138</td>
<td><strong>0.847</strong>*</td>
<td>0.089</td>
<td>-0.161*</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>1.000</td>
<td>0.257</td>
<td>0.108</td>
<td>-0.064</td>
<td>0.150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>1.000</td>
<td>0.151</td>
<td>0.090</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td>1.000</td>
<td>0.017</td>
<td>0.249*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping</td>
<td>1.000</td>
<td>-0.063</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *p<.05, **p<.01, ***p<.001*
<table>
<thead>
<tr>
<th></th>
<th>AGE</th>
<th>FAM</th>
<th>HTN</th>
<th>TC</th>
<th>DM</th>
<th>BMI</th>
<th>MENO</th>
<th>SMOK</th>
<th>METS</th>
<th>DRIN</th>
<th>STR</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>1.000</td>
<td>.174</td>
<td>.111</td>
<td>-.009</td>
<td>.045</td>
<td>-.287***</td>
<td>.694***</td>
<td>.275</td>
<td>-.543***</td>
<td>.580*</td>
<td>.041</td>
<td>.050</td>
</tr>
<tr>
<td>FAM</td>
<td>1.000</td>
<td>.103</td>
<td>.028</td>
<td>.028</td>
<td>.180</td>
<td>-.050</td>
<td>.120</td>
<td>.154</td>
<td>.125</td>
<td>.038</td>
<td>.108</td>
<td></td>
</tr>
<tr>
<td>HTN</td>
<td>1.000</td>
<td>.116</td>
<td>.306***</td>
<td>.187</td>
<td>.233**</td>
<td>.150</td>
<td>.050</td>
<td>.110</td>
<td>.127</td>
<td>.137</td>
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<td></td>
</tr>
<tr>
<td>TC</td>
<td>1.000</td>
<td>.030</td>
<td>.219**</td>
<td>.085</td>
<td>.018</td>
<td>.070</td>
<td>.084</td>
<td>-.011</td>
<td>-.032</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td>1.000</td>
<td>.086</td>
<td>.233**</td>
<td>.150</td>
<td>.034</td>
<td>.110</td>
<td>.061</td>
<td>.036</td>
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<td></td>
</tr>
<tr>
<td>BMI</td>
<td>1.000</td>
<td>.180</td>
<td>.196</td>
<td>.209*</td>
<td>.115</td>
<td>-.218**</td>
<td>-.175*</td>
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Note. * p<.05, ** p<.01, *** p<.001

AGE = age, FAM = family history, HTN = high blood pressure, TC = total serum cholesterol, BMI = body mass index, MENO = menopause, SMOK = cigarette smoking, METS = total METS/physical activity, DRIN = alcohol consumption, STR = stress, DEP = depression, EDU = education levels, INC = family income, DIS = distance to hospital, TRAN = transportation to hospital, POV = poverty, COPE = coping, SEVE = severity of CVD.
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Note. * p<.05, ** p<.01, *** p<.001
Table 22

*Intercorrelations among Coping, Coping Sub-Scales, and the Severity of CVD (N=149)*

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Note. * p<.05, ** p<.01, *** p<.001

COPE = total coping, DIST = self-distraction, ACT = active coping, DENI = denial, SUBS = substance use, EMO = emotional,
INST = instrumental, DISE = instrumental, VENT = ventilation, REFR = positive reframing, PLAN = planning, HUM = humor,
ACC = acceptance, RELI = religion, BLA = self-blaming, SEVE = severity of CVD.
Figure 3. The Correlation Model for this Study

Note. * p<.05, ** p<.01, *** p<.001, ns = non-significant
Question Two

*What are risk factors of CVD in rural Thai women?*

Multiple regression analysis, which is used as a data-analysis strategy to explain or predict an outcome (dependent or criterion) variable with a set of predictor (independent) variables, was utilized. In this study, hierarchical multiple regression was performed to predict the outcome -- the severity of CVD. Five models were added in the hierarchical multiple regression analysis. Hierarchical multiple regression analyses were performed by entering each group of risk factors into the regression equation in five consecutive blocks (non-modifiable risk factors were one block; physiological risk factors were the second block; behavioral risk factors were the third block; psychological risk factors were the fourth block; and contextual risk factors and coping were the fifth block). Results were considered statistically significant when p values were less than or equal to .05.

Table 23 displays summary of the hierarchical regression model for variables predicting the Severity of CVD in Rural Thai Women. The unstandardized regression coefficients ($B$), standard error estimates ($SEB$), the standardized regression coefficients ($\beta$). Adjusted R squared ($AdjR^2$) statistics, $R^2$ change ($\Delta R^2$) and F change in $R^2$ (F change).
Table 23

Summary of Hierarchical Regression Analysis for Variables Predicting the Severity of CVD in Rural Thai Women (N = 149)

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<th>AdjR²</th>
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Note. * p<.05, ** p<.01, *** p<.001
Table 23 (continued)

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</table>

Note. * p<.05, ** p<.01, *** p<.001

In model 1, taken together, both age and family history were significant in predicting the severity of CVD. Adjusted $R^2$, the coefficient of determination, was about 6% the variation in the severity of CVD explained by the model ($ΔR^2=.070$, $F = 5.477$, $p<.01$). When other risk factors were held constant, the result shows that age was a unique predictor of CVD ($β = .220$, $p<.01$), but family history was not a significant predictor of CVD.

In model 2, taken together and controlled for other risk factors, a group of physiological risk factors accounted for about 16% of the variance in the severity of CVD (adjusted $R^2 = .159$, $F$ change $= 4.557$, $p<.001$). The increment to $R^2$ ($ΔR^2$) as the physiological risk factors were stepped into the equation was .129. In this model, age and
high blood pressure were significant predictors of the severity of CVD ($\beta = .352$, p<.01 and -.239, p<.01, respectively).

In model 3, when a set of behavioral risk factors, which were smoking, physical activity, and alcohol consumption, were added into the model, they accounted for 33.1% of the variance in the severity of CVD (adjusted $R^2 = .331$, F = 8.247, p < .000). The increment to $R^2 (\Delta R^2)$ as the behavioral risk factors were stepped into the equation was .186. Four of the physiological and behavioral risk factors were significant predictors of CVD: high blood pressure ($\beta = -.164$, p<.05), cigarette smoking -- previous smoking compared with non-smoking ($\beta = .173$, p<.05), physical activity ($\beta = -.442$, p<.001), and alcohol consumption -- current drinking compared with non-drinking ($\beta = .177$, p<.05).

In model 4, when added psychological risk factors into the model, about 39% the variation in the severity of CVD was explained by the model (adjusted $R^2 = .390$, F change = 7.536, p=.001). The increment to $R^2 (\Delta R^2)$ as the psychological risk factors were stepped into the equation was .062. Three of the regression coefficients were significant: high blood pressure ($\beta = -.162$, p<.05), physical activity ($\beta = -.417$, p<.001), and stress ($\beta = .357$, p<.001).

Model 5 was the comprehensive model and the conceptual framework of this study. When a set of contextual risk factors and coping were added into the model, overall, they accounted for about 43% of the variance in the severity of CVD (adjusted $R^2 = .427$, F change = 1.968, p<.05). The increment to $R^2 (\Delta R^2)$ as contextual risk factors were stepped into the equation was .069. Several predictor variables had a significant effect on the severity of CVD. When all other variables were held constant, one
physiological risk factor which was blood pressure ($\beta = - .171, p<.05$); two behavioral risk factors, which were smoking--previous smoking compared with non-smoking ($\beta = .184, p<.05$) and physical activity ($\beta = -.392, p<.001$), were significant predictors of the severity of CVD. One psychological risk factor, which was stress, was also a unique predictor of the severity of CVD ($\beta = .351, p<.001$). As well as, two contextual risk factors, which were family income--high income compared with low income ($\beta = .376, p<.05$), and poverty ($\beta = .575, p<.001$) were significant predictors of the severity of CVD (see Table 23).

Question Three

*What factors moderate or contribute indirectly to the severity of CVD in rural Thai women?*

Moderator or interaction effects between contextual risk factors or coping and major risk factors were examined. The contextual risk factors, which included education levels, family income, distance to hospital, transportation to hospital, and poverty, as well as coping were added as moderator variables to examine moderator effects with both the non-modifiable and modifiable risk factors in predicting the severity of CVD. In this study, “moderator effects” refer to the presence of one variable moderates the effect the other one to predict the severity of CVD. Multiple regression analysis was also used to examine the moderator effects between pairs of those variables.

Table 24 presents the B coefficients, standard error of B ($SE\, B$), standardized regression coefficients ($\beta$), $R^2$, F statistic of the moderator effects. Results show that none of non-modifiable risk factors had a moderator effect with contextual risk factors or coping. However, modifiable risk factors, which were physiological, behavioral, and psychological risk factors, had moderator effects with the contextual risk factors in predicting the severity of CVD. Physiological risk factors, which had moderator effects,
included total cholesterol and high income ($\beta = 1.050$, $p<.05$), diabetes and distance to hospital ($\beta = .240$, $p<.05$), BMI and transportation ($\beta = -.926$, $p<.05$), and menopause and high income ($\beta = .526$, $p<.05$). In addition, previous smoking which was a behavioral risk factor had a moderator effect with transportation ($\beta = .226$, $p<.001$), also the psychological risk, e.g., depression had a moderator effect with poverty ($\beta = .573$, $p<.05$) in predicting the severity of CVD.

Table 24

*Summary of Moderator Effects between Contextual Risk Factors and Major Risk Factors Predicting the Severity of CVD (N = 149)*

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>$B$</th>
<th>$SE$</th>
<th>$\beta$</th>
<th>$R^2$</th>
<th>Adj $R^2$</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physiological risk factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol*high income</td>
<td>.177</td>
<td>.069</td>
<td>1.050*</td>
<td>.061</td>
<td>.042</td>
<td>3.145*</td>
</tr>
<tr>
<td>Diabetes *distance to hospital</td>
<td>.009</td>
<td>.004</td>
<td>.240*</td>
<td>.074</td>
<td>.055</td>
<td>3.850*</td>
</tr>
<tr>
<td>BMI * transportation</td>
<td>-.003</td>
<td>.014</td>
<td>-.926*</td>
<td>.097</td>
<td>.079</td>
<td>5.218*</td>
</tr>
<tr>
<td>Menopause * high income</td>
<td>.476</td>
<td>.186</td>
<td>.526*</td>
<td>.053</td>
<td>.033</td>
<td>2.697*</td>
</tr>
<tr>
<td><strong>Behavioral risk factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous smoking*transportation</td>
<td>.396</td>
<td>.190</td>
<td>.226***</td>
<td>.103</td>
<td>.084</td>
<td>5.535***</td>
</tr>
<tr>
<td><strong>Psychological risk factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression*poverty</td>
<td>.020</td>
<td>.009</td>
<td>.573*</td>
<td>.143</td>
<td>.126</td>
<td>8.097*</td>
</tr>
</tbody>
</table>

Note. * $p<.05$, ** $p<.01$, *** $p<.001$
Figure 4. Summary of Significant Predictor Variables and Moderator Effects in Predicting the Severity of CVD in Rural Thai Women
Summary

This study examined risk factors of CVD in rural Thai women, a population for which CVD is a major health problem. In order to prevent and treat CVD, investigating risk factors and the moderator effects thereof is essential.

Findings for research question 1 ("What are the relationships among non-modifiable, modifiable, contextual risk factors, and the severity of CVD in rural Thai women?") show that physiological risk factors, e.g., age (positive), high blood pressure (positive), and BMI (negative); behavioral risk factors, e.g., cigarette smoking (positive), and physical activity (negative); psychological risk factors, e.g., stress (positive) and depression (positive); contextual risk factors, e.g., educational levels (negative), family income (negative), and poverty (positive), were all significantly related to the severity of CVD. However, family history, total serum cholesterol, diabetes mellitus, menopause status, alcohol consumption, distance to hospital, transportation to hospital, and coping were not significantly related to the severity of CVD.

Findings for research question 2 ("What are risk factors of CVD in rural Thai women?"), based on the multiple regression analysis, show that taken together and controlled for other variables, high blood pressure, cigarette smoking, physical activity, stress, family income, and poverty were significant predictors of CVD. They accounted for 42.8% of the variance in the severity of CVD.

For research question 3 ("What factors moderate or contribute indirectly to the severity of CVD in rural Thai women?"), moderator terms were examined. The results show that there were several moderator effects in predicting the severity of CVD. These included total cholesterol and high income, diabetes and distance to hospital, BMI and transportation, menopause and high income, cigarette smoking and transportation, and depression and poverty.
CHAPTER FIVE: DISCUSSION

This study was the first to investigate risk factors of cardiovascular disease in rural Thai women. It examined the relationships among risk factors of cardiovascular disease (CVD), predictors for CVD, and the moderator effects of risk factors of CVD in rural Thai women. In this chapter, a results summary will be presented; then, results for each of the three research questions will be discussed along with the study’s limitations, significance and implications for nursing practice, and recommendations for future research.

To re-iterate the categorization scheme used for risk factors examined, three major groupings (non-modifiable, modifiable, and contextual) were used, with non-modifiable factors comprising age and family history of CVD; modifiable factors being further subdivided along physiological, psychological, and behavioral lines; and contextual factors further subdivided according to socioeconomic status and rural context; as well as coping. See page 99 for a detailed listing of all risk factors examined.

Overall, this study demonstrated that all three types of risk factors (non-modifiable, modifiable, and contextual) influenced the severity of CVD in rural Thai women. Data from this study demonstrate that age, hypertension, cigarette smoking, stress, depression, and poverty had positive relationships with the severity of CVD. Conversely, results indicated that BMI, physical activity, education level, and family income were inversely related to the severity of CVD. Contrary to previous studies, total serum cholesterol, diabetes mellitus, menopause status, alcohol consumption, distance to a hospital, transportation to health care, and coping had no relationship to the severity of CVD.
Although non-modifiable risk factors, physiological, and behavioral risk factors are significant predictors of CVD among women in Western countries, this study examined whether or not these factors were significant cardiovascular predictors for rural Thai women. Importantly, findings from this study showed that only a few of the physiological and behavioral risk factors considered to be CVD predictors for Western women were significant predictors of the severity of CVD in rural Thai women. These included high blood pressure, cigarette smoking, and physical inactivity.

Notably, this study is also the first study to examine psychological risk factors and contextual risk factors of CVD in rural Thai women. It was hypothesized that both psychological and contextual risk factors played an important role in contributing to CVD in rural Thai women due to their sociocultural and geographical environments. As expected, psychological stress was a unique predictor for CVD in rural Thai women. The contextual risk factors of income and poverty were also significant predictors of the severity of CVD in these women. However, depression and other contextual risk factors including distance and transportation to a hospital were not unique predictors of the severity of CVD among rural Thai women.

There were significant moderator effects between contextual risk factors and the classic major risk factors of elevated blood pressure, cigarette smoking, and high serum cholesterol in predicting the severity of CVD in rural Thai women. The significant moderator effects in this study included total cholesterol and family income, diabetes mellitus and distance to a hospital, BMI and transportation, menopause and family income, cigarette smoking and transportation, and depression and poverty. These findings
could be explained that some contextual risk factors had direct effect on CVD, but some had moderator effects with major risk factors (indirect effects) in predicting the severity of CVD in rural Thai women.

Discussion of Research Question One Results

Research Question One asked “What are the relationships among non-modifiable, modifiable, and contextual risk factors and the severity of CVD in rural Thai women?” The ensuing discussion will present result analyses for this question in regards to Non-modifiable risk factors, the modifiable risk factors in the form of physiological, psychological, and behavioral factors, as well as the contextual risk factors and coping.

Non-Modifiable Risk Factors and the Severity of CVD

Findings from this study demonstrated that age had a positive relationship, but family history had no relationship with the severity of CVD in rural Thai women. Findings from this study suggested that older women were more likely than younger women to have greater severity of CVD. This finding was consistent with previous reports where the increase risk for CVD continued sharply until the age of 60 to 65 years among women (AHA, 2006; Jousilahti, Vartiainen, Tuomilehto, & Puska, 1999; Mackay & Mensah, 2004). Also, previous studies in the Thai population also indicated that advancing age had a relationship with CVD (Pothiban, 2000; Tatsanavivat et al., 1998). This significant finding can be explained by the heart functions and advancing age. The heart tends not to work as well and its walls may thicken and arteries may stiffen and harden, making the heart less able to pump blood to the muscles of the body. Because of these changes, the risk of developing cardiovascular disease increases with age (Institute,
Thus, the older a person is, the more likely it is for the heart and blood vessels to be damaged.

Also age had inverse relationships with BMI, physical activity, and education levels. Data from this study indicated that rural Thai women, especially elderly women tended to have low weight, low physical activity and/or low education levels, possibly due to their culture and lifestyle. These women ate traditional local food, which consisted mainly of vegetables, thus they were less likely to be overweight or obese. Within the Thai culture, concern for the health of elderly individuals is prevalent. Old age is considered to be a time of well-deserved rest after a life of hard work and care for family members. As a result, older Thai women are encouraged to remain at home.

Furthermore, elderly women have very little formal education with the typical education level being akin to a 4th or 6th-grade level. Consequently, rural elderly women tend to have lower formal education levels and some of them were illiterate. The low formal-education level of the Thai women was likely due to several reasons, one of which was the male dominance of Thai society. Another reason was the influence of religion on the educational system. Since religion forbade women to approach monks or attend school, and it was the Buddhist monks who were the teachers, achieving a formal education was nearly impossible.

To re-iterate, findings from this study illustrate that older Thai women were more likely to have more severe CVD. Also, for the population studied, age was possibly combined with other risk factors, including physical inactivity, and low education levels, in relation to CVD.
Contrary to findings reported in prior studies (Grundy et al., 1999; Mackay & Mensah, 2004; McSweeney et al., 2003; Yusuf et al., 2001), results from this research indicate that having family history of CVD was not related to the severity of CVD although the prevalence of having family history of CVD in rural Thai women in this study was high (57.7%). The lack of relationship between family history and the severity of CVD in this study might be explained by the contribution of other pathological mechanisms to CVD. The genetic or familial effect most probably operates via several underlying pathological mechanisms and it is likely to be less important than the classic major risk factors such as elevated blood pressure, cigarette smoking, and high serum cholesterol (Jousilahti, Puska, Vartiainen, Pekkanen, & Tuomilehto, 1996). Also, however, family history by itself provided little information about the possible mechanism by which it might contribute to the risk of CVD. In this present study, another rationale for the insignificant result was limited information of family history of CVD in rural Thai women. Some of them did not know or were not accurate about their family history of diseases, in particular CVD. Further investigation is needed into the issue of family history of CVD and whether it is rated to the severity of CVD for women in rural Thailand.

**Modifiable Risk Factors (Physiological) and the Severity of CVD**

The relationship between high blood pressure and the severity of CVD was expected and consistent with previous reports where high blood pressure was a major risk factor for CVD in women. Evidence has indicated that high blood pressure increases the heart's workload, causing it to enlarge and weaken over time. It also increases the risk of
stroke, heart attack, kidney failure and congestive heart failure (AHA, 2006; Grundy et al., 1999; Mosca et al., 1997; Stamler, Stamler, & Neaton, 1993). Data from the study being reported on Thai women demonstrated that high blood pressure had relationships with diabetes and menopause. Thus, high blood pressure was an important risk factor for CVD in rural Thai women and the severity of CVD significantly increased in the women who had greater blood-pressure levels.

Contrary to previous research conducted in non-Thai populations, obesity indicated by BMI had an inverse relationship with the severity of CVD. This finding was expected since rural Thai women tended to have less obesity, had an active lifestyle and ate a healthy diet (Punyahotra & Street, 1998). Data from the present study on rural Thai women showed that most had a normal or lower-than-normal body weight (64.5%). Only 8.1% of rural Thai women were obese and the average BMI in these women was 23.5 kg/m², within the normal range of 18.5-24.9 for women. The low obesity rate, the low-to-normal body weight, and the normal BMI could be possible reasons for the lack of relationship between BMI and the severity of CVD in this study. Thus, obesity or overweight is probably not a significant risk factor in relation to the severity of CVD among rural Thai women. Other risk factors might play a role in contribution to CVD in these women.

Findings from this study also demonstrate that other physiological risk factors (the traditional risk factors identified for Western populations), which are total cholesterol, diabetes, and menopause, did not have direct relationships with the severity of CVD for rural Thai women. However, these risk factors had relationships with other
risk factors. For example, total cholesterol had a relationship with BMI; and, diabetes and menopause had relationships with high blood pressure. It is possible although total cholesterol, diabetes, and menopause did not have direct relationships with the severity of CVD, they might contribute to CVD through their relationships with other physiological risk factors such as high blood pressure and BMI.

_modified risk factors (behavioral) and the severity of CVD_

Cigarette smoking had a relationship with the severity of CVD in rural Thai women although smoking rate in these women was low. The result from this study indicated that rural Thai women who smoked were more likely to have more severe CVD. This finding supports previous reports (Goble, 2005; InterAsia, 2003; WHO, 2002b; Yusuf et al., 2001). Importantly, most of rural Thai women were non-smokers, but they were still at great risk for CVD. Second-hand smoking might be a possible reason for that occurrence since evidence showed that Thai men, particularly rural men, had a very high smoking rate. Smoking also had relationships with alcohol consumption, depression, education levels, and income. It is possible that rural Thai women who had depression and bad coping skills tended to smoke and use alcohol as their coping strategies. Cigarette smoking and alcohol consumption could double their risks for CVD. Rural Thai women with higher levels of education and income tended to smoke more than those with lower education and income. Thus, findings from this study suggest that cigarette smoking was a significant risk factor of CVD in rural Thai women because it had a strong relationship with CVD. Also, second-hand smoking, which has not been included in this study, could influence CVD in rural Thai women. Second hand smoking
should be considered in future research due to lack of information and examined whether it is associated with CVD in rural Thai women.

Data from this study demonstrate that physical activity had an inverse relationship with the severity of CVD. The negative relationship between physical activity and the severity of CVD in this study was expected. Although rural Thai women were physically active, of those who were less physically active were more likely to have more severe symptoms of CVD. These findings were consistent with previous studies (Grundy et al., 1999; Mackay & Mensah, 2004). Evidence also showed that regular physical activity prevents or delays the development of high blood pressure, and exercise reduces blood pressure in people with hypertension. Physical activity can also lower blood cholesterol levels which then decrease the risk of developing CVD (Garber, 1997; Grundy, 1998; Lee, Rexrode, Cook, Manson, & Buring, 2001; Li et al., 2006). Thus, less physical activity or physical inactivity is a significant risk factor related to the severity of CVD in rural Thai women.

Moreover, results from this study also indicated that physical activity had inverse relationships with age and depression, but had a positive relationship with education levels. As discussed previously, rural Thai women, who were older, were less likely to be physically active. This statement supports the inverse relationship between physical activity and age. The negative relationship between depression and physical inactivity can be explained by the effects of exercise or physical activity on depression. Some evidence suggested that exercise positively affects the levels of certain mood-enhancing neurotransmitters in the brain. Exercise also boosts feel-good endorphins, and reduces
levels of cortisol (stress hormone) (MFMER, 2005). Physical activity could promote health and reduce psychological problems, including depression. Moreover, rural Thai women who had higher levels of education tended to have more physical activity. It is possible that in general, people who have more education tend to have more health education, so they are more likely to practice health promotion behaviors such as exercise.

Thus, findings from this study suggest that physical inactivity is a significant risk factor since it had a relationship with the severity of CVD in rural Thai women. Rural Thai women, who were less physically active, tended to have more severity of CVD. Physical inactivity constitutes an independent target for intervention. Health care professionals should encourage rural Thai women to engage in an appropriate exercise regimen in order to promote their cardiovascular health.

Alcohol consumption had no relationship with the severity of CVD in rural Thai women. This is possibly due to the low prevalence of alcohol consumption among rural Thai women. Data from this study also support the previous study, which indicated that Thai women had much lower rate of alcohol consumption than Thai men (Chuprapawan, 2001). Similar to cigarette smoking, drinking alcohol in Thai women is not common. This is due to the Thai culture, which has a negative view of women who drink alcohol. Findings regarding the insignificant relationship between drinking and the severity of CVD from this study were both counter and consistent with previous reports. Some studies indicated that alcohol consumption had a relationship with CHD (Aekplakorn et al., 2003), but some claimed that the association between alcohol and CHD and mortality
was U-shaped: light to moderate alcohol consumption is protective while both non-drinkers and heavy drinkers have an increased risk. The benefit of light to moderate drinking may be confined to women above the age of 50 and those with other cardiovascular risk factors (AHA, 2006; Bittner, 2002). However, drinking is not encouraged as a strategy for reducing CVD risk due to the risks involved with alcohol use, including alcoholism, high blood pressure, stroke, cancer, liver disease, accidents, and fetal alcohol syndrome.

Alcohol consumption could be related to other risk factors for CVD in rural Thai women. Findings from this study show that alcohol consumption had relationships with age, cigarette smoking, depression, and poverty, which were significantly related to the severity of CVD. These findings illustrate that alcohol consumption may not be a major significant risk factor for CVD in rural Thai women, but it may contribute to CVD through its relationships with other significant risk factors including advancing age, smoking, and depression.

**Modifiable Risk Factors (Psychological) and the Severity of CVD**

Stress and depression have been documented as psychological risk factors for CVD in women. This assumption was based on studies conducted in other countries, in particular Western countries. As expected, the psychological risk factors, which were stress and depression, had positive relationships with the severity of CVD. These findings were consistent with previous studies (AHA, 2006; Appel et al., 2002; Bittner, 2002; Joynt, Whellan, & O'Connor, 2003; Kaplan & Keil, 1993; Mackay & Mensah, 2004; Macleod et al., 2002; Yusuf et al., 2001) and with the theories of stress and depression.
(Joynt et al., 2003; Rozanski et al., 1999; Selye, 1976). Also, consistent findings of the relationship between stress or depression and the severity of CVD in rural Thai women could be explained by the prevalence of stress and depression in these women.

Rural Thai women had high prevalence of stress and depression. Data from this study indicate that 44.9% rural Thai women were stressed. Some had a very high level of stress (10.7%). As well as, the prevalence of depression among these women was 45%, which is consistent with the previous study of depression in Thai women indicating that prevalence of depression in Thai women was 54.2% (Sangon, 2004). The possibility of high prevalence of stress and depression in rural Thai women might be due to their oppressive socio-cultural environments. Rural Thai women were expected to do multiple roles, including unpaid jobs such as housework, caregiver, work in their own field. Also, in general, rural dwellers are living under poverty (Gamm & Hutchison, 2003; Ricketts, 1999), so financial problems and poverty would impact rural Thai women as stressor life events. Data from this study also demonstrate that 47.7% of rural Thai women were impoverished. These findings are consistent with the study by Sangon (2004) conducted in Thailand regarding to stress life events indicated that Thai women had financial problems emerged as the most frequently reported stress life event. Thus, rural Thai women had high stress and depression due to their oppressive environments.

In addition, stress and depression also had relationships with other risk factors. For example, stress had a strong relationship with depression. This knowledge was consistent with many of previous studies (Brehm, 1998; Joynt et al., 2003). Stress also had inverse relationships with BMI, education levels, family income, and coping, but had
a positive relationship with distance to a hospital. Low SES might cause rural Thai women stress and depression. Also, data from this study show that most of rural Thai women had low levels of education. Eighty nine percent of them had less than high school education. Twenty two point eight percent were illiterate. Illiterate women tended to have low self-esteem and very little self-confidence in public, inhibiting their thinking and their perceptions. These probably cause rural Thai women are stress. The inverse relationship between stress and coping is well established (Lazarus, 1984). Rural Thai women who had poor coping skills were more likely to have high levels of stress.

Similar to stress, depression also had a relationship with other cardiovascular risk factors. Rural Thai women with depression tended to have less physical activity, low levels of education, and low income. An inverse relationship between depression and coping was significant since rural Thai women who had poor coping skills were more likely to have more depression. The positive relationship between depression and alcohol consumption could possibly be related to bad coping skills. Rural Thai women who had low coping skills tended to use alcohol to cope with their problems. Also, it is possible that rural context such as distance to a hospital might create depression for rural Thai women because a long distance makes difficulties and increases travel times for them to access health care facilities. Thus, the fact that rural Thai women are vulnerable to depression and that CVD is the leading cause of death among women.

Thus, findings from this study illustrate that stress and depression are significant risk factors for CVD in rural Thai women since they had a strong relationship with the severity of CVD. Also, both stress and depression may contribute to CVD through their
relationships with other cardiovascular risk factors including alcohol consumption, education levels, income, and distance to a hospital. Rural Thai women tended to have more stress based on their socialization and development become women. As priority, it is necessary to conduct an intervention to reduce stress levels and depression in rural Thai women in order to decrease the effects of stress or depression on their health, in particular cardiovascular health.

*Contextual Risk Factors and the Severity of CVD*

*Socioeconomic Status (SES)*

Importantly, data from this study demonstrate that both the SES variables of education level and family income had inverse relationships with the severity of CVD. These inverse relationships were consistent with previous studies (Kaplan & Keil, 1993). Low levels of formal education and family income in rural Thai women are significant since they have been linked to poor cardiovascular health. As well as, rural women who have low income were more likely to have more severe CVD because income provides access to goods and services, including quality education and medical care that may protect against disease. One possibility for the linkages between lower formal education level and lower income and increased CVD is that access to goods and services are usually limited with low income and low formal education. Knowledge that could protect against cardiovascular disease and medical care that can moderate CVD are therefore of limited availability to the women who participated.

Formal education level also had inverse relationships with other risk factors (age, stress, and depression) but had positive relationships with physical activity, family
income, and coping. As discussed earlier, an inverse correlation between educational level and age was true for elderly rural Thai women. Older Thai women would have been strongly affected by the Thai culture which, in the past, mainly encouraged and supported males in attending school-- not females. It was assumed a boy would ultimately become the family head and would need earning power to support his dependents.

Also, findings from this study demonstrate inverse relationships between SES and stress, as well as SES and depression. Possibly a greater potential for developing depression existed in lower social classes of the population studied due to increased adverse life experiences and the associated emotions of hopelessness and/or desperation. Poverty was another possible reason why rural Thai women developed stress or depression. Most of rural Thai women were living under the poverty line, thus they were more likely to develop stress or depression, which are in turn significant risk factors for CVD among these women.

The positive relationship between education levels and physical activity is also demonstrated in this study. This finding supports previous reports (Kaplan & Keil, 1993), which indicated that highest levels of education tended to be less overweight and were more physically active in leisure time. As mentioned previously, rural Thai women who have higher formal education tended to practice health promotion activities including exercise. Furthermore, data from this study indicate that education levels had positive relationships with family income and coping. Rural Thai women who had low level of school education were more likely to have less income and coping skills.
Therefore, findings from this study suggest that rural Thai women had a low level of SES, which was a significant factor in contributing to their CVD. Knowledge from this study is consistent with previous reports in which SES is inversely correlated to CVD in rural women. SES could have a direct relationship with CVD and might contribute to CVD through its relationships with other significant cardiovascular risk factors including age, smoking, physical inactivity, stress, and depression.

Rural Context

The other contextual risk factor in this study was rural context which influenced accessibility to healthcare. Variables examined included distance to a hospital, accessibility of transportation to hospital, and poverty. Interestingly, data from this study demonstrated that distance to a hospital and transportation to healthcare, did not have relationships with the severity of CVD in rural Thai women. It is possible that selection bias could have affected these findings. Rural Thai women who lived far from a hospital were unwilling to stay longer at the outpatient department in order to participate in the study due to the fact that they had to catch a bus which ran infrequently. Some communities had only one bus scheduled daily. Thus, the study lost some potential participants, who lived farther than 20 kilometers from a hospital. Because of the self-selection phenomenon which ensured most (79.2%) of the participants lived in close proximity to a hospital, the two rural context dimensions (distance to hospital and access to transportation to healthcare) might well have been affected.

Moreover, a majority (74.5%) of the participants in this study had personal transportation consisting of motorcycles and bicycles – forms of transportation that
would be inadequate in the crisis health situation of a heart attack or serious heart-related incident. If a heart-related incident arose and the participant needed emergency transportation, their recourse was to request that a neighbor or relative drive them to the hospital, thus making the participant an inconvenience, and making access to health care problematic for the participant. Therefore, distance and transportation to a hospital, were significant for rural Thai women’s health, especially cardiovascular health.

Although distance to a hospital or transportation were not significantly related to the severity of CVD, data from this study demonstrate relationships between distance to a hospital and other risk factors such as stress and depression. As explained above, the inconvenience of and problematic situation around securing transportation to a hospital might have resulted in increased stress and depression than those who lived closer. However, information regarding rural context in this study may be limited since there are several rural relation concepts such as isolation, definition of health, new comer, and old comer since evidence showed that these rural factors related to poor health of rural dwellers (Gamm & Hutchison, 2003). Future studies should examine these concepts which have not been included in this study and may be relevant to rural Thailand. Also, qualitative methods may be useful in order to get more in-depth and accurate information regarding rural context.

In addition, the relationship between poverty and the severity of CVD in rural Thai women was consistent with previous studies, in which poverty had been linked to the mortality and morbidity rates of CVD among rural populations (Appel et al., 2002; Gamm & Hutchison, 2003). Data from this study support the previous finding. Rural Thai
women in this study were impoverished (47.7%). This may be caused by limited employment, low income, and low levels of literacy, which make rural Thai women become impoverished. Thus, poverty is a significant risk factor in contribution to CVD among these women.

In conclusion, there are health disparities between people who live in urban areas and rural areas. These include, but are not limited to, the quality and quantity of health care services available as well as access to these facilities. Overall, rural Thai women were more likely than their urban counterparts to have difficulties related to their contextual variable -- specifically involving their socio-economic status (with its low formal education level and low family income) and their rural location which limited access and transportation to health care. Findings from this study suggest that distance and transportation to a hospital might not be the major risk factors of CVD in rural Thai women, but they possibly contributed to CVD through their relationships with other risk factors such as stress and depression. Also, poverty was shown to be a significant factor for rural Thai women and it had a strong relationship with the severity of CVD in these women.

**Coping and the Severity of CVD**

Findings from this study demonstrate that coping score did not have a relationship with the severity of CVD. However, three coping sub-scales, which were self-distraction, positive reframing, and acceptance sub-scales, had inverse relationships with the severity of CVD. An insignificant relationship between coping and the severity of CVD was probably due to a low reliability of the instrument measured coping, which was the Brief
COPE scale. The reliability of the total score was quite low; however the reliability of each sub-scale was high. Thus, this instrument should be appropriate to examine coping in rural Thai women. However, since two sub-scales of this instrument, which were active coping and religious practice had the lowest reliability. Therefore, this scale should be modified and re-tested again in rural Thai women or other population groups. Also, due to a low consistency of the tool, validity should be considered.

Although the overall reliability of the Brief COPE scale was low, there were significant results found in this study. Coping had inverse relationships with stress and depression, but a positive relationship with education levels. The inverse correlations between coping and stress or depression are certainly expected and can be explained by the theory of stress and coping by Lazarus and Folkman (1984). Good coping skills could change cognitive and behavioral efforts to manage specific external and internal demands that are appraised as taxing or exceeding the resources of the person, called stress. An impact of coping on depression was similar to that with stress since stress may cause depression in the end. Data from this study also demonstrate that stress had a strong relationship with depression. Therefore, coping could be seen as a moderator for stress and depression, which become the risk factors of CVD in rural Thai women.

Discussion of Research Question Two Results

Research Question Two asked “What are risk factors of CVD in rural Thai women?” As with Question One, results analyses are presented according to non-modifiable, modifiable, and contextual risk factors.
This study is the first to acknowledge that the severity of CVD in rural Thai women is caused by multiple risk factors. Interestingly, results from a multivariate investigation of cardiovascular risk factors demonstrate that all risk factors (non-modifiable, modifiable, and contextual) did influence the severity of CVD in rural Thai women. The physiological risk factor of high blood pressure and the behavioral risk factors of smoking and physical inactivity were significant predictors of the severity of CVD. Importantly, the psychological risk factor of stress was a unique predictor of CVD in rural Thai women. This finding is noteworthy since psychological risk factors such as stress have not been yet examined as major risk factors for CVD in the Thai population. The contextual risk factors of family income and poverty were unique predictors for the severity of CVD in rural Thai women. Discussion of these findings follows.

Non-Modifiable Risk Factors

Overall, when other risk factors were held constant and taken together, non-modifiable risk factors, which were age and family history of CVD, accounted for 6% in predicting the severity of CVD in rural Thai women. However, it is interesting that neither age nor family history was a unique predictor of the severity of CVD in rural Thai women. This finding may be different from previous studies, which indicated that both age and family history had effects on CVD (AHA, 2006; Grundy et al., 1999; HSFC, 2003; Mackay & Mensah, 2004; McSweeney et al., 2003). However, data from this study show that age was possibly a significant risk factor of CVD in rural Thai women since it had a relationship with the severity of CVD although the finding from the multivariate
analysis indicates that age was not a significant predictor in predicting the severity of CVD. A possible reason for this result was a small variation of age groups. As data from this study indicated, most of rural Thai women in this study were elderly. Thus, age could possibly influence CVD since it had a relationship with the severity of CVD, but this was not shown in this study when tested for in the multiple regression model.

In addition, data from this study demonstrate that family history of CVD might not be an independent risk factor of CVD in rural Thai women, although some previous studies from Western countries (McSweeney et al., 2003) indicated that familial history of CVD was a significant contributor to CVD in women. However, some evidence suggested that family history of CVD as an independent risk factor of CVD was inconclusive and controversial (Jousilahti et al., 1996). As mentioned previously, this study’s limited family history regarding CVD suggests that future research may need to assess more deeply family history including history of specific diseases and specific persons in the family, as well as whether or not (and to what degree) each historical, familial CVD factor may affect rural Thai women differently than other factors.

Modifiable Risk Factors

Physiological Risk Factors

Data from this study demonstrate that the overall model of physiological risk factors, which included high blood pressure, total cholesterol, diabetes, obesity, and menopause, had an effect on the severity of CVD in rural Thai women. They accounted for about 16% of the variance in predicting the severity of CVD. Among all physiological risk factors, high blood pressure was the one risk factor, which was useful for predicting
the severity of CVD in rural Thai women. This finding is consistent with previous reports (AHA, 2006; Grundy et al., 1999; InterAsia, 2003; Tatsanavivat et al., 1998) and can be explained by the pathophysiology of high blood pressure. Evidence have indicated that high blood pressure increases the heart's workload, causing the heart to thicken and stiffen. Also, high blood pressure increases the risk of heart attack or stroke (AHA, 2006). The prevalence of high blood pressure in the rural Thai women studied could be a reason for this significant result. However, data from this study demonstrated that the average blood pressure in rural Thai women with CVD was in the normal range, SBP 130 and DBP 79 mmHg. The seemingly normal blood pressure could possibly have resulted from the antihypertensive drugs which 63% of the sample population reported. However, the exact percentage is uncertain as some of the participants could not definitively declare whether they were or were not on such medication for blood pressure. Some participants in this study were referred by community hospitals and little information regarding medications was included on patient charts. Thus, in future research, other sources of information need to be assessed, e.g., information from the hospital system, dosage amounts and length of treatment time on antihypertensive drugs may be significant in terms of assessing high blood pressure as a cardiovascular risk factor since evidence showed that antihypertensive drugs could prevent cardiovascular mortality or major events.

In addition, data from this study show that high blood pressure had an inverse impact on the severity of CVD although there was a positive correlation between these two variables. A possible rationale is the phenomenon known as classical suppression
(Polit, 1996). In this case, high blood pressure was positively correlated with not only the severity of CVD, but also other physiological risk factors, which were diabetes, and menopause. Even though diabetes and menopause did not have relationships with the severity of CVD, having them in the equation raises the variance from what it would have been with just high blood pressure. In other words, high blood pressure had much more in common with the error variance in diabetes and menopause than it does with the good variance in the severity of CVD. However, high blood pressure shared some variance with the severity of CVD (Cohen & Cohen, 1983). Thus, high blood pressure was considered as the significant predictor of CVD in rural Thai women.

In contrast to previous studies, the physiological risk factors of elevated serum total cholesterol, diabetes mellitus, obesity, and menopause did not predict CVD in rural Thai women. While other studies from Western countries indicated that these cardiovascular risk factors were significant predictors for CVD in women (Grundy et al., 1999; Mackay & Mensah, 2004). Possible explanations for these different findings might be different culture and lifestyle between women from Western countries and rural Thai areas.

Data from this study demonstrate that rural Thai women had low levels of serum total cholesterol. This finding is consistent with previous studies of the low prevalence of high total cholesterol in all Thai women (InterAsia, 2003; Nillakupt et al., 2005). Rural Thai women especially those living in Northern Thailand generally eat healthy food such as vegetables or local produce and foods low in fat. The majority of them buy fresh food, meat, and vegetables from the nearest open market where local produce is sold. They also prepare food themselves and rarely buy ready-made food and usually eat only when they
are hungry rather than at pre-established times. This is probably a rationale for rural Thai women having low levels of serum cholesterol, which was not a significant predictor of the severity of CVD in rural Thai women. Thus, total cholesterol might not be a significant risk factor for CVD in rural Thai women. However, it is possible that total cholesterol interacts with other risk factors in predicting the severity of CVD in rural Thai women.

Diabetes was not a significant predictor of CVD. Data from this study indicate that 34.9% of rural Thai women have diabetes. As with the missing information on lipid profiles, diabetes mellitus in this study may have been under-estimated by the researcher because data on fasting blood glucose levels were missing or suspect. Physicians did not routinely perform a routine blood sugar check for all patients due to limited hospital budgets. Moreover, diabetes in this study was indicated by a self-report and from patient charts, neither of which may be accurate. It was also possible that additional medical information on the participants was filed separately in order to keep the patient files down to a manageable size. One more variable that could have affected the statistics on diabetes was the dichotomous nature of the self-reporting technique – participants could answer either “yes” (had diabetes) or “no” (no history of diabetes). Interval data, such as fasting blood glucose, might well have provided a different level of significance in the statistical tests run.

As expected, obesity was not a significant predictor of CVD in rural Thai women. Data from this study show that most of rural Thai women had normal weight and BMI. Many of the participants in the study were elderly, who were less likely to be obese in
general. For middle-aged women, the Thai lifestyle dictates that they are in agricultural careers and work side-by-side with their husbands in the field. In general, they have an active lifestyle and eat healthy diets (Punyahotra & Street, 1998). Thus, rural Thai women tended to be non-obese. Although rural Thai women are less likely to be obese, the morbidity of CVD was still high. Although rural Thai women are less likely to be obese, the morbidity of CVD was still high, possibly due to the fact that 54.4% and 10.1% of the sample participants were normal weight and underweight respectively. It is possible that low weight and low BMI are related to CVD. The result from this study was consistent with the prospective study of BMI, which demonstrated an increase of mortality due to coronary heart disease in women beginning at values of body mass index 22 kg/m² (Ashton, Nanchahal, & Wood, 2001). Thus, findings from this study suggest that obesity alone is probably not a significant predictor in contribution to CVD among rural Thai women. However, obesity together with other physiological risk factors play an important role in predicting the severity of CVD in these women.

In addition, it was hypothesized that menopause was a possible risk factor for CVD in rural Thai women. However, the finding from this study suggested that menopause might not be a significant predictor of CVD in these women. This finding was consistent with some previous reports, which indicated that although the adverse impact of menopause on cardiovascular risk factors was sufficiently documented, the relationship between menopause and cardiovascular morbidity and mortality remained controversial. Endogenous estrogen and testosterone levels do not seem to correlate with the severity of atherosclerosis or coronary events (Barrett-Connor, 1997). Further
investigation of the impact of menopause on CVD in rural Thai women is needed. Thus, menopause alone did not influence the severity of CVD. However, it contributed together with other risk factors in predicting the severity of CVD in rural Thai women.

Therefore, overall physiological risk factors of CVD did influence the severity of CVD in rural Thai women. Among this set of risk factors, the useful factor in predicting the severity of CVD was high blood pressure. Other physiological risk factors such as total cholesterol, diabetes, obesity, and menopause might have moderator effects with specific contextual risk factors that will be discussed in the Research Question Three.

**Behavioral Risk Factors**

Overall, behavioral risk factors, taken together, did influence the severity of CVD in rural Thai women. About 39% the variation in the severity of CVD in rural Thai women was explained by a set of behavioral risk factors. In terms of variables useful for predicting the severity of CVD in rural Thai women, cigarette smoking (previous smoking compared with non-smoking) and physical inactivity were the best predictors of the severity of CVD. However, alcohol consumption did not predict the severity of CVD among rural Thai women.

The significant finding regarding cigarette smoking was consistent with previous reports and can be explained by effects of cigarette smoking on vascular health. In women, the adverse impact of active smoking on cardiovascular disease and mortality is well documented, as is the rapid decline in cardiovascular risk after smoking cessation in all age and gender subgroups (Grundy et al., 1999; Mackay & Mensah, 2004). As discussed previously, due to the Thai culture, the prevalence of cigarette smoking was
much higher in rural Thai men than in rural Thai women. Interestingly, although rural Thai women have a lower rate of smoking, they are at great risk for CVD. Second-hand smoking could be a possible reason for that occurrence. When previous smokers and non-smokers were compared in this study, a history of previous smoking contributed more significantly to the severity of CVD than did a history of non-smoking. It is possible that, rural Thai women were told by their physicians to stop smoking after their diagnosis of CVD and/or they tended to quit smoking when they had more severe symptoms. Thus, cigarette smoking is a significant risk factor of CVD in rural Thai women and second-hand smoking should be considered as one of the risk factors in future research.

Another significant behavioral risk factor related to CVD in rural Thai women was physical inactivity. Data from this study demonstrated that physical inactivity was a unique predictor of the severity of CVD. This finding was consistent with findings from prior studies conducted on populations in various cultures, which indicated that both physical inactivity and lack of physical fitness strongly relate to cardiovascular endpoints and mortality in women (Mackay & Mensah, 2004). As mentioned previously, rural Thai women were physically active since their roles included not only homemaking but also working outside in agricultural fields. As part of their jobs, most of them were involved in vigorous and moderate activities. Although all the women participating in this study had high levels of physical activity, those who were less physically active tended to have more severe symptoms of CVD. This could be a rationale for the significant result of physical inactivity in predicting the severity of CVD.
However, most of rural Thai women, who had high levels of physical activities, were still at risk for CVD. This might be explained by previous reports which claimed that vigorous activity may not significantly reduce CVD among women. Although numerous studies in healthy populations and women with CHD indicated that vigorous physical activity improves CHD risk factors, recent observational data suggested that regular, moderate intensity activity may be sufficient to result in significant reductions in cardiovascular morbidity and mortality (Bittner, 2002; Lee et al., 2001). Moreover, the study by Lee et al (2001) clearly indicated that physically active women have lower CHD rates, but vigorous activities were not necessary for lower CHD rates. Among women who did not engage in vigorous activities, walking (a light- to moderate intensity activity, depending on pace) was associated with lower risk. These data from previous studies suggested that walking need not be fast-paced for benefit; time spent walking was more important than walking pace.

Therefore, overall behavioral risk factors, taken together had an effect on the severity of CVD in rural Thai women. Cigarette smoking and physical inactivity were the best predictors of CVD in these women. However, little is known about second-hand smoking and its contribution to CVD in rural Thai women, thus it is important to examine this factor in future research. In addition, vigorous physical activity may not be significant in reducing risks for CVD in rural Thai women. Moderate or brisk walking was probably significant. Physical inactivity constitutes an independent target for intervention. Health care professionals should encourage rural Thai women to engage in an appropriate exercise regimen.
Psychological Risk Factor

As expected, when examined together and with all other risk factors controlled, the psychological risk factors of stress and depression contributed to the severity of CVD. They accounted for 33.1% of the variance in the severity of CVD. However, only stress was useful in predicting the severity of CVD in rural Thai women. This finding is consistent with previous studies in Western countries (AHA, 2006; Appel et al., 2002; Bittner, 2002; Grundy et al., 1999; Joynt et al., 2003; Kaplan & Keil, 1993; Mackay & Mensah, 2004; Macleod et al., 2002; Rozanski et al., 1999; Yusuf et al., 2001), as well as with the theory of stress and CVD (Selye, 1976). Also, data demonstrated that rural Thai women had levels of stress due to their sociocultural environments. Rural Thai women were responsible for multiple roles and had an unequal position in the family. Evidence suggested that rural Thai women are regarded as the resource persons of the family and society and have multiple roles in the family (Puavilai & Stuifbergen, 2000). The role of women in Thai society is determined by custom and culture. The expectation in the traditional Thai family is that women will work in the home for example, taking care of family members, housework, and child rearing. While men work outside the home, earning an income and communicating with others in society. The husband assumes the role and status of leader. Patriarchy has traditionally been dominant in Thai society. Women have to do both housework and work outside the home. Thai women in rural areas mostly work as unpaid jobs such as housework, care taking of family members, and working in their own fields. As caregivers, a woman is expected to put everyone else except herself first. Even if these women have health problems, they are still expected to
be responsible for all other members of the family. As Punyahotra and Street (1998) indicated, Thai women experienced enormous social and economic pressures that force them to take on additional responsibilities, such as caring for aging parents or grandchildren, in addition to housework. Moreover, despite being the primary care taker of the household and children, women’s positions are not equal to men. A number of studies have found that women do not have an important role in the family and that they experience difficulties in making decisions about important family issues. These situations are readily found in rural areas where the traditional concept of family is dominant and a woman’s role is limited to fulfilling her responsibilities as wife and mother. This is consistent with findings from the previous research demonstrating an inverse association among SES, education, status in family, and health (Erci, 2003). Thus, from the above rationales, rural Thai women were prone to have stress which could negatively impact their cardiovascular health.

One unexpected finding of this study was the insignificance of depression as a predictor of CVD. One possible rationale for this could be due to a slight multicolinearity between stress and depression that made depression insignificant for the regression model. However, that unexpected result challenged assumptions about the significance of depression in contributing to the severity of CVD.

Therefore, psychological risk factors overall did influence the severity of CVD in rural Thai women. Stress was a unique predictor of the severity of CVD in rural Thai women. These women tended to have more stress and depression based on their socialization and development become women. They worked with multiple roles, which
were indicated by the Thai culture. As priority, it is necessary to conduct an intervention to reduce stress levels in rural Thai women in order to decrease the effects of stress on their health, in particular cardiovascular health.

*Contextual Risk Factors and Coping*

Overall contextual risk factors and coping were added into the model and held other risk factors constant, about 43% the variance in the severity was explained by the model. Of all these contextual risk factors, family income and poverty were significant predictors of the severity of CVD. These findings are consistent with previous reports, which indicated that contextual factors and coping might play a role in contributing to CVD among rural populations (Appel et al., 2002; Grundy et al., 1999; Kaplan & Keil, 1993). These results were expected since there were several reasons exist for the poorer health outcomes for rural Thai women. As discussed previously, low income and poverty might contribute rural Thai women to develop CVD because they were linked to accessibility to health care and quality of life. Health care access continues to be an important concern. Rural areas lag behind urban areas in health status and have had poorer quality of health care. Most small towns in the region have rural hospitals served by physicians in general practice and nurses who are considered generalists. For specialized services such as cardiovascular disease and cancer, however, referrals were made to the regional center. This is also true in rural Thailand. There are fewer physicians and nurses in general, as well as fewer family practice physicians, nurse practitioners, and specialists, especially cardiologists. Community hospitals could provide only fundamental care and treatments. They do not have capacity to provide
advance laboratory tests or physical examinations, especially for cardiovascular disease patients, thus those patients have been referred to a bigger hospital for further investigations and treatments. Thus, availability and accessibility to health care both have been considered as barriers for health of rural dwellers.

However, income and poverty had a strong relationship to each other. This is a possibility of multicolinearity, which implies that if there are significant predictor variables in the model, then the generalized variance of the significant predictor variables can be completely accounted for by less than significant orthogonal linear combinations of income and poverty. This can occur when one of the predictor variables in the model is an exact linear combination of one or more other predictor variables in the model. Thus, the coefficients may not be interpreted reliably, but the fitted values are not affected. Although there was a possibility of multicolinearity in the model, it may not affect the results if the study aims to predict the outcome (the severity of CVD), so the problem of multicolinearity can be less important. Thus, both income and poverty, which are important components of the risk factors for CVD in rural Thai women, are sustained as the predictor variables for the study model.

CVD is one of chronic illness that has been indicated with high prevalence among rural Thai women. SES and rural context might play a role in predicting the severity of CVD in rural Thai women. Compared to urban residents, rural people were not as healthy as and less likely than urban people to engage in preventive behaviors such as regular blood pressure checks, other physical check-up, or health promotion programs. Therefore, contextual risk factors should be considered as significant health disparity
issues and risk factors of CVD in rural Thai women. Decrease such health disparities would promote rural Thai women’s health, in particular cardiovascular health. Also, health promotion/prevention programs will be necessary for rural Thai women to reduce their risks for CVD.

Discussion of Research Question Three Results

Research Question Three asked, “What factors moderate or contribute indirectly to the severity of CVD in rural Thai women?”

Although physiological risk factors, including total cholesterol, diabetes, obesity, and menopause did not directly predict the severity of CVD in rural Thai women, they were together or had moderator effects with some contextual risk factors in contributing to the severity of CVD. These moderator effects included total cholesterol and high income, diabetes and distance to hospital, BMI and transportation, and menopause and high income. In addition, previous smoking together with transportation and depression together with poverty had moderator effects in predicting the severity of CVD. These findings support previous research findings that contextual risk factors might play a role in moderating major risk factors of CVD (Appel et al., 2002; Lazarus, 1984). Thus, findings from this study suggest that contextual risk factors, which are family income, distance to a hospital, transportation, and poverty, could moderate or have interaction effects with major risk factors in predicting the severity of CVD among rural Thai women.
Study Limitations

1. One limitation of this study was the sampling method and settings. A multi-staged sampling method was used for selecting the province and hospitals for this study. Due to the potential for limited data, four hospitals (one provincial and three community hospitals) were eliminated. Thus, five hospitals provided the research settings. In the designated hospitals level, all patients who met inclusion criteria were recruited. Random sampling was not feasible due to the small number of subjects; and, a selection bias was likely in that only those subjects willing to participate were included in the sample. These might cause systematic bias in selection of the study sample and limit the generalizability or external validity of the study findings. The study was also limited to a community-dwelling sample of rural Northern women, thus limiting the generalizability of the findings. Future research should examine a wider population of rural women in Northern Thailand.

2. Another limitation is that this study relied on cross-sectional data which could impede the determination of time-related relationships between study variables. It does not reflect the process of all risk factors contributing to CVD.

3. Substantial reliability was assumed to exist for the self-report data. Most notably it was assumed that the information recalled was accurate and unbiased.

4. The fourth limitation was a physical restriction in the form of visual ability. Some of the participants had extremely poor eyesight, so much so that the researcher needed to read the questionnaires for them.
5. Culturally, rural dwellers were uncomfortable about sharing their personal information, particularly in the face-to-face interview context. They tended to be more positive in order to “please” the researcher.

6. One of study instruments, the Thai-version of Brief COPE, had low reliability a potential threat to internal validity. Future studies should Modify and test some items in selected sub-scales.

Implications for Nursing Practice

Findings from this study illustrate the risk factors and the salient predictors of the severity of CVD in rural Thai women. Knowledge gained from this study is novel because previous studies have not examined or reported the predictors of CVD in rural Thai women. Knowing the relationship between non-modifiable, modifiable, and contextual risk factors and the severity of CVD helps health care professionals see that these women would benefit from culturally appropriate and relevant public health programs geared toward the prevention and treatment of those risk factors. Campaigns to raise awareness about CVD and its risk factors among rural Thai women are urgently needed. To be successful, these campaigns need to integrate the physiological, behavioral, psychological, and contextual domains. In addition, individual and community focused intervention needs to involve primary, secondary, and tertiary prevention through collaborative practice with all members of health care teams.

Recommendations for Future Research

Following are several recommendations for future research based on findings from this study. First, further investigation is needed to validate the current findings. Since the results demonstrated inter-correlations among the risk factors for CVD in rural
Thai women, CVD risk factors should be examined as multiple risk factors, rather than individuals. The present study did not look at the following important variables due to limited information: LDL-C, HDL-C, triglycerides, and second-hand smoking, as well as novel risk factors including C-reactive protein, homocystein, and other inflammatory markers. These should be examined in rural Thai women since they have been indicated as risk factors of CVD in women worldwide.

Second, since there are some limitations of the cross-sectional study, change over time could occur. Thus, longitudinal study of risk factors for CVD is needed in future research. Another suggestion is regarding generalizability. There is no absolute guarantee that the results obtained in a study will occur in every situation outside the study. One solution to this problem is to perform a greater number of observations, which could heighten generalizability. Further investigation with rural Thai women in other parts of Thailand may be helpful in terms of generalizability of the research findings. Also, different risk factors may exist between rural Thai women and urban Thai women, thus future studies to compare risk factors between those two groups could provide valuable information in conducting different interventions.

Third, intervention research is encouraged because the risk factors of CVD in rural Thai women have been indicated. Various intervention programs should be examined as to their appropriateness and effectiveness in reducing those risk factors.

Finally, measures of other rural context such as availability and accessibility of health care services should be considered in future research. Moreover, qualitative studies could prove to be more useful in assessing information about rural context in Thai population.
APPENDIX A: HUMAN SUBJECTS AND CONSENT FORM
12 January 2006

Saowapa Dedkhard, Ph.D. Student
Advisor: Amy Davis, Ph.D.
College of Nursing
PO Box 210203

BSC B06.12 RISK FACTORS OF CARIOVASCULAR DISEASE IN RURAL THAI WOMEN

Dear Ms. Dedkhard:

We received your research proposal as cited above. The procedures to be followed in this study pose no more than minimal risk to participating subjects and have been reviewed by the Institutional Review Board (IRB) through an Expedited Review procedure as cited in the regulations issued by the U.S. Department of Health and Human Services [45 CFR Part 46.110(b)(1)] based on their inclusion under research categories 4 and 7 (collection of data through noninvasive procedures and research on individual/group characteristics). Although full Committee review is not required, a brief summary of the project procedures is submitted to the Committee for their endorsement and/or comment, if any, after administrative approval is granted. In addition, as participant signatures are not culturally acceptable, waiver of documentation of informed consent is granted as it has met the requirement for a waiver as set forth in 45 CFR 46.117(c)(2) as the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. This project is approved effective 12 January 2006 for a period of one year.

The Human Subjects Committee (Institutional Review Board) of the University of Arizona has a current Federalwide Assurance of compliance, FWA00004218, which is on file with the Department of Health and Human Services and covers this activity.

Approval is granted with the understanding that no further changes or additions will be made either to the procedures followed or to the consent form(s) used (copies of which we have on file) without the knowledge and approval of the Human Subjects Committee and you College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

Sincerely yours,

Theodore Glattke, Ph.D.
Chairman
Social Behavioral Sciences Human Subjects Committee

TG:rd

Departmental/College Review Committee
SUBJECT'S CONSENT FORM

Project Title: Risk Factors of Cardiovascular Disease in Rural Thai Women

You are being asked to read the following material to ensure that you are informed of the nature of this research study and of how you will participate in it, so that you can know the nature and risks of your participation and can decide to participate or not participate in a free and informed manner.

PURPOSE
You are being invited to participate voluntarily in the above-titled research project. The purpose of this project is to examine the risk factors of cardiovascular disease in rural Thai women.

SELECTION CRITERIA
You are being invited to participate in this study because you are 35 years of age or older, live in a rural community and have been diagnosed with cardiovascular disease. Overall, one hundred forty two rural Thai women from six community hospitals and three provincial hospitals in Northern Thailand, will be invited to join this study.

ALTERNATIVE TREATMENTS
This is not a treatment study.

PROCEDURE(S)
If you agree to participate, you will be asked to consent to the following:
You will complete a set of questionnaires asking you about your personal data (e.g., age, marital status, education, etc.), health behavior, your physical activity, your stress and depression, your coping method(s), and your functional capacity based on your symptoms of cardiovascular disease. You will allow the researcher to measure your blood pressure, weight, height, waist and hip circumferences. You will also allow the researcher to review your patient chart. The study should take about 1 hour to complete.

RISKS
There are no known physical risks associated with participating in this study. Some participants may feel embarrassed about being weighed and measured waist and hip circumferences, the PI will weigh, measure waist and hip each person in a private room, where other people cannot see the actual weight, waist and hip circumferences. If the questionnaire on depression indicates that you are depressed, you will be referred to a clinic for follow-up care.

BENEFITS
There are direct benefits to you from your participation. They include blood pressure measurement and an obesity evaluation.

CONFIDENTIALITY

Version Date: January 1 2006 Page of 2 Subject’s Initials
Your participation in this study will be confidential. You will be assigned a code number. This code will appear on all paperwork for the study to identify your questionnaires and records. Your name will be removed from all forms and questionnaires and only the PI will know your name and number. The subject consent form with your signature will be kept in a locked filing cabinet, separate from the questionnaires.

PARTICIPATION COSTS AND SUBJECT COMPENSATION
There is no cost to you for participating except your time. You will receive a small gift as a token of appreciation.

CONTACTS
You can obtain further information from the principal investigator, Saowapa Dedkhard, Ph.D. Candidate at 66-54-522-430. 71 M. 12 T. Wiang Tong, Soong-men district, Phrae 54000. If you have questions concerning your rights as a research subject, you may contact the University of Arizona Human Subjects Committee Office at 001-520-626-6721 or contact them by mail at 1350 N. Vine, Tucson, AZ 85724.

AUTHORIZATION
Before giving my consent the methods, inconveniences, risks, and benefits have been explained to me and my questions have been answered. I may ask questions at any time and I am free to withdraw from the project at any time without causing bad feelings. My participation in this project may be ended by the investigator for reasons that would be explained. New information developed during the course of this study which may affect my willingness to continue in this research project will be given to me as it becomes available. This consent form will be filed in an area designated by the Human Subjects Committee with access restricted by the principal investigator, Saowapa Dedkhard, Ph.D. Candidate or authorized representative of the University of Arizona College of Nursing Department. A copy of this signed consent form will be given to me.

INVESTIGATOR'S AFFIDAVIT:
Either I have or my agent has carefully explained to the subject the nature of the above project. I hereby certify that to the best of my knowledge the person who signed this consent form was informed of the nature, demands, benefits, and risks involved in his/her participation.

______________________________   ____________________
Signature of Investigator       Date

Version Date: January 11, 2006
Subject's Initials
แบบฟอร์มการยืนยันเข้าร่วมการวิจัย

ขั้นตอน ปัจเจกส่งต่อการติดต่อโรคหวัดและลดผลเสียในผู้มีโรคที่อักเสบในเขตบ้าน

ท่านลูกจ้างฝ่ายแพทย์ที่มีปัญหาต่อท่านได้รับทราบถึงระบาดของโรคหวัด และ ท่านจะมีส่วนร่วมในการวิจัยเกี่ยวกับโรค หากท่านลูกจ้างฝ่าย
เข้าร่วมการวิจัยครั้งนี้ ท่านยินยอมที่จะมีการระบาดของโรคหวัดไปในระหว่างการวิจัยครั้งนี้ได้ การท่านจะต้องเข้าร่วมการวิจัยและมีการตัด
อันแน่นอนที่จะเกิดการระบาดในกลุ่มว้า ท่านจะต้องทราบข้อมูลและอินชีนั่งเข้าร่วมการวิจัยตามระเบียบการ และหากมีข้อสงสัยว่าท่านต้องมี
ความเสี่ยงที่จะเกิดการระบาดเข้าร่วมการวิจัยดังกล่าว

วัตถุประสงค์

ท่านมีความยินดีเข้าร่วมการวิจัยในนั้นหาข้อมูลเพื่อว่าระบาดของโรคหวัดและลดผลเสียในกลุ่ม
ผู้มีโรคที่อักเสบในเขตบ้านของประชาชนของประเทศไทย

ดูเหมือนว่าผู้เข้าร่วมการวิจัย

ท่านร่วมการวิจัยภายในเวลาต้องอยู่ในวัย 18 ปี ขึ้นไป ไม่ว่าจะอยู่ในเขตบ้านและได้รับการตรวจโรคติดเชื้อโรคหวัด กลุ่มด้วยการที่มีการวิจัยครั้งนี้
จำนวน 108 คน ที่โดยถูกต้องตามข้อกำหนดในการวิจัยครั้งนี้

การวิจัยครั้งนี้ได้เป็นการกระทำตามข้อตกลงใด

ข้อตกลงการวิจัย

สำหรับเข้าร่วมการวิจัยครั้งนี้ ท่านยินยอมที่จะให้ท่านลงนามจดความตกลง 6 ฉบับ แบบสอบถามประกอบด้วยแบบสอบถามเกี่ยวกับข้อมูลโดยปกติ (ชื่อ
ของ สถานะ สถานะทางสุขภาพ การศึกษา และ อื่นๆ) หรือการตรวจวิเคราะห์ ความเสี่ยง การป้องกันโรค วิเคราะห์การระบาด
และ อาการที่เกิดขึ้นกับโรคหวัดและลดผลเสียที่เกิดขึ้นได้ มี ท่านอนุญาตให้ใช้ข้อมูลในการวิจัยเพื่อการวิจัยอย่าง
รวดเร็วและผลิตภัณฑ์ เพื่อประเมินความเหล่าที่เกิดขึ้น โดยท่าน ท่านยินยอมพูดคุยและมีการแสดงอาการของโรค ที่ท่านผู้เข้าร่วมการวิจัย ที่ท่านจะต้องมิติดตาม
ความที่เกิดขึ้น

ความเมื่อย

การเข้าร่วมในวิเคราะห์ครั้งนี้ไม่ผิดกฎหมายใดๆ ผู้เข้าร่วมการวิจัยจะห้ามการวิจัยดังกล่าวโรคหวัด และวิเคราะห์และ
ระบาดของโรคที่เกิดขึ้น

ประวัติที่ได้รับ

ท่านได้รับประโยชน์จากการเข้าร่วมการวิจัยครั้งนี้โดยท่านได้รับการicercaเรื่องโรค และประเมินอาการของตัวเอง
การรับรองข้อมูลเป็นความถูกต้อง

การเข้าร่วมการวิจัยดังกล่าวมีการตั้งค่าในการสอบคุณลักษณะของผู้เข้าร่วม การให้ความรู้เกี่ยวกับข้อมูลของผู้เข้าร่วมการวิจัย แนวคิดและวิธีการทำงาน ผู้เข้าร่วมการวิจัยจะต้องมีความเข้าใจและสามารถดำเนินการ แบบฟอร์มการรับเอ็นดูวันวิจัยที่จะถูกแก้ไขไว้ในสูตรที่มีผลรวมและแยกจากแบบสอบถาม ข้อมูลทั้งหมดของผู้เข้าร่วมการวิจัยถูกชุดและถูกแบบโดยผู้ที่บันทึกผล และ ระบุกับในวันที่ 1 ปี หลังจากที่ข้อมูลส่งกลับจะถูกย้อม

คำแนะนำในการเข้าร่วมการวิจัย

ท่านจะไม่ได้รับสิทธิในการเข้าร่วมการวิจัยครั้งนี้ เนื่องจากใช้วิธีการที่ไม่ให้ข้อมูล ท่านจะได้รับข้อมูลการเข้าร่วมการยินยอมสำหรับการร่วมการวิจัยในครั้งนี้

ข้อมูลเกี่ยวกับ

ท่านสามารถขอข้อมูลเพื่อด้วยที่ นาง เสาวลี ติวิจาร์ (ราชกกิจกรรจก) ที่ โทรศัพท์ 084-511-2121 ที่ 2 หรือ 11 หมายเลขทาง อีเมล support@university.com และว่าที่สำนักงานที่มีที่ตั้งที่ติดต่อท่านในฐานะผู้เข้าร่วมการวิจัย ท่านสามารถติดต่อมหาวิทยาลัย Picasso ในที่อยู่ที่ University of Arizona Human Subjects Committee Office at 001-520-626-6721 or 1350 N. Vine, Tucson, AZ 85724.

การยินยอม

ก่อนที่จะยินยอมเข้าร่วมการวิจัยนี้ ท่านจะได้รับข้อมูลวิธีการดำเนินการวิจัย ความไม่ระบาย ความเสี่ยงที่อาจเกิดขึ้น และผลตอบแทนที่จะได้รับจากการเข้าร่วมวิจัยนี้ ท่านอาจไม่รู้จักหรือไม่รู้จักกับผู้ที่ดำเนินการวิจัยได้ตลอดเวลา และข้าพเจ้าสามารถที่จะยินยอมในการเข้าร่วมการวิจัยที่จะได้รู้จะไม่เกิดผลกระทบใดๆ กับข้าพเจ้า ผู้ดำเนินการวิจัยสามารถติดต่อกับข้าพเจ้าในการเข้าร่วมการวิจัยโดยใช้ที่อยู่ที่ติดต่อข้าพเจ้า หากมีการปรับเปลี่ยนขั้นตอนการวิจัยใดๆ ข้าพเจ้าจะต้องแจ้งให้ข้าพเจ้าทราบ เบื้องต้น การปรับเปลี่ยนจะเกิดขึ้นไม่ทันท่วงทีและผลจะต้องส่งผู้ที่ยินยอมในการวิจัย ท่านสามารถติดต่อข้าพเจ้าได้ที่ นาง เสาวลี ติวิจาร์ ที่ โทรศัพท์ 084-511-2121 หรือ e-mail ที่ support@university.com หรือ ที่อยู่ที่ติดต่อท่านในฐานะผู้เข้าร่วมการวิจัย

คำรับรองของผู้ดำเนินการวิจัย

ท่านเข้าร่วมงานของข้าพเจ้าได้รับข้อมูลขั้นตอนการวิจัยที่ถูกต้อง ข้อมูลที่ถูกต้องเรียบร้อยไว้ในข้อมูลของผู้เข้าร่วมการวิจัยที่ถูกย้อมและถูกย้อมจากการเข้าร่วมการวิจัยในครั้งนี้

[ลายมือผู้ดำเนินการวิจัย]

วัน เดือน ปี
APPENDIX B: INSTRUMENTS

Subject’s number [ ][ ][ ]
Date ____________________
Hospital __________________

The Personal Information Questionnaire

1. Date of Birth (day/month/year): ________________________

2. Martial Status:
   (1) _____ Single
   (2) _____ Married
   (3) _____ Divorced/Separated
   (4) _____ Widowed

3. How many members in your family? ________ person (s)

4. Levels of formal education:
   (1) _____ Pre-primary education
   (2) _____ Primary education
   (3) _____ Junior high school
   (4) _____ High school
   (5) _____ Associate Degree or higher

5. Family income (per month):
   (1) _____ ≤ 3,000 Baht/month
   (2) _____ 3,001 – 7,000 Baht/month
6. Family history of CVD (please indicate disease and person(s)): ____________

(1) _______ Yes (2) _______ No (skip to No. 7) [ ]

If yes, please check the disease and indicate the person(s) below

(1) _______ Heart disease, please indicate who _____________________
(2) _______ Stroke, please indicate who ___________________________
(3) _______ Hypertension, please indicate who _____________________
(4) _______ Others, please indicate which disease and who ____________ [ ]

7. Personal history of illness (diabetes, hypertension, or CVD)

(1) _______ Yes (2) _______ No (skip to No. 8) [ ]

If yes, which disease have you been diagnosed and which year you were diagnosed.

(1) _______ Heart disease, year _____________________
(2) _______ Stroke, year _____________________________
(3) _______ Hypertension, year _________________________
(4) _______ Others, please indicate disease and year _______________ [ ]

8. Are you smoking? (1)____ Yes (2)_____ No (skip to # 9) [ ]

If yes, how long have you smoked? ________________ [ ]

How many cigarettes do you smoke a day? __________ [ ]
9. Are you drinking alcohol? _____Yes _____No (skip to # 10)  

   If yes, what kind of alcohol do you drink?
   1) _______ Thai Alcohol (35 degree)
   2) _______ Whisky
   3) _______ Beer
   4) _______ Satoh (Thai traditional alcohol)
   5) _______ Others, please indicate ___________

10. First day of last menstrual period ___________________

11. Do you have any symptoms below? (Check all applicable):
   (1) _______Yes (2) _______No (skip to No. 12)
   1) _______Hot flashes
   2) _______Day/night sweats
   3) _______Irritability
   4) _______ Sleepless
   5) _______ Others, please indicate ___________

12. How far from your house to the hospitals?___________ km
13. What kind of transportations do you use for traveling to the hospitals?

1) _______ Personal transportation (e.g. driving or having family members, friends, or relatives who provide transportations)  
2) _______ Paid transportation (any transportation that you ask for picking up and pay for it)  
3) _______ Public transportation  

If you choose # 3 (public transportation), how many schedules a day? _______  

14. Do you have health insurance? (1) ____Yes (2) _____No  

If yes, please indicate the health insurance plan you have:  

1) _______ Public assistance program  
2) _______ Civil servant medical benefit scheme  
3) _______ Compulsory health insurance  
4) _______ Voluntary health insurance  

15. Are you using pesticides? ____Yes ______No  

If yes, what kind of alcohol do you drink?  

1) _______ Never  
2) _______ Used to  
3) _______ Less than once a month  
4) _______ More than once a month
แบบสอบถามข้อมูลส่วนบุคคล

1. วัน เดือน ปี เกิด ของท่าน: ____________________________ [ ] 4

2. สถานภาพสมรส:
   (1) _____ โสด
   (2) _____ แต่งงาน
   (3) _____ หย่า หรือ แยกกันอยู่
   (4) _____ หม้าย [ ] 5

3. จำนวนสมาชิกในครอบครัวท่านมีกี่คน? __________ คน [ ] 6

4. ระดับการศึกษาสูงสุดของท่านคือ:
   1) _______ ประถมศึกษาตอนต้น (ป. 4)
   2) _______ ประถมศึกษาตอนปลาย (ป. 6)
   3) _______ มัธยมศึกษาตอนต้น (ม. 3)
   4) _______ มัธยมศึกษาตอนปลาย (ม. 6)
   5) _______ อนุปริญญา (ปร.) หรือ ปริญญาตรี (ปร. ปริญญาตรี หรือ ปริญญาโท) [ ] 7

5. รายได้ของครอบครัวท่าน (ค้อยเดือน)
   (1) _______ ≤ 3,000 บาท
   (2) _______ 3,001 – 7,000 บาท

ผู้ป่วยหมายเลข [ ][ ][ ]
วัน เดือน ปี __________________
โรงพยาบาล __________________

แบบสอบถามข้อมูลส่วนบุคคล

1. วัน เดือน ปี เกิด ของท่าน: ____________________________ [ ] 4

2. สถานภาพสมรส:
   (1) _____ โสด
   (2) _____ แต่งงาน
   (3) _____ หย่า หรือ แยกกันอยู่
   (4) _____ หม้าย [ ] 5

3. จำนวนสมาชิกในครอบครัวท่านมีกี่คน? __________ คน [ ] 6

4. ระดับการศึกษาสูงสุดของท่านคือ:
   1) _______ ประถมศึกษาตอนต้น (ป. 4)
   2) _______ ประถมศึกษาตอนปลาย (ป. 6)
   3) _______ มัธยมศึกษาตอนต้น (ม. 3)
   4) _______ มัธยมศึกษาตอนปลาย (ม. 6)
   5) _______ อนุปริญญา (ปร.) หรือ ปริญญาตรี (ปร. ปริญญาตรี หรือ ปริญญาโท) [ ] 7

5. รายได้ของครอบครัวท่าน (ค้อยเดือน)
   (1) _______ ≤ 3,000 บาท
   (2) _______ 3,001 – 7,000 บาท
(3) _______ ≥7,000 บาท

6. ครอบครัวท่านมีประวัติโรคหัวใจและหลอดเลือด (โรคหัวใจทุกประเภท หรือโรคความดันโลหิตสูง) หรือไม่?

(1) _______ มี (2) _______ ไม่มี (ซ้ำไปข้อ 7)

ถ้ามี กรุณาระบุ บุคคล และ โรค ที่เป็น (เช่น พ่อ เป็น โรคหลอดเลือดหัวใจบิด)

(1) _______ โรคหัวใจทุกชนิด โปรดระบุ บุคคล และ โรค
(2) _______ โรคหลอดเลือดสมอง โปรดระบุ บุคคล และ โรค
(3) _______ โรคความดันโลหิตสูง โปรดระบุ บุคคล และ โรค
(4) _______ โรคอื่นๆ โปรดระบุ บุคคล และ โรค

7. ประวัติการเจ็บป่วยของท่าน

(1) _______ มี (2) _______ ไม่มี (ซ้ำไปข้อ 8)

ถ้ามี กรุณาระบุ โรคที่เป็น และปี พ.ศ.

(1) _______ โรคหัวใจทุกชนิด ตั้งแต่ปี พ.ศ.
(2) _______ โรคหลอดเลือดสมอง ตั้งแต่ปี พ.ศ.
(3) _______ โรคความดันโลหิตสูง ตั้งแต่ปี พ.ศ.
(4) _______ โรคอื่นๆ ตั้งแต่ปี พ.ศ.

8. ท่านสูบบุหรี่หรือไม่?

(1) _______ สูบ (2) _______ ไม่สูบ (ซ้ำไปข้อ 9)

ถ้าสูบ ท่านสูบบุหรี่มาตั้งแต่ปี _______

วันและกี่มวน? ____________________________
9. ทานเครื่องดื่มที่มีแอลกอฮอล์หรือไม่ (เหล้า เบียร์ สาโท หรือ ไวน์)?

(1) _____ ดื่ม (2) _____ ไม่ดื่ม (ข้ามไปข้อ 10)  [ ]

ถ้าดื่ม โปรดระบุชนิด

1) _____ สุราไทย 35 ดีกรี
2) _____ เหล้าอื่นๆ
3) _____ เบียร์
4) _____ สาโท
5) _______ อื่นๆ โปรดระบุ [ ]

ปริมาณที่ดื่ม ต่อวัน แต่ละชนิด [ ]

10. วันแรกของประจุกเดือนครั้งสุดท้าย (วัน เดือน ปี) [ ]

11. ปัจจุบันท่านมีอาการต่างๆเหล่านี้หรือไม่ (ตอบได้มากกว่า 1 ข้อ):

(1) _______ มี (2) _______ ไม่มี (ข้ามไปข้อ 12)  [ ]

ถ้ามี โปรดระบุ

1) _______ รูปแบบตามลำดับ
2) _______ เหงื่อออกมากเกินไปจากกลางวัน หรือ กลางคืน
3) _______ หงุดหงิด ฉุนเฉียวง่าย
4) _______ นอนไม่ค่อยหลับทั่วไปกลางคืน
5) _______ อื่นๆ โปรดระบุ [ ]

12. ระยะทางระหว่างบ้านถึงสถานบริการสุขภาพ เช่น โรงพยาบาล  กี่กิโลเมตร [ ][ ][ ]

24-26
13. ท่านเดินทางมาโรงพยาบาล ด้วยวิธีใด?

(1) _______ รถส่วนตัว หรือ ญาติพี่น้องมาส่ง

(2) _______ รถรับจ้าง (ว่าจ้างให้ รับ-ส่ง)

(3) _______ รถโดยสารประจำทาง (รถสองแถว รถเมล์)

โปรดระบุจำนวนเที่ยวของรถโดยสาร? _______ เที่ยว ต่อ วัน

14. ท่านมีประกันสุขภาพหรือไม่ ถ้ามีโปรดระบุประเภท?

(1) _____ มี

(2) ______ ไม่มี

ถ้ามี โปรดระบุ

(1) ______ บัตรสุขภาพ หรือ บัตรทอง 30 บาท

(2) _______ สิทธิ์การรักษา อย่างเจ้าหน้าที่ รัฐวิสาหกิจ

(3) _______ บัตรประกันสังคม

(4) ________ อื่นๆ โปรดระบุ

16. ท่านใช้ยาฆ่าแมลงหรือยาปราบศัตรูพืชหรือไม่?

(1) _______ ไม่เคยใช้

(2) _______ เคยใช้แต่หยุดใช้แล้ว

(3) ________ ยังใช้อยู่ แต่นานๆครั้ง (น้อยกว่าเดือนละครั้ง)

(4) ________ ยังใช้อยู่ประจำ (มากกว่าเดือนละครั้ง)
International Physical Activity Questionnaire (IPAQ)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
   
   _____ days per week
   
  ☐ No vigorous physical activities ➔ Skip to question 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?
   
   _____ hours per day
   _____ minutes per day
   
  ☐ Don’t know/Not sure

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
   
   _____ days per week
   
  ☐ No moderate physical activities ➔ Skip to question 5
4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day
_____ minutes per day

☐ Don’t know/Not sure

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_____ days per week

☐ No walking  ➔ Skip to question 7

6. How much time did you usually spend walking on one of those days?

_____ hours per day
_____ minutes per day

☐ Don’t know/Not sure

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a week day?

_____ hours per day
_____ minutes per day

☐ Don’t know/Not sure

This is the end of the questionnaire, thank you for participating.
แบบสอบถามการเคลื่อนไหวร่างกายนานาชาติ

เราสนใจศึกษาการเคลื่อนไหวร่างกายในรูปแบบต่างๆ ที่ทำปฏิบัติในชีวิตประจำวัน ต่อมาดังนี้จะถามท่านเกี่ยวกับเวลาที่ท่านมีกิจกรรมการเคลื่อนไหวร่างกาย อย่างหนักหน่วง ไม่น้อยกว่า 7 วันที่ผ่านมา กรุณาตอบต่อมา.

1. ในช่วง 7 วันที่ผ่านมา มีกี่วันที่ท่านได้มีการเคลื่อนไหวร่างกายอย่างหนัก เช่น ยกของหนัก ขุดดิน การก่อสร้าง หรือการขึ้นบันได (กรุณาบอกถึงเฉพาะการเคลื่อนไหวร่างกายที่ท่านทำอย่างน้อย 10 นาที)

_________________ วันต่อสัปดาห์
_________________ ไม่มีการเคลื่อนไหวร่างกายอย่างหนัก (ข้ามไปข้อ 3)

2. ตามปกติท่านใช้ขั้นตอนเท่าใดในวันหนึ่งในการเคลื่อนไหวร่างกายอย่างหนักในช่วง 7 วันที่ผ่านมา

_________________ ขั้วโมงต่อวัน
_________________ นาทีต่อวัน

ให้ท่านนี้อธิบายเกี่ยวกับประการสำคัญที่ท่านทำปฏิบัติในช่วง 7 วันที่ผ่านมา กิจกรรมที่ท่านทำ ประการสำคัญตามลำดับ หมายถึง กิจกรรมที่ใช้ความพยายามทางกายประการสำคัญและทำให้ท่านหายใจเร็วลงระดับปกติ ให้เน้นถึงเฉพาะกิจกรรมที่ท่านทำอย่างน้อย 10 นาทีในแต่ละครั้ง.
3. ในช่วง 7 วันที่ผ่านมา มีกี่วันที่ท่านได้มีการเคลื่อนไหวทางร่างกายระดับปานกลาง เช่นยกของเบาๆ ปั๊มนิ้ว ฯลฯ

ไม่เร็วมาก เป็นต้น กิจกรรมดังกล่าวไม่รวมถึงการเดิน

___________ วันต่อสัปดาห์

___________ ไม่มีการเคลื่อนไหวงานระดับปานกลาง (ข้ามไปข้อ 5)

4. ตามปกติแล้ว ท่านใช้เวลาท่านที่อยู่ในการทำกิจกรรมระดับปานกลางในหนึ่งวันของสัปดาห์ที่ผ่านมา

___________ ชั่วโมงต่อวัน

___________ นาทีต่อวัน

☐ ไม่ทราบ/ไม่แน่ใจ

ให้นำ 정보มาใช้ในการเดินในช่วง 7 วันที่ผ่านมา ซึ่งรวมถึงที่ทำงาน และที่บ้าน การเดินทางโดยการเดินจากที่หนึ่งไปยังอีกที่หนึ่ง และกิจกรรมการเดินอื่นๆที่ท่านทำเพื่อป้องกันหุ้นใจ กีฬา ออกกำลังกาย หรือ ในยามว่าง

5. ในช่วง 7 วันที่ผ่านมา มีกี่วันที่ท่านเดินอย่างน้อย 10 นาทีในแต่ละครั้งของการเดิน

___________ วันต่อสัปดาห์

☐ ไม่ได้เดิน (ข้ามไปข้อ 7)

6. ตามปกติท่านใช้เวลาในการเดินนานเท่าไหร่ในหนึ่งวันของสัปดาห์ที่ผ่านมา

___________ ชั่วโมงต่อวัน

___________ นาทีต่อวัน

☐ ไม่ทราบ/ไม่แน่ใจ
คำถามข้อสุดท้ายจะเกี่ยวกับเวลาที่พักนั่งในช่วงวันระหว่างสัปดาห์ที่ผ่านมา (ไม่รวมวันเสาร์และอาทิตย์)
รวมถึงเวลาที่ใช้ในการนั่งในที่ทำงาน ที่บ้าน ระหว่างการพักผ่อน ทั้งนี้อาจรวมถึงเวลาที่นั่งกับโต๊ะ การไปเยี่ยมเพื่อน การอาบน้ำ หรือ การนั่ง หรือนอนดูทีวี

7. ในช่วง 7 วันที่ผ่านมา พักผ่อนที่อาศัยอาศัยในช่วงวันระหว่างสัปดาห์

__________________ ชั่วโมงต่อวัน
__________________ นาทีต่อวัน

☐ ไม่ทราบ/ไม่แน่ใจ

แบบสอบถามเพียงหน้านี้ ขอบคุณในความร่วมมือ
แบบประเมินและวิเคราะห์ความเครียดด้วยตนเอง
กรมสุขภาพจิต กระทรวงสาธารณสุข

ในระยะ 2 เดือนที่ผ่านมา ท่านมีอาการ พฤติกรรม หรือความรู้สึกต่อไปนี้มากน้อยเพียงใด
โปรดขีดเครื่องหมาย X ลงในช่องแสดงระดับอาการที่เกิดขึ้นกับตัวท่านตามความเป็นจริงมากที่สุด

<table>
<thead>
<tr>
<th>อาการ พฤติกรรม หรือ ความรู้สึก</th>
<th>ระดับอาการ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1. นอนไม่หลับเพราะคิดมากหรือกังวลใจ</td>
<td></td>
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<tr>
<td>2. รู้สึกจุกจุ้นง่วง ร้าวทารา</td>
<td></td>
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<tr>
<td>3. ทำอะไรไม่ได้เลย เพราะประสบความรู้สึก</td>
<td></td>
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<tr>
<td>4. มีความรู้สึกว่าหายใจ</td>
<td></td>
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<tr>
<td>5. ไม่ออกอากาศประจุค้น</td>
<td></td>
</tr>
<tr>
<td>6. ปวดหัวข้างเดียว หรือปวดบริเวณขมับทั้งสองข้าง</td>
<td></td>
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<tr>
<td>7. รู้สึกไม่มีความสุข และเศร้าหมอง</td>
<td></td>
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<tr>
<td>8. รู้สึกเหงาในชีวิต</td>
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<tr>
<td>9. รู้สึกชีวิตไม่มีความคุ้มค่า</td>
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<tr>
<td>10. ภูมิทัศน์อยู่ด้วยกัน</td>
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<tr>
<td>11. รู้สึกเหงาในชีวิต</td>
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<tr>
<td>12. รู้สึกเหงาในชีวิต</td>
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<tr>
<td>13. รู้สึกเหงาในชีวิต</td>
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<tr>
<td>14. มีอาการห่วงใยตื่นเต้น</td>
<td></td>
</tr>
<tr>
<td>15. เลี่ยงสัมผัส ปากสั่นหรือมือสั่นไม่ทรงตัว</td>
<td></td>
</tr>
<tr>
<td>16. รู้สึกลักษณะการกระทำสั่งต่างๆ</td>
<td></td>
</tr>
<tr>
<td>17. ปวดหรือกลืนดันเมื่อปรับรับระหว่างที่นอน หลัง หรือก่อน</td>
<td></td>
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<tr>
<td>18. ขึ้นเตียงกับเหยื่อการนอนที่ไม่คุ้มค่า</td>
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</tr>
<tr>
<td>19. มีอาการหรืออาการเสริม</td>
<td></td>
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<tr>
<td>20. ความสุขทางเพศลดลง</td>
<td></td>
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</tbody>
</table>
The Center for Epidemiologic Studies Depression Scale (CES-D)

(Randoff, 1977)

Below is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past week:

<table>
<thead>
<tr>
<th></th>
<th>During the past week:</th>
<th>Rarely or none of the time (less than 1 day)</th>
<th>Some or a little of the time (1-2 days)</th>
<th>Occasionally or a moderate amount of time (3-4 days)</th>
<th>Most or all of the time (5-7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I was bothered by things that usually don't bother me.</td>
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<tr>
<td>2.</td>
<td>I did not feel like eating; my appetite was poor.</td>
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<tr>
<td>3.</td>
<td>I felt that I could not shake off the blues even with help from my family or friends.</td>
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<td>4.</td>
<td>I felt I was just as good as other people.</td>
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<tr>
<td>5.</td>
<td>I had trouble keeping my mind on what I was doing.</td>
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<td>6.</td>
<td>I felt depressed.</td>
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<td>7.</td>
<td>I felt that everything I did was an effort.</td>
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<tr>
<td>8.</td>
<td>I felt hopeful about the future.</td>
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<td>9.</td>
<td>I thought my life had been a failure.</td>
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<tr>
<td>10.</td>
<td>I felt fearful.</td>
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<tr>
<td>11.</td>
<td>My sleep was restless.</td>
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<td>12.</td>
<td>I was happy.</td>
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<td>13.</td>
<td>I talked less than usual.</td>
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<tr>
<td>15.</td>
<td>People were unfriendly.</td>
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<tr>
<td>16.</td>
<td>I enjoyed life.</td>
<td></td>
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<td>17.</td>
<td>I had crying spells.</td>
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<td>18.</td>
<td>I felt sad.</td>
<td></td>
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<tr>
<td>19.</td>
<td>I felt that people disliked me.</td>
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<tr>
<td>20.</td>
<td>I could not get going.</td>
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</table>
แบบสอบถามความรู้สึกซึมเศร้า
คำมั่น ไม่แสดงข้อความตอบให้ตรงกับความรู้สึกของคุณ ที่สามารถอธิบายได้หรือสูญเสียทุกสิ่งทั้งหมด ได้ปฏิบัติ
ในสัปดาห์ที่ผ่านมา

<table>
<thead>
<tr>
<th>ข้อความ</th>
<th>ไม่เยอะหรือไม่เคยเลย (น้อยกว่า 1 วัน)</th>
<th>น้อยครั้ง (1-2 วัน)</th>
<th>บางครั้งบางคราว (3-4 วัน)</th>
<th>เป็นประจำ (5-7 วัน)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ฉันถูกรบกวนโดยบางสิ่งบางอย่างที่โดยปกติแล้วไม่เคยเป็นบกพร่อง</td>
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<tr>
<td>2. ฉันไม่รู้สึกอย่างปกติ ความอยากอาหารของฉันไม่ค่อยมี</td>
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<tr>
<td>3. ฉันรู้สึกว่าลืมไม่สามารถปลดปล่อยความเศร้าได้ทั้ง ๆ ไดรับความรู้สึกจากครอบครัวหรือเพื่อน</td>
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<td>4. ฉันรู้สึกว่ามันเป็นไปได้และมั่นคงอย่างที่</td>
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<tr>
<td>5. ฉันมีปัญหาในการจดจำความคิดในสิ่งที่ก้าวหน้าอยู่</td>
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<td>6. ฉันรู้สึกเจ็บปวดที่ร่างกายหรือใจ</td>
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<td>7. ฉันรู้สึกว่าทุกสิ่งทั้งหมดทำให้ความพยายาม</td>
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<td>8. ฉันรู้สึกมีความหวังเกี่ยวกับอนาคต</td>
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<td>9. ฉันรู้สึกว่าชีวิตของฉันดีที่มากขึ้น</td>
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<td>10. ฉันรู้สึกโดยทั่วไป</td>
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<tr>
<td>11. ฉันไม่สามารถนอนหลับพักผ่อนได้</td>
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<td>12. ฉันมีความสุข</td>
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<tr>
<td>13. ฉันพูดเยอะกว่าปกติ</td>
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<tr>
<td>14. ฉันรู้สึกทนกลิ่นที่ไม่เป็นที่ต้องการ</td>
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<tr>
<td>15. ฉันรู้สึกว่าผ่อนผัน ๆ ไม่เป็นที่อยู่นิ่ง</td>
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<tr>
<td>16. ฉันมีความสุขในชีวิต</td>
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<tr>
<td>17. ฉันมีทางออกที่มั่นคงให้พ่อแม่</td>
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<td>18. ฉันรู้สึกพยาบาท</td>
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<tr>
<td>19. ฉันรู้สึกว่าผ่อนผัน ๆ ไม่ชอบที่</td>
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<tr>
<td>20. ฉันรู้สึกว่าฉันไม่สามารถที่จะอะไรค่อยไปได้</td>
<td></td>
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</tbody>
</table>
**Brief Coping Orientations to Problems Experienced Inventory (Brief COPE)**

(Carver, 1997)

**BRIEF COPE**

We are interested in learning how people deal with a difficult or stressful event in their lives such as an illness. There are lots of ways to deal with such things. We would like to know the ways that you have used to deal with the illness.

Each statement below says something about a particular way of dealing with the illness. We would like to know how much you have used any of the following ways to deal with the illness. There are no "right" or "wrong" answers.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>A little bit</th>
<th>A medium amount</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I've been turning to work or other activities to take my mind off things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I've been concentrating my efforts on doing something about the situation I'm in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I've been saying to myself &quot;this isn't real&quot;</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I've been using alcohol or other drugs to make myself feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I've been getting emotional support from others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. I've been giving up trying to deal with it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I've been taking action to try to make the situation better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I've been refusing to believe that it has happened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I've been saying things to let my unpleasant feeling escape.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. I've been getting help and advice from other people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I've been using alcohol or other drugs to help me get through it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not at all</td>
<td>A little bit</td>
<td>A medium amount</td>
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<tr>
<td>12.</td>
<td>I’ve been trying to see it in different light, to make it seem more positive.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13.</td>
<td>I’ve been criticizing myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14.</td>
<td>I’ve been trying to come up with a strategy about what to do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.</td>
<td>I’ve been getting comfort and understanding from someone.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16.</td>
<td>I’ve been giving up the attempt to cope.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17.</td>
<td>I’ve been looking for something good in what is happening.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18.</td>
<td>I’ve been making jokes about it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>19.</td>
<td>I’ve been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20.</td>
<td>I’ve been accepting the reality of the fact that it has happened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>21.</td>
<td>I’ve been expressing my negative feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>22.</td>
<td>I’ve been trying to find comfort in my religion or spiritual benefits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>23.</td>
<td>I’ve been trying to get advice or help from other people about what to do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>24.</td>
<td>I’ve been learning to live with it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>25.</td>
<td>I’ve been thinking hard about what steps to take.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>26.</td>
<td>I’ve been blaming myself for things that happened.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>27.</td>
<td>I’ve been praying or mediating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>28.</td>
<td>I’ve been making fun of the situation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>
แบบวัดความสามารถในการเผชิญปัญหาของย์

เรานำความสนใจที่จะศึกษาการที่ผู้หญิงไทยเผชิญปัญหาในชีวิตประจำวัน เราอยากทราบว่าทำนกี่ใช้ชีวิตการใดในการเข้าใจปัญหาในชีวิตประจำวันดังกล่าว

ตัวชี้วัด ในแต่ละคำถามตอบไปนั้น กรุณาทำครองหมาย ที่สามารถอธิบายได้ที่ที่สุดขั้นในที่ที่ถูกต้องหรือได้ปฏิบัติ

ไม่ใช้ช่วงเวลาในการ

ไม่เคยหรือไม่เคยเลย (น้อยกว่า 1 วัน) น้อยครั้ง (1-2 วัน)
บางครั้งบางคราว (3-4 วัน) เป็นประจำ (5-7 วัน)

<table>
<thead>
<tr>
<th>เมื่อฉันเครียด</th>
<th>ไม่เคยหรือไม่เคยเลย</th>
<th>น้อยครั้ง</th>
<th>บางครั้งบางคราว</th>
<th>เป็นประจำ</th>
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</thead>
<tbody>
<tr>
<td>1. ฉันหันไปทำงาน หรือที่ทำงานอื่นๆที่ทำให้ฉันลืมเรื่องเครียดต่างๆ</td>
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<td>2. ฉันได้ตั้งใจอย่างมากในการแก้ปัญหาที่เกิดขึ้น</td>
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<td>3. ฉันบอกตัวเองว่า “ฉันไม่ใช่เรื่องจริง”</td>
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<td>4. ฉันคิดเห็นว่า วุ่นวายหรือว่าเพื่อทำให้ฉันรู้สึกดีขึ้น</td>
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<td>5. ฉันได้รับการปลอบใจจากครอบครัว</td>
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<td>6. ฉันรู้สึกเชื่อว่าจะเผชิญปัญหาต่างๆ</td>
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<td>7. ฉันได้รับการปลอบใจหรือความเข้าใจจากคนอื่น</td>
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<td>14. ฉันรู้สึกว่าเป็นเรื่องจริง</td>
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<td>15. ฉันคิดเห็นว่าเป็นเรื่องจริง</td>
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<td>16. ฉันคิดเห็นว่าเป็นเรื่องจริง</td>
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<td>17. ฉันรู้สึกว่าเป็นเรื่องจริง</td>
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<td>18. ฉันรู้สึกว่าเป็นเรื่องจริง</td>
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เมื่อฉันเครียด

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</thead>
<tbody>
<tr>
<td>19.</td>
<td>ฉันหันไปทำกิจกรรมอื่นๆ เพื่อทำให้ฉันคิดถึงปัญหาของฉัน ดูทีวี ดูหนัง ดูหนังสือ ซื้อของ หรือ นอนหลับ</td>
</tr>
<tr>
<td>20.</td>
<td>ฉันยอมรับว่าปัญหาได้เกิดขึ้นจริง</td>
</tr>
<tr>
<td>21.</td>
<td>ฉันได้รับความรู้สึกว่าไม่ดีจากปัญหาใดๆ</td>
</tr>
<tr>
<td>22.</td>
<td>ฉันไปวัดหรือทำกิจกรรมทางศาสนา เพื่อให้รู้สึกดีขึ้น</td>
</tr>
<tr>
<td>23.</td>
<td>ฉันพยายามขอคำแนะนำหรือความช่วยเหลือจากผู้อื่นว่าจะทำอย่างไร</td>
</tr>
<tr>
<td>24.</td>
<td>ฉันเรียนรู้ว่าจะอยู่กับปัญหา</td>
</tr>
<tr>
<td>25.</td>
<td>ฉันคิดอย่างหนึ่งว่าจะทำอย่างไรได้</td>
</tr>
<tr>
<td>26.</td>
<td>ฉันดูหนังสือของสุขภาพสัตว์ที่เกิดขึ้น</td>
</tr>
<tr>
<td>27.</td>
<td>ฉันออกกำลังกายหรือทำสมาธิ</td>
</tr>
<tr>
<td>28.</td>
<td>ฉันมั่นใจว่าปัญหาเป็นเรื่องเล็ก ไม่จริงจัง</td>
</tr>
</tbody>
</table>
The NYHA Classification of Functional Capacity

Please check ✓ the items below that indicate your current symptoms:

_______ Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea or anginal pain.

_______ Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain. I am comfortable at rest.

_______ Less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain. I am comfortable at rest.

_______ Symptoms of heart failure or the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort increases.

The NYHA Classification of Functional Capacity (Thai-version)

การตัดสินใจเกี่ยวกับทรัพยากรที่มีอยู่ในสิ่งที่กล่าวถึง

โปรดเช็คเครื่องหมาย ✓ หน้าข้อใดต่อไปนี้ ที่กำเนิดอยู่

_______ ไม่มีอาการอ่อนเพลีย หายใจลำบาก หรือ เจ็บบริเวณหน้าอก หรือไหล่ เวลาปฏิบัติภาระจิตวิญญาณปกติ

_______ มีอาการ อ่อนเพลีย หายใจลำบาก หรือ เจ็บบริเวณหน้าอก หรือไหล่ เวลาปฏิบัติภาระจิตวิญญาณ และไม่มีอาการ เวลาพัก หรือ หยุดทำ

_______ มีอาการเหนื่อยล้า อ่อนเพลีย หายใจลำบาก หรือ เจ็บบริเวณหน้าอก หรือไหล่ไว้ว่าทำภาระกรรมเล็กน้อยแต่ไม่สามารถพักผ่อนได้

_______ อาการเหนื่อยล้า อ่อนเพลีย หายใจลำบาก หรือ เจ็บบริเวณหน้าอก หรือไหล่ แม้กระทั่งเวลาพัก
Physiological Measure Chart

(Data Collection Tool for to Be Used by the Researcher)

Chart Review

1. Serum Cholesterol:

   Total Cholesterol___________ mg/dl
   Triglycerides_______________ mg/dl
   LDL-C_______________________ mg/dl
   HDL-C_______________________ mg/dl

   _________ Diagnosis and/or treatment with lipid-lowering drugs during the previous 2 weeks

2. Fasting plasma glucose___________ mg/dl,

   _________ Diagnosis and/or treatment of diabetes

3. _________ Diagnosis and/or hypertensive treatments during the previous 2 weeks

Physiological Measures

1) Blood Pressure___________ mmHg

2) Weight___________ kg, height___________ cm

3) Waist circumference___________ cm, hip circumference___________ cm

4) Waist-to-Hip ratio (W/H)___________
REFERENCES


