SOCIO-ECONOMIC-DEMOGRAPHIC FACTORS, HEALTH STATUS AND EXERCISE OF THAI POPULATION

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Thesis
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SOCIO-ECONOMIC-DEMOGRAPHIC FACTORS, HEALTH STATUS AND EXERCISE OF THAI POPULATION

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ABSTRACT#

The adverse health effects of the lack of exercise are well known. The objective of this study was to identify the main factors related to exercise and health status. The study employed data from the 2010 Evaluation of Health Promotion and Sports for Health in the local Authorities Project. The study included women (38.6%) and men (61.4%) The average age was 52 (SD=14.8 years). More than half of the respondents reported educational attainment of primary school (62.2%). Most subjects were married (68.2%). Farming accounted for the largest occupation category (25.3%); two-thirds were living in an urban location and more (25.2%) lived in the Northeast than other regions.

Multi-logistic regression revealed that recommended exercise was related to attitude toward exercise, perceived benefit of exercise, involvement in exercise campaigns, and access to an exercise facility. Knowledge and attitude about exercise and involvement in a health/sports club were most closely related to health status. Public health managers should consider supporting sports campaigns and exercise facilities as the motivators driving behavior appear to differ across characteristic status.

KEY WORDS: EXERCISE / HEALTH BEHAVIOR / HEALTH STATUS

208 pages

ปัจจัยทางสังคม เศรษฐกิจ และประชากรที่มีผลต่อสถานะทางสุขภาพและการออกกำลังกายของประชากรไทย

SOCIO-ECONOMIC-DEMOGRAPHIC FACTORS, HEALTH STATUS AND EXERCISE OF THAI POPULATION

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บทคัดย่อ

งานวิจัยครั้งนี้มีวัตถุประสงค์เพื่อหาปัจจัยหลักที่เกี่ยวข้องกับการออกกำลังกายและสถานะทางสุขภาพของคนไทย โดยใช้ข้อมูลการประเมินผลการส่งเสริมสุขภาพและการกีฬาในภูมิภาคท้องถิ่นปี 2553 ผลการศึกษาพบว่ากลุ่มตัวอย่างเป็นเพศหญิง (38.6%) และเพศชาย (61.4%) มีอายุเฉลี่ย 52 ปี ส่วนใหญ่สำเร็จการศึกษาระดับประถมศึกษา(62.2%) ส่วนใหญ่แต่งงานแล้ว (68.2%) มีอาชีพเป็นเกษตรกร (25.3%) นอกจากนี้ยังพบว่าสองในสามของกลุ่มตัวอย่างอาศัยอยู่ในเขตเมือง และอาศัยอยู่ในภาคตะวันออกเฉียงเหนือ

ผลจากการวิเคราะห์การถดถอยพหุโลจิสติกพบว่าการออกกำลังกายมีความสัมพันธ์กับทัศนคติต่อการออกกำลังกาย การรับรู้ประโยชน์ของการออกกำลังกาย การมีส่วนร่วมในโปรแกรมการออกกำลังกาย และการเข้าถึงอุปกรณ์การออกกำลังกาย นอกจากนี้ความรู้และทัศนคติเกี่ยวกับการออกกำลังกาย และการเป็นสมาชิกในชมรมสุขภาพ และชมรมกีฬา มีความสัมพันธ์กับสถานะทางสุขภาพของประชากรไทย ดังนั้นผู้ที่เกี่ยวข้องควรพิจารณาสนับสนุนโปรแกรมการออกกำลังกาย และอุปกรณ์การออกกำลังกายในชุมชน เพื่อจูงใจให้ประชากรไทยมีการออกกำลังกายเพิ่มมากขึ้น

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CHAPTER I
INTRODUCTION

1.1 Rationale and background

Ever since the developing countries started importing medical technology from western countries, the success of medical, public services and health, including the improvement of socio-economic conditions, has caused the rapid decline of fertility and mortality (demographic transition). These changes have influenced the population structure by reducing the proportion of child population and increasing the proportion of elderly population; while the disease pattern has been replaced from acute disease (such as yellow fever and cholera) to cardiovascular disease (CVD) or non-communicable disease (such as hypertension and diabetes) as the primary cause of morbidity and mortality (epidemiologic transition) (Omran, 1971).

According to data on cause of death (Clark, DesMeules, Luo, Duncan, & Wielgosz, 2009) CVD is increasing in developing countries. In 2002, more than 60 percent of developing country populations face of burden of coronary disease (WHO, 2008). Since 1980, Thailand is facing the challenge of the transition from communicable diseases such as flu and tuberculosis to non-communicable diseases (NCD) such as coronary heart disease (CHD) and cancer (Kanchanachitra & Podhisita, 2011). NCD morbidity is steadily rising and CVD is becoming a major cause of death (Keys, 1970). In 2005 67.8% of all deaths were NCD. The main cause of death in males is cerebrovascular diseases, while females usually die of cerebrovascular diseases, diabetic mellitus, or ischemic heart disease (Blane, Bartley, & Smith, 1997; Thammatach-aree, 2011). As shown in Table 1.1 the top 5 causes of death by disease in Thailand in 2000-2010 include heart disease as the second rank followed by hypertension and cerebrovascular disease (CDC, 2010). Furthermore, the trend of these diseases is increasing rapidly over time. Despite the government efforts to address the challenge, the percentage of cases of CVD has not decreased (Porapakkam

et al., 2010; Porntrakulphiphat, Thepsuthammarat, Treapkhuntong, & Pratipanawatr, 2011).

The achievements in medicine and public health have led to the increase in life expectancy, however people with longer life expectancy are not necessarily in experiencing good quality of life, especially when there are increases in NCD such as CVD (Table 1.1). Therefore, better control of CVD should improve life expectancy and quality (Berkman, Lisa, Singer, & Manton, 1989; Thammatach-aree, 2011).

In this research, our goal is to explore ways in which the population can live longer with good health. As already stated, in the past, individuals contracted acute disease regardless demographic factors such as gender, age, ethnicity/race or social class, and most groups of the population had the similar risk. But chronic diseases are more likely to be linked to the population's characteristic, lifestyle and psychological status. All of these factors are a key to understanding health status and illness in the society (Louis G & Richard K, 1992; Solar & Irwin, 2010).

Beside the biological factors, Socio-economic-demographic factors are also an important determinant of health and morbidity. People who report good health tend to have more salary, higher education, a professional occupation and better access to health service (Annandale, 1998; Solar & Irwin, 2010). Thus, the different attributes of the population become an important predictor of health status in response to the question *"why is there large health inequality between the most and least advantaged populations"*.

Table 1.1 Top Five Causes of Death by Disease in Thailand, 2000-2010

Rank	2000	%	2005	%	2010	%
1	Cancer	10.8	Cancer	12%	Cancer	19%
2	Disease of heart	5.2	Disease of heart	7.4%	Disease of heart	12%
3	Hypertension and cerebrovascular disease	5.4	Hypertension and cerebrovascular disease	4.9	Hypertension and cerebrovascular disease	10%
4	Nephritis, nephroortic syndrome and nephrosis	2.5	Nephritis, nephroortic syndrome and nephrosis	3.2	Lower respiratory tract infections	9%
5	Disease of liver and pancreas	1.8	Disease of liver and pancreas	2.3	HIV	4%

Source: CDC (http://www.cdc.gov/globalhealth/countries/thailand/, access at March 3, 2014)

From the above discussion, socio-economic-demographic factors contribute to health inequality as well as the changing lifestyles or (non-)health behaviors such as lack of physical activity, poor diet, smoking and drug use (Javadzade, 2012; NSO, 2014). Increasingly, developing countries are adopting western dietary preferences such as consuming excessive amounts of fat, sugar and salt. Poor nutrition interacts with the increase in other poor health behaviors such as smoking, excessive alcohol consumption and non-exercise. These are major factors leading to the increased prevalence of NCD (House, Landis, & Umberson, 1988; Jacob, 2012). Health behavior, especially exercise, has long been known as a major factor for reducing health risk, particularly CVD. Other benefits include improved blood sugar level, preventing or controlling diabetes symptoms, preventing obesity and hypertension and reducing the rate of morbidity or mortality from CVD and some forms of cancer. From a psychological perspective, exercise is also related to reduced

stress, anxiety, tension and depression (Haskell & LEE, 2007; Pan, 1997; Robert, 2003).

However, despite the obvious evidence based on the benefits of exercise with health, there is still a large segment of the population who does not exercise despite knowing the consequences. In America, more than 60 percent of the population does not practice the recommended level of exercise while only 10% of the population regularly exercises (Robert, 2003). In Thailand, more than 70 percent of those over 15 years do not practice the recommended level of exercise (National Statistical Office, 2011). The Thai government tries to encourage people to exercise according to the "National Sport Development Master Plan" from 2005-2010 including the "National Economic and Social Development Plan" (Number 8-9) in order to promote Thais to participate in exercise and sport. Yet, people still resist these plans(Ministry of Public Health, 2011). According to a survey, Thai respondents age between 15-60 years spent less than 15 percent of their free time for exercise (National Statistical Office, 2011). It is a complex issue and hard to understand why sedentary people do not exercise more, there are socio-economic and individual factors which are associated with the level of exercise, including urban-rural residence and availability of facilities and resources to exercise and maintain health (Robards, Evandrou, Falkingham, & Vlachantoni, 2012).

Social determinants, such as education, income, occupation, the availability of health services and facility reduce barriers to good health and will indirectly promote a reduction in the health risk health behaviors, such as smoking and excessive alcohol consumption. These factors are also influenced by the differentials of wealth, power and resources (House et al., 1988; Marmot, Bruce, & Nancy, 1999). Thus, several studies found an association between morbidity and mortality, including the poor reporting of disease and lower health behavior, are related with a person's social condition (Cutler, Deaton, & Lleras-Muney, 2006; Nilsson, Ostergren, & Berglund, 2005; Robards, Evandrou, Falkingham, & Vlachantoni, 2012). The National Institutes of Health found that respondents who live in rural areas have higher rates of NCD such as CHD, obesity and cancer including an increased probability of health risk behaviors such as smoking, non-exercise, poor diet, and limited use of seatbelts than those living in urban areas (Eberhardt & Pamuk, 2004; Hartley, 2004).

In general, there are many differentials between urban and rural areas, for example the differences in health care services, healthy delivery, and health promotion including available infrastructure, and these are related to different life outcomes among areas. There are also selection factors which explain rural-urban health differentials. Firstly, in rural areas today the proportion of the population who stays behind are mostly elderly rather than the working-age group. Naturally, the elderly population will face more problems about their health and have higher prevalence of chronic conditions, which are worsened by the higher levels of poverty (Cutler et al., 2006; Shkolnikov & other, 1998; Tunprayoon, 1989). A second factor is resource availability. A study of the disparity in health status between areas found that rural residence is associated with lower-income jobs, and lower-employment opportunities which could be the main determinant of health disparity (Eberhardt & Pamuk, 2004; Humphreys & Carr-Hill, 1991).

In addition, many research studies found the link between lower levels of non-active leisure time in rural areas compared to urban areas, while the changing of the working pattern from manufacturing agriculture to the industrial agriculture is leading to reduced physical activity related to work (Adler & Newman, 2002; Engström, 2006). Furthermore, rural residents are more likely to having poor diet which increases overweight. The rates of tobacco smoking are also higher in rural areas, and the rural population is less likely to access the health care services. Although homicide rates and injuries rates, particularly motor vehicle accidents, are higher in urban areas. But if we consider in the rate of people who survive after suffering trauma, mortality is higher in rural areas (Humphreys & Carr-Hill, 1991).

Thus, the health of individuals is greatly influenced by geography and the demographic composition, including elder age, disadvantaged SES (SES), and some ethnic and racial minorities. Furthermore, other influences on health include the environment or the composition of the communities such as access to exercise facilities, campaigns related to better health, and support by family and peers (Adler & Newman, 2002; Sallis, Prochaska, & Taylor, 2000; Salmon, 2010)

There are many articles and research to support the strong relationship between surrounding environment, health and exercise behavior (Haskell & LEE, 2007; Lovell, Ansari, & Parker, 2010; Robert, 2003). A study of exercise in England

found friends network, neighborhood, housing environment, school, and working place are strong, shared environmental effects of behavior. These factors could be linked to increased exercise opportunities (Robert, 2003; Sallis et al., 2000). Furthermore, the mere availability of an exercise facilities can influence exercise too, by reflecting the type of community that provides exercise facilities, peer group exercise activities, and presence of exercise coaches, which have strong significant associations with increasing the percentage of people who exercise (Robert, 2003; Sallis et al., 2000)

More recently, it has been suggested that some people may be better predisposed toward health behavior than others because people have their own motivation (Bryan, Hutchison, Seals, & Allen, 2007; Lovell et al., 2010). These internal drives will lead to action or could be the trigger for either rewarding or negative physiological responses to health behavior such as exercise (Bryan et al., 2007).

The purpose of this study is to examine the factors that are related to the health status of population and exercise. This study tries to determine “How socio-economic-demographic factors, psychological factors, health related behavior factors and community factors influence health status and exercise". The results of this research could how public health interventions could be implemented to increase exercise to improve the health status and well-being of the population.

1.2 Research questions

1. Does the exercise level of the Thai population relate to socio-economic-demographic factors?

2. Do the socio-economic-demographic factors impact on chronic illness?

3. What factors that affected to the behavior of population on exercise and their health status?

4. What are the appropriate strategies to promote exercise in Thailand in order to prolong the better quality of life?

1.3 Research objective

The objective of this study aims to explore the relationship among socio-economic-demographic factors, psychological factors, health related behavior factors and community factors toward on health status and exercise of Thai population.

The specific objectives of the study are:

1) To examine the relationship among the health status and exercise of the Thai population based on the differential socio-economic-demographic factors.

2) To explore the relationship between psychological factors, health related behavior factors and community factors regarding exercise.

3) To examine the relationship between psychological factors, health related behavior factors and community factors and health status.

1.4 Hypotheses

The proposed hypothesis will be testes as follows:

1. There is a relationship between socio-economic-demographic factors and exercise.

2. There is a relationship between psychological factors (such as perceived of benefits to exercise, perceived of barriers to exercise, knowledge about exercise and attitude about exercise) and exercise.

3. There is a relationship between health related behavior factors (such as smoking, Alcohol consumption, involvement on sport campaign and involvement to health/sport club) and exercise.

4. There is a relationship between community factors (such as exercise facilities and Community exercise leaders) and exercise.

5. There is a relationship between socio-economic-demographic factors and health status.

6. There is a relationship between psychological factors (such as perceived of benefits to exercise, perceived of barriers to exercise, knowledge about exercise and attitude about exercise) and health status.

7. There is a relationship between health related behavior factors (such as smoking,

Alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise) and health status.

8. There is a relationship between community factors (such as exercise facilities and Community exercise leaders) and health status.

9. There is a relationship between exercise and health status.

1.5 Benefits of the study

1. The results of this study could be of benefit for the Ministry of Public Health, Department of Health, Local government and the Ministry of Tourism and Sports, which have policies to encourage citizens to exercise more to increase life expectancy and good quality of health. Moreover, this study could be a source of information for local government agencies, non-government organizations, and civil society in promoting physical activity and sports for healthier lifestyles.

2. The results of this study may support organizations that are involved in the promotion of physical activities and sports for health, such as the Thai Health Promotion Foundation. This study could help the organization in developing strategic planning to increase either individual or community participation in physical activity and sports for a healthier lifestyle.

3. This study would fill the knowledge gaps, particularly to publicize innovative knowledge and ideas for promoting exercise and sports for the community and also to encourage collaboration among local agencies which might include local government, sport clubs and mass media in implementing policy on exercise and sports for a healthier lifestyle.

4. This research might give support for educational institutions in developing innovative and practical programs to promote exercise and sports for healthier lifestyles of Thais. Accordingly, the government (local and national) and academia could propose plans or policies that are suitable for the community in terms of exercise and sports.

1.6 Operational definitions

1. Health status refers to the physical condition reported by the respondent of having or not having a diagnosis or a symptom stated by a medical doctor previously (Bergner & Rothman, 1987). The diagnosis or symptoms of interest in this study comprise hypertension, obesity, heart disease, hyper-cholesterol, and cancer.

2. Health related behaviors refer to the individual actions that are related to individual heath based on the perceived of benefits and barriers toward health status in order to promote, protect or maintain their health (Conner, 2002). In this study health related behaviors refer to exercise or physical activities, smoking, alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise.

3. Exercise refers to bodily movements such as cycling, jogging, walking, continuously for at least 3 days per week and 30 minutes per time (Robert, 2003).

4. Socio-economic-demographic factors Socio-economic-demographic factors refer to age, sex, educational level, marital status, occupation, region and area of residence.

5. Community factors are defined as the availability of exercise facilities, and availability of community exercise leaders or instructors.

6. Psychological factors mean individual beliefs/attitudes of persons about the advantage by a particular activity (Champion, 2013) or the specific understanding that impedes someone to do a healthy action or undertake recommended behaviors (Russell E. Glasgow, 2013). In this study psychological factors refer to perceived of benefits to exercise, perceived of barriers to exercise, knowledge about exercise and attitude about exercise.

CHAPTER II
LITERATURE REVIEW

The literature and research describe the essential conceptual knowledge, theory and related significant findings for socio-economic-demographic factors, health status and exercise of the Thai population. This chapter discusses related concepts and research as follows:

2.1 Trend and situation of morbidity and mortality in Thailand

2.1.1 Morbidity and mortality in Thailand

2.1.2 Current morbidity and mortality in Thailand

2.2 The concept of health and its proximate determinants

2.2.1) Biological factors, personality and early life conditions

2.2.2) Health related behaviors and lifestyle

2.2.3) Socio-economic-demographic factors

2.2.4) Psychological factors

2.2.5) Community factors

2.3 Exercise

2.4 Defining and measuring of health status

2.5 The Health Belief Model

2.6 Theory of Planned Behavior/ Reasoned Action

2.7 Conceptual framework

2.1 Trend and situation of morbidity and mortality in Thailand

Generally, the morbidity and mortality statistics are widely used for both research and administrative purposes such as contributing to defining health problems, monitoring the efficacy of health programs, and identifying the emerging problems of public health. The quality of morbidity and mortality statistics are determined by the method and study design of collecting data.

In Thailand, morbidity and mortality information can be acquired from several sources: routine vital statistics, the Population and Housing Census or special sample surveys. The limitations of data include underreporting, fragmentation, and reliability. Thus, the information of morbidity and mortality should be interpreted cautiously. In this section we will illustrate the trends of morbidity and mortality in Thailand from past to present based on the demographic transition and epidemiologic transition as a case study.

2.1.1 Morbidity and mortality in Thailand

Thailand has gone through the process of demographic transition in approximate 60-70 years, or in two generations (since 1995). In the first half of the twentieth century, Thailand's crude death rates were approximately 30 per 1,000. After we improved public health and transferred new medical technologies from developed countries, crude death rates sharply dropped to below 20 per 1,000 by the mid-1950s (Kanchanachitra & Podhisita, 2011).

The mortality decline is the consequence of treatments by antibiotics and vaccines including the capacity to control vector-borne disease which contributed to the decrease in child mortality from the major epidemics, for example, malaria, tuberculosis, pneumonia, and intestinal infectious disease. The age-specific death rates confirm significant mortality reduction among children less than one year old, while the age-specific death rates among adults had declined little.

The reasons for decreasing rate of mortality due to infectious diseases differ between developing and developed countries. Thailand has had successes from transferring medical knowledge and techniques from developed countries, and by improving public health. The perspectives of demographers and sociologists on causes of Thai mortality declines can be separated into two camps: One emphasizes the rising

standard of living, especially nutrition, which contributes to social and behavioral improvements. The other viewpoint is that mortality declined rapidly because people adopted health behaviors and preferred modern medicine over traditional remedies (Caldwell, 2001).

Regarding, the infant mortality rates (IMRs), the probability of dying in the first year of life was assumed to be implicitly declining similar to the crude death rate decline as the result of the expanding program of immunization project (EPI) and maternal and child health program. The IMRs continually decreased from 84.2 to 51.3, 40.7, 26.1, and 11.3 per 1,000 live births in 1964-1965, 1974-1975, 1985-1986, 1995-1996 and 2005-2006 respectively.

On the other hand, reduction in maternal mortality required a much better health infrastructure and economic development. In the context of decreasing IMRs, it is also important to note that the lower IMR is the main factor contributing to reduced overall mortality rates and increase in life expectancy at birth. By using the Brass technique to estimate life expectancy, life expectancy at birth had increased after 1960 and in 1973, 1974, 1960 and 1970 to 39, 40, 51, 56 years for men and 42, 44, 55, 56 for women respectively (Rungpitarangsi & Benjawan, 1974).

When reviewing the demographic transition, it is also important to consider the "epidemiologic transition" (Omran, 1971). This concept separates the epidemiologic transition into three eras: The pestilence and famine era, followed by the era of pandemics recession, and, thirdly, degenerative and man-made diseases era. It's difficult to declare the specific starting time of each era.

Thai society also follows the epidemiologic transition in which morbidity and mortality trends can be attributed to three groups of causes. The first group Infectious diseases, parasite infection and malnutrition which significantly declined, most noticeably for pediatric infectious disease , malaria, tuberculosis, pneumonia, and gastroenteritis.

The second group consists of chronic and degenerate diseases, which sharply increased in recent decades, notably heart disease, malignancies, hypertension and cerebrovascular disease. Both heart disease and malignancies were responsible for only 2-3% of all deaths in the early mid-twentieth century (1958-1970), then

continually increased and rose to 22% as the first and the third cause of death in 2007 respectively.

Lastly, the third group is external causes of deaths, known as the ills of civilization as are the result of the imbalanced development process of industrialization, consisting of intentional injury such as homicide, suicide, and war, and unintentional injury such as traffic accidents, drowning, other accidents and poisoning, which increased remarkably before the expansion of chronic and degenerative diseases in the first period.

To sum up, in Thailand, the main mortality causes before 1980 were diarrhea and airborne diseases such as pulmonary tuberculosis and pneumonia. After 1980, the disease pattern changed from infectious disease to non-communicable disease (NCD) or man-made disease such as CHD and cancer. According to the survey of major causes of deaths in 2004 (Table 2.1) for all age groups problems of the circulatory system have been dominant (18.6%) and most were cerebrovascular diseases. Cancer and tumors were second at 16.2% have nearly equal proportions of lung, liver and bile-duct cancers. The third ranked cause of death is infectious disease, with mainly HIV infection and tuberculosis among adolescent and young adult men at 15.5%. Last, the external causes were ranked at 12.4% with accidents among school-age children, and road traffic injuries involving motorcycles as the most common (Chuprapawan, 2003).

The causes of death of male are mostly circulatory system diseases (21.4%) followed by infectious diseases (18.2%). Female deaths are mostly caused by cancer/tumors (16.6%) followed by circulatory system diseases (16.5%). The third ranked cause of death was “external causes” for both males and females (Antarasen, 1988).

Table 2.1 By age group and sex, the causes of death in 2004 are as shown in the table below:

Aged group	Major cause of deaths		Remarks
	Male	Female	
Under 1 year	Premature birth low birth weight, pneumonia, systemic infection	Premature birth low birth weight, congenital heart defect, pneumonia	Due to HIV infection 5.7%
1 – 4 years	Accidental drowning, pneumonia	Accidental drowning, pneumonia	Due to HIV infection 13.3 %
5 – 24 years	Accidental drowning, road traffic accidents	Accidental drowning, road traffic accidents	Due to HIV infection 7.9 %
25 – 44 years	HIV infection, road traffic accident, suicide	HIV infection, road traffic accident, suicide	
45 – 59 years	Liver/bile-duct cancer, cerebrovascular diseases	Liver/bile-duct cancer, cerebrovascular diseases, diabetes	
60 -74 years	Cerebrovascular diseases, liver/bile-duct cancer, chronic/obstructive pulmonary disease	Cerebrovascular diseases, liver/bile-duct cancer, diabetes	
75 years and up	Cerebrovascular diseases, cancer, chronic/obstructive pulmonary disease, ischemic heart disease	Cerebrovascular diseases, chronic/obstructive pulmonary disease	

Table 2.2 presents a comparison of leading causes of death from 1958 to 2007. The main cause was infectious diseases (27%) in 1958, and continued declining as a proportion to 7%, 5% and 2% in 1970, 2000 and 2007, respectively.

Table 2.2 Causes of death in Thailand 1958-2007

1958	**Rate**	**%**	**1970**	**Rate**	**%**
Certain diseases peculiar of first year of life	64.2	7.7	Certain diseases peculiar of first year of life	29.5	4.5
Pneumonia	38.9	4.6	Accident poisoning	27.7	4.2
Gastro enteritis & colitis	38.9	4.6	Homicide and operations of war	21.6	3.3
Tuberculosis respiratory system	38.1	4.5	Tuberculosis respiratory system	21.0	3.2
Malaria	37.8	4.5	Heart disease	15.6	2.4
Accident poisoning	16.5	2.0	Pneumonia	15.1	2.3
Diseases of pregnancy, childbirth and the pueperium	15.0	1.8	Gastro enteritis & colitis	15.0	2.3
Heart disease	13.6	1.6	Malignant and neoplasms all forms	13.3	2.0
Dysentery	9.4	1.1	Malaria	10.4	1.5
diseases of the stomach&duodenum	8.4	1.0	Diseases of pregnancy, childbirth and the pueperium	7.6	1.1
Beri-beri	6.7	0.8	Diseases of the stomach&duodenum	6.9	1.0
Typhoid&paratyphoid	6.0	0.7	Cirrhosis of liver	4.1	0.6
All other causes	541	65.0	All other causes	470.7	71.6
Total	**835**	**100.0**	**Total**	**659**	**100.0**

Table 2.2 Causes of death in Thailand 1958-2007 (cont.)

1990	**Rate**	**%**	**2007**	**Rate**	**%**
Diseases of heart	51.0	12.0	Malignant, neoplasms all forms	85	14
Accident and poisonings	42.0	9.4	Accident and poisonings	56.7	9.1
Malignant, neoplasms all forms	39.0	8.8	Diseases of heart	29.0	4.7
Suicide, homicide and other injuries	15.0	3.4	Hypertension and cerebrovacular disease	24.0	3.9
Hypertension and cerebrovacular disease	15.0	3.3	Pneumonia and other disease of lung	23.0	3.6
Disease of liver and pancreas	13.0	3.0	Nephritis, nephortic syndrome and nephritic	22.0	3.4
Pneumonia and other disease of lung	11.0	2.3	Disease of liver and pancreas	14.0	2.2
Nephritis, nephortic syndrome and nephritic	7.6	1.7	Suicide, homicide and injuries	12.0	1.8
Tuberculosis, all forms	7.0	1.6	Human immunodeficiency virus disease	8.8	1.4
Paralysis, all types	5.9	1.3	Tuberculosis, all forms	7.7	1.2
All other causes	241.0	54.0	All other causes	344.0	55.0
Total	**448.0**	**100.0**	**Total**	**626.0**	**100.0**

Nutrition deficiencies (4-6% of all deaths) were high only in the period of 1958-1970. Malaria disappeared among main causes of death in 1990, and certain diseases prevalent in the first year of life (e.g., diphtheria, measles, whooping cough, pneumonia and diarrhea) also receded in importance after 1970. By contrast, tuberculosis and pneumonia still remained as important causes of death. Now, however, Thailand faces newly emerging diseases such as HIV which became the eighth leading cause of death in 2007 (Chuprapawan, 2003).

According to Omran's epidemiologic transition (1971), Thailand seems to deploy the contemporary delay model, but current mortality burden has become a protracted-interruption of infectious diseases and typified the first transition starting with declining mortality from pandemic or infectious diseases in the mid-1950s. The second transition, however, began around 1980 when NCD started growing as the main cause of death.

Thailand's mortality patterns are similar to the currently industrialized countries. However, there are left-over ills of infectious disease which have reappeared after a significant decline in incidence such as malaria or tuberculosis, and there are also so-called new emergent diseases such as HIV or new strains of influenza (i.e., 2009).

In addition, if we study the interaction of the phenomena of the demographic and epidemic transitions, this may help us more clearly understand the changing disease pattern. From the last step of the demographic transition (increase of old age mortality) it is necessary to understand the age structure change as a result from changing mortality and fertility rates under the four distinctive stages. The first stage is a young population structure before the demographic transition. The continuation of uncontrolled fertility and high mortality keeps the age distribution young. Then comes to the second stage of the typical sequence of the demographic transition, in which significant mortality decline precedes that of fertility decline. The reduction from very high levels of infant mortality raises the population growth rate, including increases the number of young children (0-15 year) in particular. The third stage occurs when significant decline of fertility starts.

Falling fertility causes a continuous decrease in the proportion of young children in the population, thereby making the age distribution older. This stage should be called the stage of fertility-dominated population ageing. The fourth stage is mortality-dominated population ageing, as most developed countries are experiencing at present. After the completion of the demographic transition, fertility remains relatively stable, and there are further reductions in mortality. At this stage, the major driving force of mortality of population is degenerative diseases of the elderly, or so-called mortality-dominated ageing. Thailand is moving toward the completion of its demographic transition as indicated by the proportion of children aged 0-14 dropping

from 45.1 percent in 1970 to 21.2 percent in 2010 while the elderly steadily increased from 4.9 percent to 11.9 percent, respectively (UN, 2009)

From mortality and morbidity data in the USA from 1970-1980, it has been suggested that in the fourth stage (era), after passing three stages of epidemiologic transition or "delayed degenerative diseases," the relative decrease in mortality from degenerative diseases is strongly associated with advances in medical treatment and beneficial changes of life style. Nevertheless, several degenerative diseases remain as the primary causes of illness and death. It is reasonable to expect that there will be continuously increasing survival of the elderly and a decline in mortality due to degenerative diseases in the future (Olshansky & Ault, 1986).

2.1.2 Current morbidity and mortality in Thailand

During 2000-2012, it was estimated 400,000 deaths occurred each year, 56-58% of which were male and 42-44% female. More than a half of all deaths involved people aged 60 years or older, of which around 170,000 were people aged 70 years or older. The disease pattern shifts from acute/pediatric to chronic disease/elderly and displays the gradually increasing trends of death at age 75. It obvious that the median age at death is being pushed further in the direction of older ages and in the coming decades, morbidity and mortality of the elderly will become the major health problem due to replacement of a larger proportion of mortality along with the increasing need for more health and social services, especially after age 75.

The process of mortality decline is also related to changes in age pattern of mortality, in sex ratios of death or in cause of death. Thailand, like other countries, exhibits the virtually universal age patterns of mortality: High at both ends and lowest in the middle or U shape which is typical of developing countries. These age patterns of mortality are used to construct life tables which resemble the Coale-Demeny Model life table Region West. The mortality level in males estimated from life expectancy at birth of 69.6 years is 22.4 while that in females estimated from life expectancy at birth of 77.7 years is 24.0. With the continual decline of infant mortality and gradual increasing of elderly mortality rate due to the older age structure, the overall age patterns of mortality are similar to the earlier patterns. In fact, the death rates of males are higher than that of females in all age groups.

According to Public Health Profile of Thailand (Kanchanachitra & Podhisita, 2011), the physical health of Thais has steadily improved. The average life expectancy of Thais has increased to 69.5 and 76.3 years for men and women respectively. Mortality rates of those of working age are falling. According to our 2009 study, the top causes of healthy life-year losses are alcoholism in men and diabetes in women. This replaces HIV/AIDS which was the main cause of mortality in 2004. Furthermore, cancer and accidents remain top causes of death among Thais. CVDs, especially hypertension, coronary heart disease and diabetes, are on a rapid and steady rise and require immediate attention to ensure prevention and care by all sectors of society involved.

For the health behaviors, the survey has found improvements in many ways. There has been a notable decrease in the number of smokers, those who consume alcohol at dangerous level and those with inadequate physical activities and exercise. Bad diets–both inadequacy and overconsumption–remain a concerning issue. Fruit and vegetable consumption is declining, while consumption of fatty fast food, snacks and carbonated drinks is on the rise, especially amongst children. The National Health Examination Survey of 2008–2009 found 34.7% of Thais over 15 years old were overweight and 32.1% were obese. The increased rate of teen pregnancies especially in the lower age group of 10–14 years old is a serious concern in the area of reproductive health and sexual behaviors that needs special attention and care. The environment seems to be improving overall–whether it's air, particulates, water, garbage and unpleasant odors–but cooperation to improve the quality of Thailand's environment remains vital.

Furthermore, after the "Universal Coverage of Health Insurance" policy came into effect, almost 100% of Thai people are guaranteed access to essential health services, with lower burdens and risks associated with medical expenses. The number of households impoverished by medical expenses decreased from 280,000 households in 2000 to 88,000 in 2008. However, government health subsidy remains unequal, especially in–patient services, with a tendency to favor the rich rather than the poor. Similarly, there is unequal distribution of health–related resources, especially personnel and medical supplies. There's a highly uneven concentration in terms of efficiency in this regard.

Given the economic development, modern medical knowledge, social protection and access to improved health services, the average life expectancy of Thai people is on a steady rise. According to the mid-year 2011 population projection, the average life expectancy at birth (e_x) of Thai population for males and females are 69.5 years and 76.3 years, respectively. If they live to be 60 years old, they can expect a further 19.4 years for males and 21.9 years for females. In 2009, the Health-Adjusted Life Expectancy (HALE) of newborns was 92% (men) and 88% (women), decreasing to 75% and 73% at 60 years old, respectively. Women have higher rates of HALE loss. The main causes of HALE losses are alcohol dependence, harmful alcohol use and traffic accidents for men, and diabetes and stroke for women.

Thus, nowadays, the proportion of cause of death according to three categories after adjusted cause-specific mortality fraction (CSMF) of Thailand in 2010 reveals that 67.8% of all deaths were due to NCD, 14.4% to infectious diseases, 12.5% to external causes of death, and 5.1% were due to ill-defined condition. The leading causes of mortality in males are cerebrovascular diseases, traffic accidents, and HIV/AIDS, while females usually die of cerebrovascular diseases, diabetic mellitus, or ischemic heart disease (Porapakkam et al., 2010).

2.2 The concept of health and its proximate determinants

The World Health Organization (WHO, 2008) has defined health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". The concept of health based on a sociological perspective may be more applicable to pre-modern societies and aspects of religious purity. This perspective is characterized by lack of knowledge related to hygiene and germ theory regarding illness (Turner & Marino, 1994). Illness is not only caused by neglect of hygiene but also by poor health behavior, social norms or restrictions (Turner & Marino, 1994).

During the industrial revolution in the 19th century, materialistic pursuits and urbanization actually reduced hygiene and environmental health. Accordingly, life expectancy at birth was as low as 40 years (Donkin, Goldblatt, & Lynch, 2002). In the current century, the determinants of health and life expectancy are now chronic

diseases, pollution, toxins, medical care, nutrition, physical activity and access to firearms. Donkin (2002) argued that the material perspective influence on health inequality and differential health services accessibility, while the psychological perspective suggested that health inequalities between areas is not an significant factor (Donkin et al., 2002). The effects of both endogenous and exogenous factors on individual health are discussed in the next section.

2.2.1) Biological factors, personality and early life conditions

Physiology, hormones and genetics are some of the biological factors that play necessary roles in affecting health over the life course. Social scientists are paying more attention to biological factors due to the effects of social factors on health through biological mechanisms and processes, while resistance against disease of people involves, in part, genetic factors (D. R. Williams & Collins, 2010). Williams and Collins stated that the individual characteristics of behavior and cognitive function affect personality (as relevant to Kessler's work), and some personality variables impact moderately on people's health. The variables' group was considered to be composed of helplessness, confidence, compulsion, hopelessness, hot temper, hopelessness, suppression and rejection. If the early life experiences dominate an individual's health later in life, people who have experienced infectious disease in childhood tend to have chronic diseases in adulthood or even late in life (D. R. Williams & Collins, 2010). A study of early experience and effects on health found early life experiences may be a cause of health status levels through diverse socio-economics in the well-organized brain. The latent effects, pathway effects, and cumulative disadvantages accumulate and are considered to be an influencer of health status (Hertzman, 1999).

2.2.2) Health-related behaviors and lifestyle

The critical influencing factors of people's health are lifestyle and behavior (D. R. Williams & Collins, 2010). For example, diet behavior, cigarette smoking, alcohol consumption, drug abuse and physical activity are health-risk related behaviors, or can also be health-promoting behaviors. A study about the relationship between adult health status and health behavior such as diet and exercise found that

health behaviors were assumed to be effectors for observing teacher's evaluation of immature trait characteristics and middle aged self-reported health status (Hampson, Goldberg, Vogt, & Dubanoski, 2007).

The important determinants influencing population health are not only health policy and investment in medicine but also accessibility and utilization of medical care (Blater, 1990). Moreover, health facilities are important factors which are the basis for preventing and treating illness. However, poor health seeking behavior may derive from social and cultural limitations, or could be affected by disadvantaged implementation of organizational policies and practices (Thammatach-aree, 2011). To prevent the disease, the health education and promotion programs should be encouraged by changing and increasing the knowledge and understanding.

Health-related behaviors related to health status include several behaviors, among them are cigarette smoking, alcohol consumption, dietary patterns and exercise which will be described in more detail below. Exercise, as related to heath status, will be described in Section 2.2.6

- **Cigarette smoking and other tobacco use**

Smoking of cigarettes and tobacco is reasonably considered to be "the risk factor of the century" and being an independent risk factor for CVD by an estimated 12% of all disease burden and over 20% of CVD in developed countries by vascular diseases as a major public health burden attributable to cigarette smoking. The tobacco smoking exposure increases the risk of CVD because of itself and other risk factors, including lipid abnormalities and other abnormalities of red blood cell chemistry. The health hazards of lipid abnormalities indicate increased low density lipoprotein cholesterol, very low-density lipoprotein cholesterol, and increased carboxyl hemoglobin. The signs of red blood cell abnormalities are increased platelet aggregation, chronic reduction of fibrinolysis, increased BP and vasoconstriction, and cardiac arrhythmias (Tracy, Julie, Amy, & Andrew, 2011).

Cigarette smoking effects will increase the probability of dying from heart disease and stroke for both males and females and CHD in youth of both genders. Inhaling the smoke from others' use of tobacco, cigarettes and cigar has become a serious health problem that could increase risk of CVD among non-smokers (World

Health Organization, 2002c). In addition, chance of CVD mortality increases by 2-3 fold for secondary exposure to tobacco smoke. Among urban/industrialized countries where smoking has been common, CVD prevalence is estimated at 22% and 4.5 million deaths (Solar & Irwin, 2010). Recently, WHO tobacco will be responsible for approximately 12.3% of global deaths by year 2020 and over 12% of all deaths in India and China (J. Wardle, 1999). The effects of cigarettes have become an important CVD risk factor for women smokers after menopause and women in reproductive ages that use oral contraceptive. Furthermore, the WHO MONICA Project has shown that CVD risk factors negatively influence blood cholesterol and BP, so the reduction of CVD mortality is almost 50% when these factors can be decreased (Wardle & et, 1999).

The global trends show more young smokers, especially young women, and past smoking is an important factor to increase the risk of CVD in women after menopause, including the women (aged 15-49 year or reproductive age) who used the contraceptive method (Wardle & et, 1999). In the past few decades the number of smokers have increased in developing countries while, in many industrialized countries, there is a decrease of smokers, particularly among males. To sum up, the increasing numbers of smokers in developing countries are reversing the decline in several developed countries. Smoking rates, especially among young people and women are increasing in some low and middle income countries. Smoking increases risk of mortality through lung cancer, cancer of the upper digestive tract and other cancers, heart disease, chronic respiratory disease, and a range of other medical conditions (Wardle & et, 1999).

- Alcohol Consumption

Increasingly, alcohol consumption is having a harmful effect on health. Actually, the amount of absolute alcohol in grams is determined by the amount of alcohol in each beverage times the number of beverages per day. Thus, one-half ounce shot of 80-proof spirits, a 12 ounce bottle or beer and a 4 ounce glass of wine have the same amount of alcohol and can be called "drink equivalent" (Lee, Crombie, Smith, & Tunstall-Pedoe, 1990; Makela, Valkomen, & Martelin, 1997).

Moreover, the relationship between some levels of intake (1-2 drinks per day) with lower risks of CHD is interesting, in that it can help to reduce risk by approximately 30-50% (Makela et al., 1997). The relationship between alcohol consumption and CVD was studied and it was found that drinkers with lower consumption have lower risk of the most common cardiovascular condition such as CHD) (Klatsky, 2004). This is similar to the study about the effect of alcohol consumption on coronary heart risk that found indirect CHD because of several cardiovascular-related biochemical, e.g., HDL (high density lipoprotein cholesterol) and adiponectin at higher levels;, fibrinogen was also lower (Susan, 2011).

- Dietary patterns

The relationship between CHD risk and dietary fat was studied by using many approaches; one method would control feeding studies and study outcomes such as plasma lipids, limited randomized trials, and large cohort studies. All studies found that CHD cause and prevention may rely on specific dietary fatty acids (Willett, 2012). Moreover, dietary imbalance indicates the relative excessive or deficient nutrients in dietary pattern of the population or an individual, and may also relate to energy intake and burn out. Dietary imbalance may become a dominant effect of fat from insufficient gain of complex carbohydrates and fiber or over-intake of calories through habitual physical activity. The relation of dietary and coronary disease showed that increasing risk of CHD is associated with red meat consumption in high levels, but CHD risk can be controlled by alternative protein sources (Bernstein, 2010) such as fish, and also higher intake of fruits, vegetables and whole grains. The last referred group have decreased the risk of developing hypertension as well (Shilpa & Katherine, 2011).

2.2.3) Socio-economic -Demographic factors

- Age and gender structure factor

Age is an important determinant of health. The association of age and death was introduced as a well-known law of mortality by Gompertz who observed death rates of European populations in the nineteenth century that showed how the

relationship increased geometrically, while population's age showed arithmetical progression (Gompertz,1825:513,cited by(Olshansky & Ault, 1986)

The study about the rate of CHD mortality in member states of the EU found the younger age have lower CHD mortality than older age groups because of smoking rate reductions in the former group (Melanie, Nick, Peter, & Mike, 2013). Conversely, CHD mortality is higher in the elderly population, whereas lower smoking rates have interacted with increased rate of the obesity and diabetes.

Moreover, The United Nations (1989) found age differentials for health. For example, the children and the elderly have higher morbidity and therefore need more health services. The threshold for the higher morbidity rates were found for those over the age of 50 in Bangladesh. However, the very elderly females were particularly vulnerable because they did not have easy access to health service, many were poor and faced gender inequality in food distribution (J Randel, German, & Ewing, 1999).

There are gender differentials in health status as explained by researchers who studied both developed and developing countries. Greater female longevity was observed as early as 1662, but the general public only realized the sex difference in mortality in the twentieth century (Nathanson, 1984). There are two interpretations about gender differences in mortality: Biological and behavioral. The biological perspective has focused on genetic and hormonal mechanisms, but there is no supportive evidence, and suggested that estrogens may be providing prevention against CVD (Petretta, 2010). The behavioral/environmental perspective at the individual level states that gender differences in health result from each gender's exposure to risk factors; and from self-protective behaviors through socialization processes and life styles (Vlassoff, 2007).

Nathanson (1984) argued that men and women have dissimilar exposure to social and psychological stress. Women tend to be diagnosed through higher self-reported morbidity; therefore, women may receive early treatment and care for their illnesses (Nathanson, 1984). Moreover, nutritional dietary status in women is significantly lower than men in Zimbabwe (Hindin, 2000). Use of social and health care services by the elderly depends on gender factor as well (Coulton & Frost, 1982). Female elderly prefer activity with leisure and pleasure, but elderly maleelderly are more likely to rely on personal care service since life skills are fewer. Phillips and

Verhasslelt (1994) stated that gender inequality had differential characteristics in varied societies (Phillip & Verhasselt, 1994). The health service utilization between men and women differs, and many studies found an association with geographical, economic and cultural factors. Moreover, the reports suggested women had self-selected health services and also chose for other family members. In developing countries, young Egyptian women had obtained home care but men and mothers-in-law preferred to visit the doctor. Thus, unequal health services accessibility results in inequality of health (Rafei, 2001).

Pol & Thomas (1992) showed that females were more attentive to their own health and made better health care service choices than males did, and the rates of medical consultation of females were higher than males. On the contrary, men sought more advice from professional doctors and were more likely to be treated by professional doctors whereas women would be treated as inferiors (Westbrook & Viney, 1983). Nurses tended to treat male patients with tenderness and well-mannered caring. Both males and females have been affected by the inequality of health services accessibility (United_Nation, 2001). Comparisons between women and men by socio-economic statuses examined the accessibility of health care and information, and found that rates of morbidity and disability were higher in women.

- Marital status

Marital status is considered to be a key indicator affecting morbidity and mortality. According to the study of marital status, health and mortality, it was found that unmarried persons have generally experienced poorer health and more risk of mortality than married persons, especially for men (Robards et al., 2012). For the elderly population in developing and developed countries, health risk for elderly females elderly increased more rapidly than for males, particularly in developed countries (United_Nations, 1999). Most widows or divorced females tend to live alone, and need more health care and social services.

The relationship of marital status with physical and mental illness is significant, as the death rates of the married couples were lower than the unmarried, perhaps because of watchful selection. Married couples tend to live healthier lifestyles, well-being, and good protections. Marital status, particularly in women, is linked to

financial security since most unmarried elderly life were more prone to illness(Judith Randel, German, & Ewing, 1999-2000). The widows' behaviors both in lifestyles and eating are less nutritious, and may interact with occurrence of psychological problems such as depressive disorder.(Louis G & Richard K, 1992) suggested that marital status was considered to be an indicator for health service utilization with various personalities.

In addition, while life expectancy among men is lower, divorced or widowed men tend to remarry. For single women, however, life quality decreases rapidly after widowhood or single living. In sum, the population has varying death rates between males and females, there is usually an age gap between husband and wife, and women tend to be more single later in age (United_Nation, 2001).

- Socio-economic status

The relationship between socio-economic status (SES) and health have been addressed by many studies. The general conclusion is that people with lower SES have lower health status but the relation between SES and health is less clear. Some studies found that people have better health because of higher SES, while the others insist that lower SES is a cause of poor health. In other words, people of low SES are prone to premature CHD and also have higher risk factors(A. M. Clark, 2011). In the United States, it has been found that SES is associated with CHD mortality in males but not in females (Labarthe, 1998). Another study found the lower SES groups have more risk of CHD (A. Clark et al., 2009) and also have low access to the professional medical care system (Pamuk, Makuc, Heck, Reuben, & Lochner, 1998).

The most common variables used to determine the SES are income, education and occupational level which are now discussed.

- Education

Education is positively related to health, and affects it in both direct and indirect ways. Higher educated people are more likely to be employed and have a higher salary, they may have higher levels of social support and have less health risk behaviors and have better access to health care services. Some studies found education is inversely associated with CHD (E. Loucks, 2011; E. B. Loucks, 2012).

The UN stated that education is an important determinant of health and death, both at the personal and household level in developed countries. Education and income are inter-related since a person's education enhances income and, inversely, income indicates personal education. Education may leverage individual social status and life with higher quality that provide the best options for health service utilization. After WWII, the education systems were widely expanded but the elderly have gained poorly for health service utilization. Life expectancy is significantly related with education in Lithuania. (United_Nation, 2003).

For the study in 14 European countries, males aged 65 year or over have higher rates of secondary education in 11 out of 14 countries. The people who live in rural areas can get by with less education and literacy rates than people in the cities. During 1979-1989 in Russia, the death rates were higher among the less than the higher educated because the level of education relates to infectious disease, parasitic disease, respiratory disease, accidents, violence, suicide, and alcoholism (Kalediene & J., 2000; Shkolnikov & other, 1998).

For the elderly men and women in Asia, inequality of education increases at secondary and tertiary levels, and the elderly are less educated that the younger generation. The literacy rates in developing countries were lower in female elderly than men, but working-age females had higher literacy rates than men. Education and health are related for the elderly, and the higher-educated elderly can better adapt to changing socio-economic environment compared to the lower-educated elderly citizens (United_Nation, 1996).

In the case of developed countries, the inequality of education during 1970-1990 in Finland was linked with health crisis and death. The education level, particularly in women, was a more significant factor for heart disease than income or occupation. During 1960-1986 in the US, the death rates of the people with low income and less education between 25-64 years of age were higher than for the rich and the higher-educated. (United_Nation, 2003). Moreover, some reports showed the benefit of joint investment in education and health because they supported each other. The population with better education and health usually have a high standard of living (Amaducci et al., 1998).

- **Occupation**

Different occupations affect different health risks; it was observed that the mortality rates of people in manual occupations were higher than those in non-manual work (Adler & Newman, 2002). Williams and Collins (1995) argued that occupational status can be a better indicator than income in health studies, and also be an outcome of health (Wilkinson & Marmot, 2002). Therefore, the workers with good occupations had good health (Pol & Thomas, 1992). Nilsson et al. (2005) found that male workers, both non-manual and manual laborers, had higher cardiovascular mortality risk than high-level manual workers (Engström, 2006; Nilsson et al., 2005). The government officers had more income security and others benefits including a stable choice of health services, whereas most people in the agricultural sectors had lower incomes. In the business sector, especially during an economic crisis, most small entrepreneurs face higher costs and fewer customers, and this negatively impacts on health service utilization (Catalano, Dooley, & Jackson, 1981).

- **Economic situation**

Social scientists have increasingly focused on income inequality and health in recent decades since the higher income and social status is related to well-being. The more inequality of income, the more differences in health (Kawachi, Kennedy, & Wilkinson, 1999a). The evaluation of relationship in adulthood between socio-economic situation in premature and low self-rated health found that financial difficulties have higher risk of low self-rated health (Regidor et al., 2011). The UN report on growth and demographic structure in the developed countries found income to be related to health expenses that increase quickly in the first year after giving birth and declined later, but that the expenses could increase once more when elderly. Hence, household income had reflected both direct and indirect impacts on morbidity and death (United_Nation, 2001).

In North Korea, the household health expenses increased depending on higher income. The heads' of family aged 30-44 years pay less on health care than the elderly in the family. For the survey in South Korea, the proportional data of household health expenses in 1985 showed that 65% were for medical consult, 32% for medication, and 3% for medical equipment. The household expenses with the

elderly and heads' family aged over 55 years represented 68% for medical consult, and 27% for medication. The proportional data in 1988 are inversely as follows: 52% for medical consult and 44% for medication. The data from North Korea and South Korea showed that the elderly had to pay more on health costs.

A study in Thailand found no relationship between reported acute illness and income (Umeh & Rogan-Gibson, 2001). A study of illness during the economic crisis in 1997 showed that health was affected by the first healthcare selection (Hanjansit, 2000). More patients with respiratory or muscular disease or osteoarthritis chose not to these a doctor at public or private hospitals including health centers and clinics, and preferred alternative medicine choices or pharmacies for care and medicine.

Moreover, the inequality of health services accessibility is the major problem of disease prevention. People who are poor and malnourished are more prone to illness when they could not obtain the primary or effective health care (Hanjansit, 2000). Most of subsidy was given to private health services by the government to generate more benefits for the rich than the poor. The costs of operation and treatment were rising more rapidly than income. As a consequence people could not afford to pay for higher standard treatment. Since people can spend more on their health because of higher income, the government should promote improved economic status of the population

The needs of health care services expand with physical deterioration of aging and isolated living of the elderly. The elderly are often forced to choose the lower-quality or nearby health services to avoid higher expenses for health. Thus, economic conditions have significantly impacted on health among the people with risk of chronic diseases and psychological problems (United_Nations, 1999).

- Residential area

Aggregate level studies or ecological studies are interested in the rate of morbidity and mortality in the areas compared with various statuses indicators. Independent and dependent variables are measured for groups and variability in outcomes across groups is examined as a function of group level variables (ACSM, 2000). SES of the community or area are related with most health outcomes at the

individual or group level and are a simple way to measure SES at the individual level in the ecological studies. Moreover, the socio-economic position may predominately explain the distribution of resources. The specific SES factors for individuals correlate with the physical and social infrastructure by health outcome and individual compositional aspect (ACSM, 2000).

The rate of morbidity and mortality in the area are related to mean SES of residents. The units of analyses are often used in census blocks and tracts, postal codes, metropolitan statistical area, states, and counties. The socio-economic level of the residents in one area, median or per capita income, deprivation scores, percent in poverty, unemployment, median level of education, and income, are converted into a composite index (ACSM, 2000).

The SES of the area is closely related to psychosocial factors and social infrastructure by their influence on health, while health related behavior was independent of individual and household SES (Haskell & LEE, 2007). The United Nations stated that over-population in the rural areas has led to increased migration to urban slums. In cities, he rates of morbidity, death rates and illness would rise and health costs would increase more for the lower-income (United_Nations, 1999).

In China, the government supports health care services which are more effective and accessible in the city than in the countryside, and the elderly obtain free medical care. A survey in 1988 found that the rural families could only pay 80% for cost of medical consults and 84% of the cost of medication. Also, in India, the elderly in rural areas could not access health benefits or proper health care (United Nations, 1996).

Kaufman, et al (1997) reported that the subsidy for health care programs like medical staff development and free health care services is offered to more cities and this benefits the wealthy more than the poor. To obtain affordable treatment cost in the rural areas, people had to pay for transportation with long wait times and low quality of service (Kaufman, Cooper, & Mcgee, 1997). Randel, German and Ewing (1999) indicated that most of the elderly live in the rural areas but health care services are concentrated in the cities. As a result, the elderly choose self-care by buying drugs or praying (J Randel et al., 1999).

Chamroonsawasdi (2010) found that the elderly in the city inclined to utilize modern health care more than the rural elderly. This study also found that some elderly self-treated because they did not want to burden their children with the cost and trouble of visits to the doctor.

Snider (1982) found that the urban and rural elderly are alike in choosing over-the-counter drugs and government hospitals (CDC, 2010). This study also found that the people in the urban area are inclined to select private health services whereas those outside the city will select the public outlets (Tunprayoon, 1989).

2.2.4) Psychological factors

- Attitudes and knowledge toward action

Theories of health behavior such as Social Cognitive Theory and the Theory of Reasoned Action see knowledge and attitudes as only two attributes of pathways that induce health behavior (Avis NE, Smith KW, & JB, 1989). Many studies found that health information can facilitate awareness about benefits of healthy practices. Several studies explain the positive influence of health information on health practice. For example, one study found that more people use hearing aids when they received knowledge about how to use hearing aids and benefits (Chamroonsawasdi, 2010). Residents of a semi-urban community of Nepal were assessed for their knowledge, attitude, practice and behavior related to cardiovascular health. The study found lack of knowledge was a cause of CVD-risk behavioral factors such as smoking more frequently. Response delay related to unhealthy diet and obesity (W. Chen, Yu, & Glaser, 2009). Knowledge about influence of tobacco smoking on stroke and heart attack were linked with lower active smoking and exposure to passive smoking in Vietnam (An, Minh, Huong, & al, 2013).

Furthermore, WHO encourages more awareness on diet and physical activity as suitable for improving cardiovascular health (Mendis, Puska, & Norrving, 2011). To achieve the desired health behavior it is important to have a deep understanding about the underlying social context of disease (Pearson, Bazzarre, & Daniels, 2003). Understating the knowledge, attitudes and practices (KAP) would help to explain cardiovascular health and community behavior (Khan, Jafary, & Faruqui, 2007). In addition, the report showed that lack of knowledge and attitudes about

diabetes was related with high prevalence to behavioral risk factors, especially in consumption of tobacco and alcohol in Nepal (Vaidya, 2011).

On the contrary, a study in Iran found that health literacy level was not significantly associated with health practice, such as mammography, utilization of emergency room, and reporting ill health (Javadzade, 2012). This result may be because the received health information was not sufficient to raise awareness about the positive impact of good health practices.

- Perceived benefits and barriers toward action

The perceived benefits are defined as beliefs of positive end results to a perceived threat with a behavioral reaction. The construct of perceived benefit is applied to health behaviors and is specific to an individual's perception of the **benefits by accumulating and engaging in a specific health action**. The perceived benefits of exercise has the first priority concern and followed by healthy in mind and prevention including life enhancement and social (Lovell, Ansari, & Parker, 2010 March;).

A study of the relationship between a breast self-exam (BSE) and perceived benefit is important because when breast cancer is found earlier there is more chance of survival. With BSE there is earlier detection, but not all women check with BSE. If women believe about the benefits of adopting this behavior they did BSE more frequently (Graham, 2002).

The Health Belief Model (HBM) is based on the perceived barriers to change as a personal evaluation with hesitation to adopt and change to a new behavior that mainly determines behavior change (Janz & Becker, 1984). A person needs to believe the benefits of the new behavior over the past behavior (Centers for Disease Control and Prevention, 2004) and then new behavior will be adopted. The barriers are the difficulty to change patterns of behavior, developing a new habit, fear of not being able to perform the practice correctly, or being embarrassed to try (Umeh & Rogan-Gibson, 2001). A study about exercise in the United Kingdom found physical exertion was a more important perceived barrier than other barriers such as time wasting, exercise background, and unsupportive family. The physical activity program was designed for people who perceived a high benefit/barrier (Geoff P. Lovell et al., 2010).The level and possibility to take part in leisure time physical activity (LTPA)

are related to various perceived barriers that can be reduced by provision of relevant environmental opportunities and social support (Cerin & Leslie, 2010).

2.2.5) Community factors

The community factors are defined as the availability of exercise facilities, exercise instruments, exercise leaders or instructors, and friends' support. The conclusion has been assumed that if the community has better facilities and environmental support, this will motivate people in their community to exercise and lead to good health.

There are many articles and research to support the strong relationship between surrounding environment, health and exercise behavior. The study of exercise in England found not only the neighborhood, but the adaptive environment and also school and peers have strong shared environmental effects on behavior. These factors may all be related to approach and the chance to exercise (Robert, 2003; J. Sallis et al., 2000). Another study found that improving the physical activity level and physical health by using suitable exercise programs for community groups that involve members of the community in active engagement and participation can be effective for behavior change (Hicks, 2013; Stuart, Benvenuti, Macko, & Taviani, 2009). Furthermore, parenting behavior may be one of leading influences on children's exercise by creating an atmosphere of exercise (Beets, Cardinal, & Alderman, 2010; Trost et al., 2003). The relations between mother–daughter and father–son for physical activity has higher correlation than opposite gender interaction; therefore, the shared family atmosphere tends to be an effective process to achieve interventions on childhood exercise behavior (Trost et al., 2003).

Furthermore, the communities that have exercise facilities such as sports clubs, equipment and physical presenters or coaches as conditional support during people's exercise activities have greater success in increasing the percentage of people who exercise (Robert, 2003; J. Sallis et al., 2000)

2.3 Exercise

2.3.1 Definition of exercise

Exercise has been defined differently across studies. The US National Institutes of Health states that an exercise is one kind of physical activity of patterned performances and energy utilization to develop and maintain good health (Robert, 2003).

The Department of Health, Ministry of Public Health In Thailand (MOPH-Thailand, 2008) defines exercise as an means of force utilization and energy in order to make the body strong and better functioning. The meaning of exercise for health is an exercise for burning up fat with oxygen for a long period to improve endurance of lungs, heart and blood circulatory system.

More specifically, physical activity is clarified as a movement that requires condition for skeletal muscle contraction and results in energy burning beyond resting levels (Caspersen, Powell, & Christenson, 1985). This work can be performed as part of the daily requirements of the job or around the house (mopping, sweeping, etc.), or leisure time (also known as recreational) activities. Accurate assessment of the level of physical activity in large populations becomes important in epidemiologic studies investigating associations between health benefits and physically active lifestyles.

Exercise is best established in a structurally designed program for enhancing a state of physical exertion by certain intensity, duration, and frequency (Caspersen et al., 1985). Generally, exercise programs are designed with specific goals in mind. Such goals can range from improving athletic performance to improving or maintaining health. Unlike physical activity, exercise programs can be tailored to one individual. Furthermore, the intensity, duration, and frequency can be manipulated to produce the desired goals. For these reasons, exercise programs are implemented in interventional research studies to assess the effects of exercise on a specific physiologic parameter, such as BP, body weight, blood lipids, etc.

2.3.2 Exercise recommendations

American College of Sports Medicine (ACSM) (2000) found that to gain health benefits, people should workout using a moderate intensity of at least 60-74%

of maximum heart rate for 30 minutes or more. For best results, this kind of physical activity is practiced at least 5 days of the week. Other regimens include 20 minutes of vigorous-intensity exercise (75-85% of maximum heart rate), and on 3 or more days per week (ACSM, 2000) as shown in Table 2.3.

Table 2.3: Exercise recommendations for improved overall health

Intensity	**Duration**	**Frequency**	**Examples**
Moderate (60-74% of maximum heart rate)	30 minutes or more in one long bout or several 10-minute bouts	5 or more days of the week	-Brisk walk for 30 minutes -10 minutes of walking, -10 minutes of playing tag
Vigorous (75-85% of maximum heart rate)	20 minutes or more	3 or more days of the week	-Jogging for 20 minutes -Spinning class

In addition to these population-based studies, several experimental studies led exercise scientists to examine the effect of intensity level as well as the minimum length of each bout of activity. A study by Haskell and Lee (2007) revealed that several short bouts such as three 10-minute sessions of moderate-intensity to vigorous-intensity activity in a day produced similar improvements in health-related outcomes compared to one longer bout (e.g., one 30-minute bout)(Haskell & LEE, 2007). Another study by Ebisu (1985) demonstrated that three shorter sessions of exercise can enhance fitness and yield greater improvements for HDL cholesterol than one or two longer sessions. Thus, both vigorous and moderate-intensity activity have important health implications, as do both continuous and accumulated bouts of activity (Ebisu, 1985).

It is recommended that a physical activity for adults should be in moderate-intensity mode for at least 30 minutes and at least 5 days of the week (Haskell & LEE, 2007). This is similar to the policy of the U.S. Department of Health

and Human Services, which recommends 30 minutes of physical activity per day to prevent chronic disease and at least 60 minutes per day to manage weight (USDHHS, 2005).

2.3.4 Types of Physical Activity

There are many kinds of exercise, variable by age, for persons with special physical conditions, which can be used for continuous exercise with no danger, and good outcomes. There are five types of this exercise as follows (ACSM, 2006):

Isonomic exercise

This type of strength training is a dynamic between joint angle and muscle length without change in static positions during contraction called for dynamic/isotonic movements. Examples of isotonic movements are lifting weights, calisthenics, and swimming, rock climbing and cycling.

Isokinetic exercise is a strength-typed training for skeletal muscles to enlarge size through concentric or eccentric contraction by using weight equipment with resistive force of gravity. Weight training uses a variety of special techniques to target muscles and type of movement, and the examples are weighted bars, dumbbells or weight stacks.

Sports is strength-type training and may include many kinds of movement such as bodybuilding, weightlifting, powerlifting, strongman, highland games, shot-put, discus throw, and javelin throw. Many sports use one part of strength training in their regimen, e.g., mixed martial arts, American football, wrestling, rugby football, track and field, rowing, lacrosse, basketball, baseball and hockey. Strength training is becoming increasingly popular.

Anaerobic exercise is an exercise which promotes lactic acid formation that is useful in non-endurance sports for promoting strength; speed and power including the example of body builders to build muscle mass. The energy system of muscle training in anaerobic exercise is useful for greater performance in short durations (one second up to about 2 minutes) and high intensity activities. Any activity lasting longer than about two minutes becomes an aerobic metabolic system exercise. The examples of this are weight lifting, sprinting, and jumping.

Aerobic activity is any physical activity with large muscle groups and utilizes more oxygen than at a resting state. Examples of aerobic activity are brisk walking, jogging, football, basketball, swimming and bicycling, and these are very beneficial for the heart.

2.3.5 Exercise Components

For physical activity to yield health benefits, it must meet certain criteria and abide by specific principles. This section presents the components of exercise and the principles governing the physiologic changes and health benefits related to exercise.

The both type of aerobic and anaerobic exercise occurs in any physiological system brings to outcome in volume equivalent to a minimum amount of exercise or physical work is needed. The exercise volume depends on four factors that are referred to as *exercise components:* intensity, frequency, duration, and length (ACSM, 2006).

1. Frequency represents the number of exercise sessions repeated per week
2. Duration represents the length of each continuous exercise session
3. Intensity represents the strength of physical activity during the exercise session
4. Length represents the number in weeks or months the particular activity sessions are sustained.

Frequency

Frequency of exercises is the number of repeated times per week or year for physical activity. A report of the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommend that physical activity should occur on most days of the week and all days as the ideal to reduce some risks of chronic disease and improve quality of life (ACSM, 2000). According to the ACSM, the minimum frequency of vigorous exercise needed to increase cardiorespiratory fitness is 3 days per week (ACSM, 2000). The other health organizations recommend that exercise be performed three to five times per weeks.

Some additional improvements in fitness may be realized if a sixth day a week is added, but exercising more than six times per week yields relatively small increases in fitness and may even do more harm than good (Caspersen et al., 1985).

The frequency of participation in exercise is considered to be one important factor but not equivalent to exercise duration and intensity at a higher level. Some studies reported optimum exercise frequency should be three to five days per week but does not imply that six or seven days per week yields additional benefits. Therefore, the optimum frequency is simply the minimum time investment for the maximum health-related benefits. At the beginning, exercise should be limited to at three or four days per week increasing to five or more days per week in accordance with enjoyment and ability to tolerate. The first few weeks are usually a period of motivation and intention to exercise every day, but can be overdone, causing fatigue, soreness, injury or boredom. Thus, it is important to find the optimum frequency and duration for each individual that yields health benefits.

Cardiovascular fitness can also be improved by exercising only twice a week; this is especially true for de-conditioned individuals. This is strongly recommended as a start for sedentary individuals. A slow and progressive increase to three or four times per week should ensue when the individual feels comfortable. This usually occurs within the 4 to 6 weeks of appropriate training.

Duration

According to ACSM's Position Stand, the duration of any aerobic activity necessary to promote aerobic capacity must be at least 20 continuous minutes (Caspersen et al., 1985). In addition, several 10-minute bouts for total 30 minutes duration have been shown to yield equivalent results as one 20-minute bout.

Exercise duration is opposite to intensity of the activity, therefore, intensity of the activity and, therefore, intensity and duration can interact to produce the desired results. It is also possible that a high-intensity, low duration activity can yield similar results if the intensity for the same activity is reduced and the duration increased. Accordingly, manipulations in duration and intensity can be applied in different populations to make exercise safe and yet still achieve the desired health benefits.

A daily accumulation of 20 to 60 minutes of continuous exercise is recommended in the general population. For those unable to sustain long periods or for those who prefer it, intermittent bouts of exercise (10 minute minimum) can be performed several times throughout the day. This is also recommended strongly during the first few weeks of exercise. For example one can exercise either in the morning or afternoon for 10 minutes both. Similar exercise benefits can be derived if the volume of exercise (continuous or intermittent) is equal.

Generally speaking longer exercise duration offers added health and physical performance benefits (muscular and cardiovascular endurance). However, the rate of return for these benefits diminishes substantially beyond 60 minutes of continuous exercise. Thus, the small gain of benefits beyond 60 minutes of exercise and the increased risk for injury leads the author to recommend against exercising beyond 60 minutes.

The condition to enhance cardiovascular fitness should be endurance exercise in short periods of 5 to 10 minutes per day. But some studies suggested optimum exercise is 20 to 30 minutes. As noted, "optimum" is used to consider the time investment, and the specified time help to achieve a suitable exercise intensity period for each person (Morris, Heady, Raffle, Roberts, & Parks, 1953). The aerobic capacity improvements are achieved when the minimal threshold of both duration and intensity is exceeded by using one of two programs: either a short-duration, high-intensity program or a long-duration, low-intensity program. Moreover, exercise duration and intensity should be taken into account when analyzing a physical activity. Daily endurance training session can be more beneficial by multiple shorter bouts, e.g., three 10-minute bouts or a single minute 30-minute bout. Obviously, longer bouts will facilitate weight loads.

Intensity

Intensity is the most difficult to determine. This is especially true for aerobic type of work. Intensity can be viewed the degree by which exercise or the particular physical activity places a demand on the system (muscle, heart, or entire body) per unit of time. It can be described and quantified as a percentage of the

maximum work a system or an individual is capable of performing. For certain types of work, intensity is easy to quantify.

Normally, the more strongly one participates in activities with the time spent, the more in health benefits will be obtained (see Table 2.3). These activities are more helpful for heart and lungs, and also burn more calories than less forceful activity. However, the best fitness choice is moderate-intensity activities when exercising at a fast past over 30 minutes on most days of week.

Exercise intensity is characterized by ACSM and the American Heart Association (AHA) as being either low, moderate, or high intensity. As mentioned earlier, the most practical way to determine exercise intensity is to base it on the percentage of the maximum heart rate that the individual achieves and maintains during exercise. A more elaborate classification of exercise intensities based on MHR and HRR are presented in Table 2.4.

Table 2.4 Classification of Exercise or Physical Activity Intensity

Exercise Intensity	**HRR (%) or VO_2R (%)**	**MHR (%)**	**Activities**
Very Light	< 20	<50	Slow walk (25-30 min/mile), slow biking, yard work, dancing, etc.
Light	20-39	50-63	Walking the dog (20-25 min/mile)
Moderate	40-59	64-76	Brisk walk (16-18 min/mile), climbing stairs, mowing the lawn
Hard	60-84	77-93	Jogging at speeds of approximately 10-15 min/mile, tennis (singles), racquet ball, etc.
Very Hard	≥85	≥94	Running at speeds of less than 10 min/mile, basketball, soccer

2.3.6 Exercise Model

Popular exercises are suggested as follows: (Weinberg & Gould, 1995)

1. Walking or jogging.

This kind of exercise is well known because it is low cost and can be done alone or with a group. The difference between walking and running is that in walking, one foot always touches the ground with even pressure, whereas, in running, there is a brief moment when both feet do not touch the ground and there is more weight on the feet during contact with the ground. The elderly or people who have knee joints or ankle problem should avoid running; walking or swimming is a more appropriate exercise in those cases.

2. Body exercise

Stretching exercises are good for health in aging, joint movement and prevent fainting. Body exercise has many positions so that everybody part can work out and be trained for durability, strength, balance, and flexibility. For example: dancing, ballet, aerobics, and tai-chi.

3. Yoga

Yoga is a 5000-year-old discipline in physical and mental conditioning by combining breathing exercise and meditation to achieve a sense of balance and health. Yoga breathing is smooth and controlled with aspiratory length equal to expiratory length. Concentration meditation helps to improve sensing of the internal effects, maintaining calm, inner peace, and acute awareness. The nervous system and endocrine glands then increase circulation through the various postures. Many of the postures can be provide more benefits, but may not be applicable to older adults (Robert, 2003).

4. Bicycling

Regular cycling strengthens and improves the muscle tone of the legs, thighs, and buttocks, and is good for mobility of hip and knee joints. Generally, the muscle function will be improved slowly by cycling, and may be slightly painful if over exercising or straining.

Cycling improves general muscle function gradually, with lower risk of over-exercise or strain. Regular cycling strengthens leg muscles and is

good for the mobility of hip and knee joints including improving in the muscle tone of legs, thighs, buttocks and hips.

5. Golf

Golf might be considered a relaxing activity by playing at a slower pace and less constant movement than other sports. But there are exercise advantages to swinging a club and walking through 18 holes of a golf course.

6. Football

Football or "soccer" is commonly known and the most popular sport worldwide. This sport provides excellent exercise for both males and females.

7. Baseball

Baseball, like cricket, is a sport that involves using a bat to hit a ball that is pitched, and then fielded by other players. There are brief periods of running in between batting episodes.

8. Softball

Softball is a variant of baseball played with a larger ball on a smaller field.

9. Basketball

Basketball is a one of the most popular and viewed worldwide sports by played between two teams with five players on a court. Basketball involves continuous movement up and down the court with brief periods of stationary passing of the ball.

10. Lacrosse

Lacrosse originated from Native Americans and is a team sport played using a small rubber ball and a long-handled stick called “Crosse” or “lacrosse stick”. The head of the lacrosse stick is strung with loose mesh using for catch and hold the lacrosse ball.

11. Racquetball

Racquetball played with a small racquet to hit a hollow rubber ball in an indoor or outdoor court.

12. Boxing, Karate, Judo, Kickboxing

Boxing, Karate, Judo, Kickboxing are combat or fighting sports between two people who throw punches with gloved hands against as a test of strength, speed, reflexes and endurance.

13. Roller skating

Roller skating is a good sport for recreation or transportation by traveling on smooth, flat surfaces with roller skates.

14. Skateboarding

Skateboarding is an action sport which involves riding and performing tricks using a skateboard.

15. Tennis

Tennis is played between 2 players in singles or two teams of two players each in doubles. Players use a racquet to hit a rubber ball. This sport involves periods of sprinting and exertion.

16. Volleyball

Volleyball is a team sport between two teams, and each team of six players are separated by a net. Each team tries to hit a large rubber ball to the opponent so that they are not able to return the ball.

17. Ice skating and Skiing

Skating and skiing involve moving on ice or snow while wearing skates or ski boots. This activity involves strengthening of the legs and back and can be competitive (i.e., speed) or for leisure.

2.3.7 Effects of exercise on health and well-being

The effects of exercise are useful for health and certainly reduce aging, promote longer life and better self-healing. A health promotion specialist (Weinberg & Gould, 1995) observed that many persons in the physical education profession overstate the merits of regular exercise by making claims for its health benefits which cannot be adequately supported by sound experimental evidence. On the other hand, a physical educator may be remiss if he does not encourage habitual physical training now since scientific support for the health benefits of exercise may be forth-coming in the near future. Though only a few studies have provided any measure of scientific

proof of a cause and effect with chronic exercise and longevity, prevention of disease, or recovery from disease, many investigations have shown a positive statistical association between exercise and general health and well-being. A productive person would likely conclude that moderate regular exercise will not cause any harm and that it might significantly enhance life in both quality and quantity. The effect of exercise on health is hypothesized as follows:

Coronary Heart Disease (CHD)

CHD risk factors are certain diseases, symptoms or which increase the chances of conditions or habits to develop CHD. Some of the risk factors for heart disease are not preventable such as aging or family history of heart disease. Physical inactivity may be a cause of an effect of CHD.

The leading killer of CHD is when oxygen flow to the heart muscle is cut off by a blockage of one or more branches of the coronary arteries. Numerous studies of large populations have compared the incidence of CHD in sedentary occupation groups (e.g., bus drivers and postal carriers) who have more CHD than individuals of other occupations which involve more physical activity (Skinner, 1968). However, the sedentary lifestyle groups usually have heavier body weights, eat more fat, and smoke more that the active groups and it is impossible to point to lack of exercise any more than to one of these other factors as the cause of heart disease.

More and more clinical evidence that moderate exercise programs are beneficial in restoring heart attack victims to productive, active lives gives further support to the view that exercise is a valuable tool in the fight against heart disease. Post-coronary patients show improved electrocardiograms, greater work capacity, and diminished chest pain in response to exercise after several weeks on progressive walking programs. Cardiologists who witness the rapid recovery of such patients on training programs are usually some of the greatest promoters of regular exercise.

Hypertension

Hypertension, i.e., chronic high blood pressure (BP), causes the heart to strain without rest against a greater than normal resistance, gradually weakening the heart muscle, and may result in death. Individuals with essential hypertension can

decrease 10 mmHg of BP (both systolic and diastolic) by changing lifestyle or behaviors and more endurance work-outs. The exercise tolerance as an important determinant of moderate hypertension (pressures 140/90 to 160/105 mmHg) was recommended in the non-pharmacological management phase. After pharmacological therapy had helped reduce high BP (>160/105 mmHg) to lower pressures, exercise should be added to the regimen. In addition, after the training activity reduces BP, then antihypertensive medication can be reduced (Hagberg, 1990).

Thus, regular endurance exercise induces some reduction of resting BP in individuals of all ages. The systemic hemodynamic changes, and any neurohumoral mechanisms underlying such reductions in BP, remain unclear. The acute BP-lowering effects of single bouts of submaximal endurance exercise needs further study. Other non-pharmacological interventions, such as weight loss, behavioral modification, diet, and drug therapy, must also be investigated to assess potential synergistic, additive, or inhibitory interactions with exercise (Hagberg, 1990).

Diabetes Mellitus

Diabetes Mellitus is characterized by high blood sugar level and urine sugar levels and is caused by a failure of the pancreas to secrete enough insulin, which is required to transport sugar from the blood into the muscles and other tissues. Exercise increases the ability of the muscles to take up glucose from the blood without insulin by some as-yet unknown mechanism. Therefore, the diabetic patient ordinarily requires less insulin when she is physically active. It is extremely doubtful, however, that exercise can change the course of this disease. The physically active diabetic can simply lead a more varied life while obtaining other benefits of exercise and requires less insulin therapy in doing so (Wannamethree, Shaper, & Alberti, 2000).

Several studies have observed the naturally occurring changes in behavior and rising risk for type 2 diabetes that have a relation to less physical activity. Some populations that have traditionally led physically active lifestyles become sedentary after their society becomes more urban. In South Pacific island cultures, Zimmet and colleagues (1992) found a significant association between an abandonment of traditional lifestyles, which were physically demanding, in favor of more sedentary lifestyles with an increased incidence of type 2 diabetes mellitus (Zimmet et al., 1992).

Other studies observed individuals who migrated from a rural region to a more urban region. Individuals from a population subgroup who migrated were compared with individuals who remained in their homeland. For example, Marchand and colleagues (1997) found that type 2 diabetes was twice as prevalent among Japanese immigrants to the United States as among those who remained in Japan. Both types of studies have assumed that the adoption of a more urban lifestyle leads to increased risk of diabetes because of a decrease in physical activity. Of course, the effects of dietary changes are often difficult to isolate from the effects of urbanization (Marchand, Wikens, & Kolonel, 2000).

Cancer

A few studies have associated physical training with a decreased incidence of cancer, but a cause-and-effect relationship seems unlikely. Much more confirmation of these pilot studies is required before any confidence can be placed in a conclusion that regular exercise reduces the risk of cancer (Friedenreich & Orenstein, 2002).

Cancer types vary and have different risk factors, but some factors are associated with multiple cancers such as smoking as one risk factor for lung, mouth, throat, larynx, and bladder cancers. In 2001, 30% of 172,000 cancer patients also had alcoholism (American_Cancer_Society, 1993). Though several factors like these are associated with higher rates of cancer, how they contribute to the pathophysiology that leads to specific-site cancers is less well understood than for some other chronic diseases such as CVD and type 2 diabetes. For example, excessive sun exposure (especially in fair-skinned people) increases the risk of basal cell and squamous cell carcinomas, which are diagnosed in about a million people each year. However, indirect sun exposure can be a serious cause of melanoma, which had an incidence of about 51,000 new cases in 2001 and accounted for 7,800 (80%) of the estimated 9,800 deaths from all skin cancers (American_Cancer_Society, 1993).

The American Cancer Society has not identified physical inactivity as a major, independent risk of cancer in order to be useful for primary or secondary prevention. Many studies have found that the relation of physical activity with the rates of cancers has increased markedly in the past decade, e.g., increasing evidence about decreasing risk of breast cancer among females as a result of physical activity.

Physical inactivity is just one of multiple risk factors for some cancers, whereas labor-intensive jobs and physically active leisure are related to decreased risk of colon cancer (Shephard, 1995; Thune & Furberg, 2001)

Obesity

Regular exercise is of proven value in the regulation of obesity, or excess body fat. Used as an adjunct to a low calorie diet, exercise will increase the percentage of muscle in the total body composition and decrease the percentage of fat. There is rather convincing evidence that regular, moderate physical activity not only causes a greater caloric expenditure during the exercise itself but may also increase the resting metabolic rate for some hours after exercise, Regular exercise may also reduce one's appetite somewhat, thereby affecting not only caloric expenditure but also caloric intake (Anderson, 1968).

2.3.8 Research relate to exercise and health

Health promotion advice for physical and mental health suggests as much daily exercise as possible. A good balance includes a work-out of at least 15-20 minutes per session and repeated three times a week. Exercise helps boost oxygen and metabolism, increasing artery flexibility, limits the skin fold fat and plaque in the arteries and reduces stress (Robert, 2003). A study of Japanese in Osaka found that 9.2% of 2,240 people who walked to work for 0-10 minutes a day were hypertensive within a 10-year period.

Moreover, walking 20 kilometers per week may lower weight and BP. Any kind of exercise or sport should be performed at least 30 minutes daily. Examples of exercise types are aerobic dancing, jogging, swimming, cycling, or Oriental sports such as yoga, T ai Chi or Chi Gong. Regular exercise such as pacing, jogging, cycling, swimming and playing sports can control BP effectively. Moreover, exercise will help to decrease risks of other diseases such as diabetes mellitus, high cholesterol, CHD and some kinds of cancer (Robert, 2003). What's more, exercise also helps patient have low body weight and this alleviates BP and harmful cholesterol (Ebisu, 1985). All of above can be applied to exercise for controlling systolic and

diastolic BP among hypertensive patients, and can reduce BP by 5-7 mm Hg after regular exercise.

People who regularly exercise will have healthier hearts, reduced BP and reduced cholesterol. However, the elderly should exercise gradually and stop if they are exhausted (Hays, Damush, & Clark, 2005). Aerobic activity for elderly with hypertension includes moving exercises such as pacing, cycling, Tai Chi, aerobic dancing or walking that also have some benefits and should be performed not less than 20 minutes and 4 times a week. When people already choose one suitable exercise such as walking, they must start slowly and speed up for three times a week for 30 minutes or more. Exercising for 50-60 minutes, 3 or 4 times per week is fairly effective to decrease BP and may reduce the risk of CHD (Roddy, Zhang, & Doherty, 2005). In a study of diabetes among adults in Da Qing, China, the researchers found all the intervention groups had lower rates of diabetes than the control group, independent of being lean or overweight (Pan, 1997).

Schaller (1996) found that Tai Chi can reduce BP by 4.6% for systolic and 3.6% for diastolic (Schaller, 1996). Tabara (2007) reported that sedentary elderly persons who have aerobic exercise frequently at a level of mild to moderate intensity have significantly reduced arterial stiffness and BP (Tabara, Yuasa, & Oshiumi, 2007). They also reported that lack of exercise is a cause of reduced arterial stiffness and also CVD in the elderly (Frederick & Ryan, 1993). Moreover, metabolic studies suggest that physical activity could augment diabetes prevention and treatment by reducing initial occurrence reversing secondary occurrence, and delaying medical complications in tertiary cases. The direct effect of physical activity is improved glucose transportation and insulin sensitivity, but weight loss may be an indirect effect (King et al., 1984). The cohort study found that more than half the diabetic patients were in remission after a mean follow-up of six years. The relationship between glucose tolerance improvement with weight reduction, increased fitness, and mortality has showed one-third lower mortality rate than the rest of the cohort who were not treated (Eriksson & Lindgarde, 1991).

2.4 Defining and measuring health status

Reduction of mortality is related to a low IMR (19 per 1,000 live births) and insurance coverage (Wibulpolprasert, 2002). The life expectancy of both males and females in over has increased to 67.9 and 75.0 years respectively (Institute for Population and Social Research, 2004). Moreover improved life expectancy is generally associated with increased quality of life. Finally, morbidity could represent some aspects of health, such as the health system and health service quality.

Two critical tools for measuring the occurrence of diseases are incidence and prevalence, as incidence reflects the burden of disease as a newly emergent problem in specific time periods (Gordis, 1996), whereas prevalence measures presence of disease in the community (Rothman, 2002): "The longer the duration of disease once it occurs, the higher the prevalence" (Rothman, 2002). Shorter periods of epidemics could be the result of rapid death or recovery. The prevalence rate increases more slowly and is not suitable use in the study of the cause of disease but is useful for measuring the disease burden on the population. Moreover, higher prevalence could indicate that a disease has an "insidious onset" (Rothman, 2002). Therefore, prevalence is more appropriate for the study of chronic diseases.

The morbidity data came from several sources such as health care service, clinics or hospitals. However these records are not adequate for evaluating health problems in a community because many ill people choose to self-treat (Bhatia & Cleland, 1995). Accordingly, most of de facto data on morbidity and mortality come from records in clinics and hospitals while health surveys are useful for approximating population health status and are a reasonable proxy for prevalence of chronic conditions (Vaidya, 2011).

For morbidity measurements, there are two methods comprised of self-perceived, as result of individual report, and as diagnosed by trained observers. Illness identification is reported as follows: Perceived but un-observed, observable but un-perceived and perceivable and observable (Murray & Chen, 1992).

The widely accepted definition of morbidity is self-perception, some disturbance of well-being or ill-health as perceived by the individual (White, Williams, & Greenberg, 1961). Murray and Chen recommended that societal well-

being can be reflected by the occurrence of illness and also self-reported morbidity associated with “a major social phenomenon” (Murray & Chen, 1992).

- Validity of Self-reported Morbidity

Self-reported health status can be used as a tool in order to study morbidity, and this approach conserves time, money and logistical considerations of the research (Avis NE et al., 1989; Tasnuva Wahed & Kaukab, 2013). The various factors such as self-perception of sickness, culture, sex and socio-economic level, have influenced the reliability of self-reported illness. Social and cultural determinants affecting sickness perception, so-called *conscious misreporting* and *introspection* on health matters. This might lead to misleading or increased perception of illness (Murray & Chen, 1992). On the other hand, those factors are not determinants of self-reported health and diagnosis from doctors. For instance, the illness incidence in France and England as reported by medical doctors might be influenced by their cultural tendencies (W. Chen et al., 2009). Doctors from France tend to diagnose as schizophrenic those less than 45 years of age more than those who are over 45 years old. A study of 228 Taiwanese aged more than 65 years noted that there were some medical self-reported conditions that biased clinical diagnosis, namely heart disease, hypertension and diabetes (An et al., 2013).

Nevertheless, the only way to obtain verbatim health information of people is to interview them face by face. Several research studies have studied that the extent to which reported illness is considered as an accurate indicator for health status and well-being of the population. Engstad (2000) stated that the self-reports of stroke could represent the prevalence of stroke. The interview reports were compared among 10,523 hospitalized records by persons aged 25-74 year, and found that 84% of self-reports agreed with a diagnosis of ischemic heart disease (IHD) (Pearson et al., 2003).

A study in Ontario among females aged 50 years or above in 1990 found high correlation between the prevalence of self-reported heart disease and actual heath disease condition among the population (Khan et al., 2007). Halabi et al. (1992) compared 100 cases and 100 controls involved in self-reported illness such as heart disease, back pain, rheumatoid arthritis, hypertension and pulmonary disease including smoking histories. The comparison group was controlled for sex, age and number of

household members. The fact-based data collection confirmation of the health interview survey gave well-defined chronic conditions (Vaidya, 2011). Moreover, the physician-evaluated morbidity and self-reported morbidity among white and African-American adults in the United State were compared with morbidity indicators and were modestly correlated together and were stronger predictors of self-assessed health and morbidity (Ben-Shlomo, 1993).

-Health status

A physician as an observer has to determine and rate the individual health status looking at various aspects in health, such as presence or absence of harmful disease, assessing risk of premature death including severity of disease, and screening for psychological well-being, discomfort, and overall perception of health.

The individual characteristic of a population or environment can be used to measure and represent one or more aspects of health (Graham, 2002). *Self-assessment on health status* can influence results of medical services. Persons may assess their condition as "excellent" "good", "fair" or "poor" and this can serve as a health indicator (G. P Lovell, W. E Ansari, & J. K Parker, 2010).

Some theories are popular for measuring health by integrating objective and the individual subjective impressions (USDHHS, 2005). Prevalence of hypertension, obesity, heart disease, hyper-cholesterol, and cancer could be measured by self-reports in the population that has ever been treated by some physicians, nurses or health officers and were diagnosed. Interviews help to provide estimates because and this is more convenient than directly measuring each respondent. This approach is also suitable for tracking chronic disease-related health status over time. However, verbal self-reports could underestimate the prevalence of the condition(s).

Assessing overall health of the population is obtained by accumulating individual data collected because single data points are easier to define than grouped data. The individual health condition could be rated along a continuum from perfect health to death (USDHHS, 2005). For example, a proxy indicator of the health status of population can be infant mortality. Infant mortality represents the morbidity of infants, health care service quality, maternal care and the environmental conditions.

In this research, interviews were used for collecting data on self-health assessment of chronic disease and related syndromes.

2.5 The Health Belief Model

- History and Orientation

The Health Belief Model (HBM) is a psychological method for predicting and describing health behaviors by focusing on personal attitudes and beliefs through the examination of perceptions and attitudes towards disease and negative action outcomes. The HBM was first developed by social psychologists Hochbaum, Rosenstock and Kegels working in the U.S. Public Health Services in the 1950s since the free tuberculosis (TB) health screening program was failing. Furthermore, the HBM has been adapted to explore various health behaviors both long-term and short-term, including gender risk behaviors and also HIV/AIDS transmission (Glanz, Rimer, & Lewis, 2002).

The HBM is an intrapersonal theory which uses the combination of individual, knowledge and beliefs for health promotion to generate interventions and prevention programs. The HBM assumes that behaviors are changed by three ideas at the same time (Becker, 1974):

1. Perceived susceptibility and severity: an individual recognizes the adequate reasons for making their health a concern;

2. Perceived threat: people realize a disease or negative health outcome is the result from weakness; and

3. Perceived benefits and barriers: personal belief that behavior change will have more benefits than any costs of doing so.

The HBM is a simultaneous process about healthy behavior to predict individual health-related behavior and motivating risk-prone individuals, to avoid developing the negative health outcomes. If one has perceived susceptibility and the disease is severe, then it is necessary to feel threatened by these perceptions. Environmental factors may include a sports campaign, television advertising or caring relatives. The advantage of changing one’s behavior should be compared to the

behavioral barriers to change so as to decide whether to take action (Becker, Radius, & Rosenstock, 1978). Thus, this theory supports decision-making based on personal socio-economic-demographic characteristics and interrelationships (V. L. Champion, 1984).

- Core Assumptions and Statements

The HBM relies on personal understanding about health and willingness to take actions such as exercises as in the examples below (Conner & Norman, 1996):

1. Avoid having a negative health condition such as CVD;
2. Setting a positive expectation by adopting suggested action and avoiding a negative health condition, for example exercising to reduce the probability of getting CVD;
3. Belief in ability to take exercise or the recommended health action exercise for health and feeling comfortable to do so.

The structure of HBM can be divided into four groups in term perceived threat and net benefits as follows: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These concepts are most apparent among people who are strongly willing to act and change their behavior based on their perceived vulnerability. HBM integrated the self-efficacy concept in 1988, which reflects personal confidence in the ability to achieve an action and purpose. In this way, the HBM can be applied for changing poor health behaviors, such as lack of activity, cigarette smoking, or fatty diet (Eisen, 1992).

Table 2.5 A guide for health promotion practices (Eisen, 1992)

Concept	Definition	Application
Perceived Susceptibility	One's opinion of chances of getting a condition	Define population(s) at risk, risk levels; personalize risk based on a person's features or behavior; heighten perceived susceptibility if too low.
Perceived Severity	One's opinion of how serious a condition and its consequences are	Specify consequences of the risk and the condition
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance.
Cues to Action	Strategies to activate "readiness"	Provide how-to information, promote awareness, reminders.
Self-Efficacy	Confidence in one's ability to take action	Provide training, guidance in performing action.

Conceptual of Health Belief Model

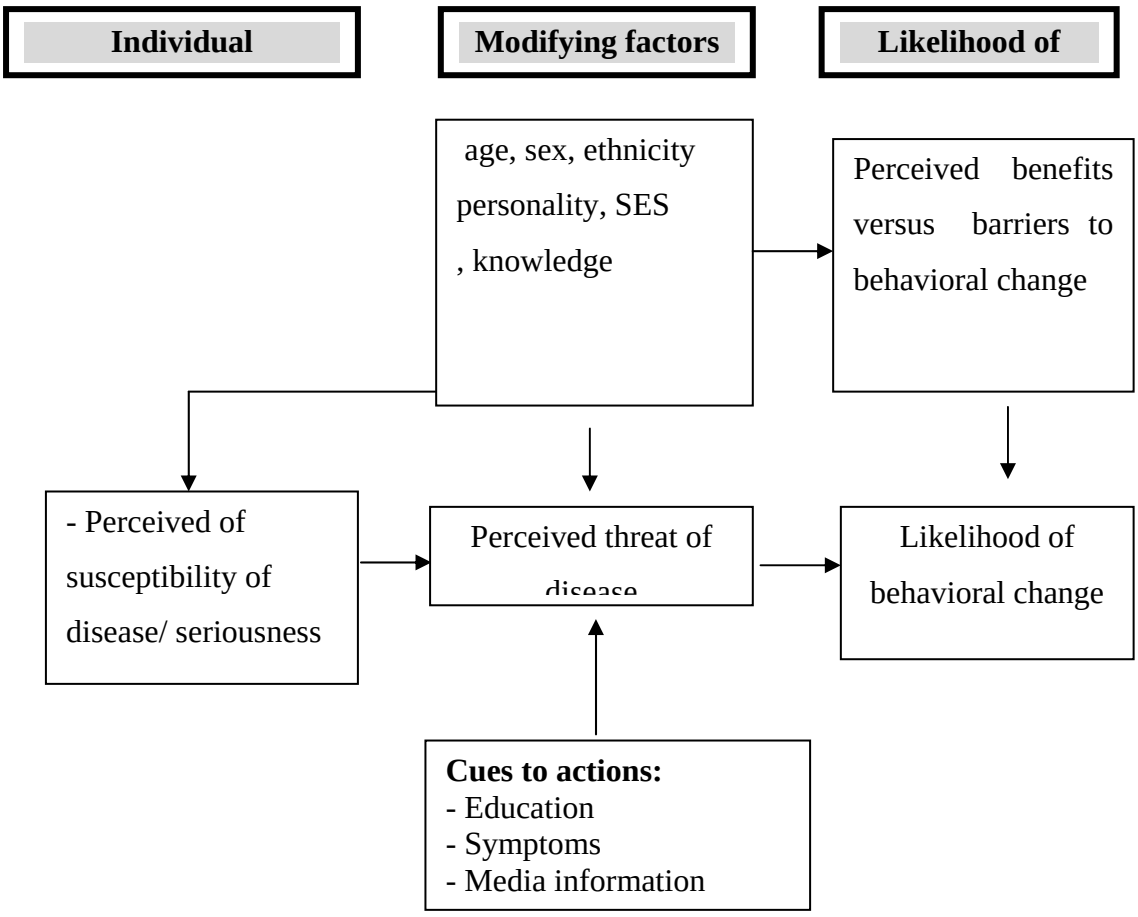

Figure 2.1 : Conceptual framework (based on the health belief model) (Glanz, Marcus Lewis, & Rimer, 1997; Glanz et al., 2002)

The HBM has been applied to a range of health behaviors and topics. The broad range applications can be classified into three groups as follows (Conner & Norman, 1996);

1) Preventive health behaviors include health-promotion and reducing health-risk behaviors, e.g. diet, exercise, smoking, vaccination;

2) Sick role behaviors: refers to agreement on a recommended medical treatment plan based on clinical diagnosis;

3) Clinical usage, as applied by physicians for various reasons.

In the case of medically established illness (rather than mere risk reduction), the dimension has been reformulated to include acceptance of the diagnosis, personal estimates of susceptibility to consequences of the illness, and susceptibility to illness in general.

- Constructs

"Perceived Susceptibility" Perceived susceptibility refers to beliefs about the probability of getting a disease or condition. For instance, a woman believe in the possibility of getting breast cancer before she is willing to obtain a mammogram (Glanz et al., 2002)

"Perceived Severity" Feelings about the seriousness of contracting an illness or of leaving it untreated include evaluations of both medical and clinical consequences (for example, death, disability, and pain) and possible social consequences (such as effects of the conditions on work, family life, and social relations). The combination of susceptibility and severity has been labeled as perceived threat (Glanz et al., 2002).

"Perceived Benefit" The personal susceptibility to a serious health condition as a perceived threat as a call to action and may be influenced by the person's beliefs regarding perceived benefits of the various available actions for reducing the disease threat. For non-health related perceptions, the financial savings related to quitting smoking or pleasing a family member by having a mammogram, may also influence behavioral decisions. Thus, individuals exhibiting optimal beliefs in susceptibility and severity are not expected to accept any recommended health action unless they also perceive the action as potentially beneficial by reducing the threat(Glanz et al., 2002).

"Perceived Barriers" The cost-benefit analysis is used for making decisions about the expected-beneficial actions with perceived barriers. Thus, combination of susceptibility and severity may bring the energy or force to act, and the perception of benefits (minus barriers) help to determine choice of action (Rosenstock, 1974).

"Cues to Action" The concept of cues refers to triggers for precipitating in actions. For example, the willingness to take action (perceived susceptibility and perceived benefits) may be controlled by other factors such as bodily events or environmental events, such as media publicity(Becker, 1974).

"Self-Efficacy" is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (Becker et al., 1978). In 1988, Rosenstock, Strecher, and Becker suggested that self-efficacy be added to the HBM as a separate part, while including original concepts of susceptibility, severity, benefits, and barriers. The first model was developed in the frame of preventive health actions such as a screening test or an immunization that were not complicated behaviors (Becker et al., 1978).

For successful behavior change, people must feel threatened (as the original HBM theorizes) by present behavioral patterns (perceived susceptibility and severity) and believe that change will become a valued outcome at an acceptable cost (perceived benefit). They also must feel confident (self-efficacious) in their ability to overcome perceived barriers to action (Becker et al., 1978).

"Other Variables" The variety of demographic, socio-psychological, and structural variables may influence perceptions directly, but also indirectly influence health-related behavior. For example, socio-economic-demographic factors, particularly educational attainment, are believed to have an indirect effect on behavior (Becker et al., 1978).

The HBM attributes are shown in Figure 2.1 and arrows indicate relationships between constructs. Modifying factors include knowledge and socio-demographic factors as they influence health perceptions as a call to action. Health beliefs include the major HBM attributes such as susceptibility, severity, benefits, barriers, and self-efficacy and, when combined, may lead to behavior change. Within the "health belief" box, perceived susceptibility and severity are combined to identify threat.

The HBM-attributed influence to outcome of behaviors and among these constructs is not examined. This ambiguity has led to variation in HBM applications. Many studies have tried to establish each of the major dimensions as independent, but others have been interested in multiplicative approaches. Analytical approaches to

identifying these relationships are needed to improve the HBM utility in predicting behavior (Becker et al., 1978).

2.6 Theory of Reasoned Action and Planned Behavior

2.6.1 Theory of Reasoned Action

The theory of reasoned action focuses exclusively on perceptions of the value and likelihood of the consequences associated with a behavioral decision. With its explicit focus on norms, the theory of reasoned action (TRA) provides a more social account of the kinds of beliefs that have consequence with respect to behavior change (Ajzen and Fishbein, formulated in 1980). Although formulated outside the health domain, the TRA has been used extensively to articulate the causal relationship between health beliefs and health behavior. The TRA provides the framework to analyze the relevance of specific beliefs depending on the issue and the situation. The theory focuses on the operationalization and measurement of variables, providing specific combinatorial rules that are to be used when analyzing the relationship between health attitudes and behavior (I. Ajzen, 1985, 1987, 2002).

2.6.2 The Theory of planned Behavior

The Theory of Planned Behavior (TPB) extends the TRA's underlying framework by incorporating perceived behavioral control as a direct influence in intention and behavior (I. Ajzen, 2002; Manstead & Parker, 1995). Perceived behavioral control reflects the ease or difficulty of taking a specific action and is distinguished in the model from actual behavioral control (I. Ajzen, 2002; Manstead & Parker, 1995). Any discrepancy in perceptions of control-either under- or overestimation- undermines the predictive validity of theory (I. Ajzen, 2002; Manstead & Parker, 1995). To the extent that a behavior is entirely under one's control, the TPB and the TRA do not differ. Because most health behaviors depend in some manner on possessing skills and resources and eliciting the cooperation of others, health behavioral decisions may be better described by the TPB than by the TRA.

The inclusion of perceived behavioral control echoes recent suggestions to incorporate self-efficacy into health behavior frameworks such as the Health Belief Model (Manstead & Parker, 1995; Notani, 1998), the Protection Motivation Theory, and the Subjective Expected Utility Theory. Rather than testing the TPB, some investigators merely have incorporated self-efficacy into their application of the TRA. Differentiating perceived behavioral control and efficacy beliefs can be problematic. It is unclear whether perceived behavioral control reflects beliefs about self-efficacy (i.e., my ability to execute a specific action), beliefs about outcome expectancy (i.e., my ability to attain a specific outcome), or the recognition of barriers to action (i.e., the existence of specific situational impediments to action). Moreover, the specific beliefs that underlie people's perceptions have been difficult to identify (Price, 2001; Terry, Hogg, & White, 1999; C. Thomas, 2001).

- **Operationalization and measurement**

Ajzen and fishbein (1980) have provided specific instructions regarding the operationalization of each theory's dimensions. The basic assumption underlying the TRA is that behavior directly reflects an individual's intention to take action. Behavioral intention is in turn a weighted linear function of an individual's attitude toward performing the behavior and the perceived subjective norms concerning whether or not to take action. The relative influence of subjective norms and attitudes is thought to vary across situations and issues. Attitudes toward the action are in turn the product of salient beliefs about the consequences of the action weighted by the evaluation of those consequences. Perceived norms are based on the degree to which relevant individuals and groups support taking action, weighted by the actor's motivation to comply with the expectations of others. Any additional factors are understood to influence behavior indirectly through their effect on beliefs about the behavior or beliefs about social norms(I. Ajzen, 2002; Manstead & Parker, 1995).

- **Correspondence between attitudes and behavior**

How researchers have operationalized intention has proved important in identifying the relation between attitudes important in identifying the relation between attitudes and behavior. Notani (1998); (Phillips, Holley, & Bates, 2002) have

distinguished between behavioral intention and behavioral expectation. Intention indicates a plan to perform a behavior, whereas expectation reflects the perceived likelihood of performing the behavior in the future. People have been shown to rely on their beliefs about formulating a behavioral intention, whereas their thoughts about prior behavior and the presence or absence of situational constraints determine behavioral expectations (Aronson, Wilson, & Akert, 2003). Compared to intention, expectation is thought to be a better predictor of behavior. Recently, Notani (1998); (Phillips et al., 2002) have noted that although people may not intend to perform an unhealthy or risky behavior (e.g., driving while intoxicated), they are willing to do under certain conditions, irrespective of their intentions to behave appropriately. Their willingness is a reaction to features of the immediate situation rather than the implementation of deliberate planning.

Conceptual Model

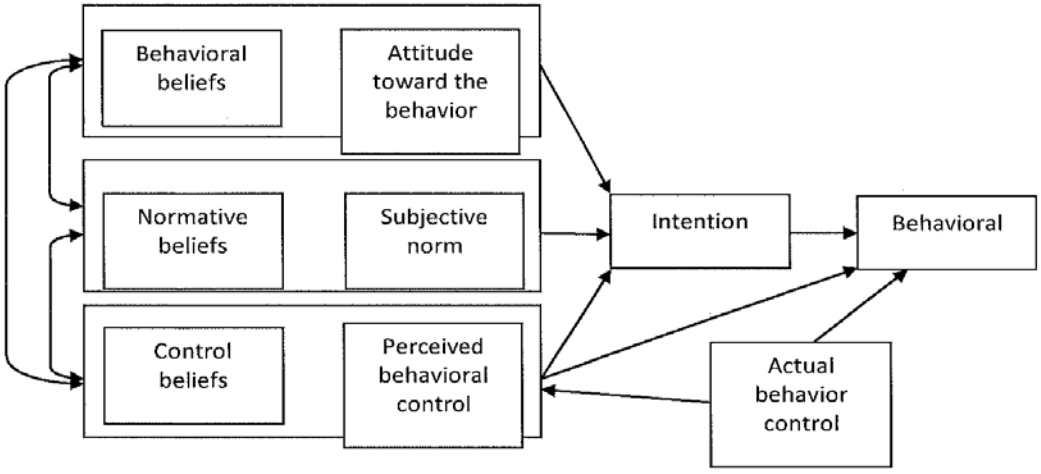

Figure 2.2 : Concept framework based on the Theory of Planned Behavior/ Reasoned Action (I Ajzen, 1991)

This research applies both the Health Belief Model and Theory of Planned Behavior/Reasoned Action as a basis of analysis as described below.

2.7 Conceptual framework

The conceptual framework of this study arises from the Health Belief Model (HBM), the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA). This framework describes how a range of different factors could have affected exercise-behavior and individual's health status. The TPB/TRA are applied to knowledge and attitudes which could be predisposing factors to encourage someone to practice an advantageous health action. Moreover, the HBM explains the relationship among demographic-socio-economic factors and perceived benefits/barriers of exercise and health status. The demographic-socio-economic factors drive someone to have varied perceptions of benefits/barriers of preventive action, such as exercise, which may influence the likelihood of disease and premature mortality. Importantly, the community factors including exercise facilities and community exercise leaders, take part in changing the knowledge, attitudes and practice in exercise. All these factors will affect an individual’s health. Thus, the framework of this study will combine both theories as shown in Figure 2.3.

In this framework, there are four key groups of variables. The first group is demographic-socio-economic factors which represented the based characteristic factor of sample including age, sex, marital status, education, occupation, region and area of residence. The second group consists of individual perceptions or psychological factors (perceived of exercise benefits, perceived of exercise barriers, knowledge about exercise and attitude about exercise) that may influence health action. The third group is health related behaviors refer to exercise or physical activities, smoking, and alcohol consumption, involvement to sport campaign, involvement to health/sport club and the duration of year in exercise. Lastly, community factors included exercise facilities and community exercise leaders which are the cue action as the important key to change their perception or behavior.

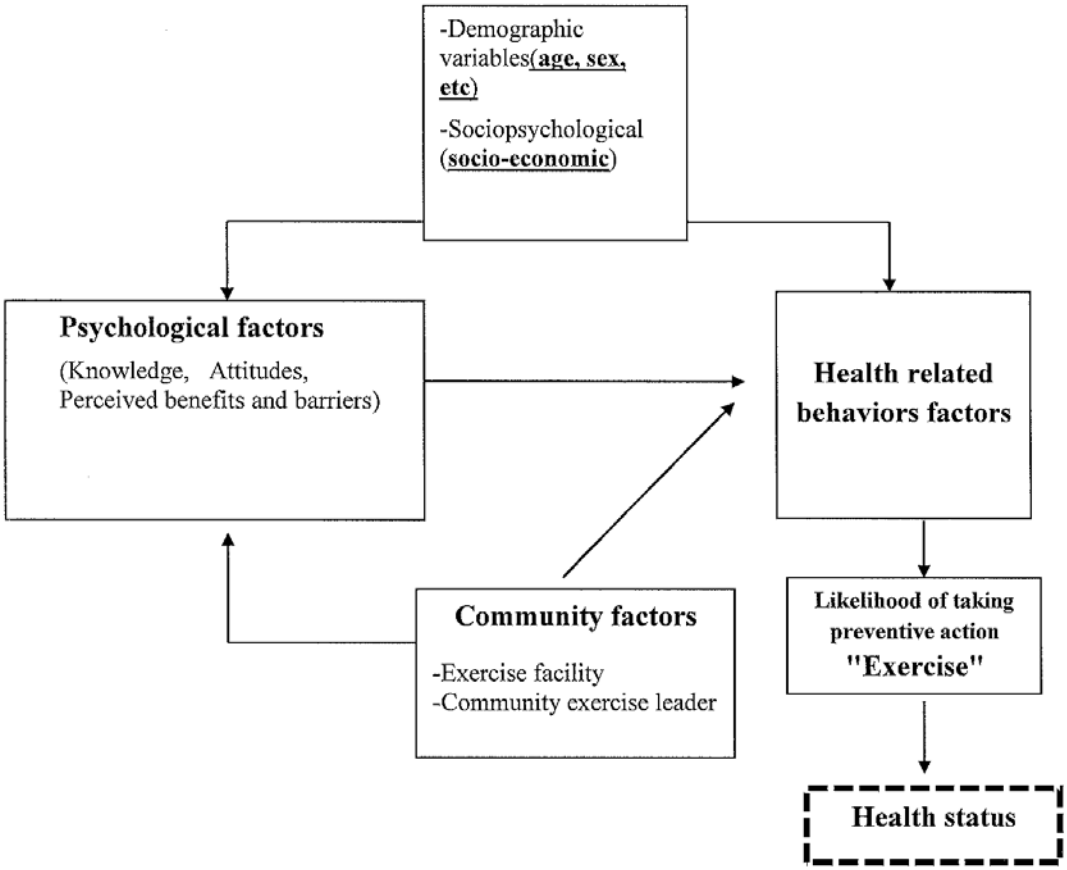

Figure 2.3: A framework of measuring the differentials of health status and exercise

CHAPTER III
METHODOLOGY

This study concentrates on the socio-economic-demographic factors and exercise that affect health status of the population in Thailand. To determine these relationships, reliable, valid data and information were collected to achieve the objective of this study.

3.1 Source of Data

The study will employ the data from the Evaluation of Health Promotion and Sports for health in Local Authorities Project (2010) conducted by the Institute for Population and Social Research (IPSR) Mahidol University. The objective of the evaluation project was to examine the effectiveness of health promotion and sport program for increasing the exercise activity among Thai population. This project was following National Strategy "to develop Healthy Thai population by regularly exercise" which aimed to integrate all sectors, to develop a learning process, emphasis on public participation, to create good cooperation and public awareness. There was also an important goal which was to give people aged 6 years and above regular exercise for better health. To implement the policy, all regions administrative authority was expected to send a project proposal to Ministry of Public Health of Thailand. Mostly the project proposal came from the urban area due to their ability to write a proposal was better than their counter part who lived in rural. This situation might produce the selection sampling bias which urban respondents were higher than rural respondents.

3.2 Sample of the study

This survey applied a multi-stage design which a complex forms of cluster sampling.

Cluster sampling is a type of sampling which involves dividing the population into groups (or clusters). Then, one or more clusters are chosen at random and everyone within the chosen cluster is sampled. Several levels of cluster selection may be applied before the final sample elements are reached. The multi-stage of this study was region, province, district, municipality and village, respectively.

In order to ensure a representative sample of the population, the cluster sampling process involved several steps. Firstly; 20 provinces were selected from six sub-regions which reflect the different social, economic and ecological conditions of Thailand. Next, two districts each were selected from the 20 provinces. Thirdly, two municipalities each were selected from the 40 sampled districts. The last stage, the author selected two villages each were selected from 80 municipalities and collected the information from every household in the villages. The total household in the survey were 8,886 households while the total sample universe is around 27,409 cases. the selection criteria for this research selected only the cases that answered the questionnaire and aged 15 years old and over because the author investigated health risk behavior such as smoking, alcohol consumption and exercise behavior that require retrospective self-reports about engaging in these behaviors. It could be more accurate and reliable from the first source than using the information answered by other family member(Brener, 2003). Moreover, It is assumed that someone over age 15 years would have their own independent thinking, and have the freedom to choose an activity that they prefer, such as reading, watching movies, exercise, sports, etc. (Campbell, 2007). Thus, the size of the sample for analysis was 8,617 cases.

Underlying the sampling frame is a selection bias as there were more male respondents than female respondents. This is because the questionnaire was typically answered by the head of the household. In Thailand, the head of the household is usually a man.

3.3 Operational definition of the variables

The functional definition of each variable used in this study is provided in this section.

i Independent variables in this research include socio-economic-

Demographic characteristics including sex, age, marital status, Education, Region and Residence area. Psychological factors including perceived of benefits to exercise, perceived of barriers to exercise, knowledge about exercise and attitude about exercise. Health related behaviors including smoking, alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise, and community factors including availability of exercise facilities and availability of community exercise leaders or instructors.

Table 3.1 Operational definition and level of measurement of independent variables

Variable name	Definition	Measurement	Level of measurement
Socioeconomic-demographic characteristics			
Sex	The biological characteristics of gender at birth	0=Male 1=Female	Nominal
Age	The length of time that a person has lived until the last birthday	1= 15-39 year 2= 40-59 year 3= 60-69 year 4= 70-79 year 5= Over 80 year	Ordinal
Marital status	Current status	1= Single 2=Married 3=Widow 4=Divorce/separate	Nominal
Education	- the educational attainment	1=No education 2=Primary school 3=High school 4=Vocational Certificate 5=University	Ordinal
Occupation	Occupation sector	1=Unemployment 2=Student 3=Agriculture 4=Business owners 5=Government 6= employee 7= Labor Contractors 8=Other	Nominal

Table 3.1 Operational definition and level of measurement of independent variables (cont.)

Variable name	Definition	Measurement	Level of measurement
Region*	The administrative boundary where the respondents lived	1=Northern 2=Northeastern 3=Western 4=Central 5=Eastern 6=Southern	Nominal
Residence area	The place of residence	0= urban 1= rural	Nominal
Psychological factors			
Knowledge about exercise	Ten knowledge questions about benefits of exercise	Score from questionnaire number 2.2.1-2.2.10 (see in appendix)	Interval
Attitude toward exercise	Eleven attitude questions about exercise	Score from questionnaire number 2.5.1-2.5.11 (see in appendix)	Interval
Perceived benefit of exercise	Perceived of benefit of exercise for one's physical Mental health and Society (17 question)	Score from questionnaire number 2.3.1-2.3.17 (see in appendix)	Interval
Perceived barriers of exercise	Perceived barriers to exercise for one's physical Mental health and Society (15 question)	Score from questionnaire number 2.4.1-2.5.15 (see in appendix)	Interval

*A six-region is dates to 1935. It was formalized in 1977 by the National Geographical Committee, which was appointed by the National Research Council (Mundus, 1981)

Table 3.1 Operational definition and level of measurement of independent variables (cont.)

Variable name	Definition	Measurement	Level of measurement
Health related behaviors			
Smoking	Does the respondent smoke tobacco	1=Yes 0=No	Nominal
Alcohol consumption	Does the respondent drink alcohol	1=Yes 0=No	Nominal
Involvement in campaigns	engage or participate in sports campaign activity	1=Involve 0=Not involve	Nominal
Member of health/sport club	Register as a member in health/sports club (such as football club, yoga club)	1=Yes 0=No	Nominal
The duration of year in Exercise	The number of year in engage of exercise	year	Interval
Community factors			
Exercise Facility	The availability of equipment to exercise for health (such as weights, treadmill)	1= Have 0= Not have	Nominal
Exercise leaders	The availability of someone who leads or motivates people to exercise	1=Yes 0=No	Nominal

3.4.2 Dependent variables that are explored in this research include exercise and health status

Table 3.2 operational definition and level of measurement of dependent variables

Variable name	Definition	Measurement	Level of measurement
Exercise	The bodily movements continuously for at least 3 days per week and 30 minutes per time, such as cycling, jogging, walking	1=Yes 0=No	Nominal
Health status	The physical condition reported by respondent, i.e., having or not having a diagnosis or a symptom determined by a medical doctor	1 = Have disease 0 = Don't have disease 0=Not sure	Nominal

3.4 Data analysis

This study used secondary data from the Evaluation of Health Promotion and Sports in Local Regions Project (2010). The SPSS for Windows version 17.0 was employed to apply the following statistics:

1. Descriptive statistics, e.g., frequency distributions and percentages in order to describe the demographic characteristics (age, sex, marital status, region, residence area), socio-economic status (education and occupation), Psychological factors (knowledge about exercise, attitude toward exercise, perceived benefit of exercise, perceived barriers to exercise), Health related behaviors (physical activities, smoking, alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise) and community factors (exercise facilities and exercise leaders) and health status.

2. Cross tabulations in order to explore the relationship between socio-economic-demographic factors toward on health behavior (exercise, smoking and drinking) and health status (comprise hypertension, diabetes, CHD, hyperlipidemia and cancer). In additional, analysis crosstab between place of exercise and health status (comprise hypertension, diabetes, CHD, hyperlipidemia and cancer)

3. Multivariate analyses to explore the association between socio-economic-demographic factors (age, sex, educational level, marita status, occupation, region and area of residence), Psychological factors (knowledge and attitude toward exercise, perceived benefits and barriers to exercise), Health related behaviors (smoking, alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise) and Community factors (exercise facilities and exercise leaders) toward on exercise and health status. This analysis was divided into the following as:

The multivariate logistic analysis will provide an analytical framework to address the nature of hierarchical data because the dependent variable is a nominal (dichotomous) measurement. The set of logistic models will be built to analyze the influence of socio-economic-demographic factors (age, sex, educational level, marital status, occupation, region and area of residence), Psychological factors (knowledge and attitude toward exercise, perceived benefits and barriers to exercise), Health related behaviors (smoking, alcohol consumption, involvement on sport campaign, involvement to health/sport club and the duration of year in exercise) and Community factors (exercise facilities and exercise leaders) on the dependent variables (exercise and health status). Variables related to health status and exercise was categorized into two groups. Exercise is classified as “yes” (1) or “no” (0), while health status is classified as “have disease” (1), “don’t have disease” (2) or “not sure” (3).

In addition, when the author analyzed exercise as the dependent variable, the duration of year in exercise did not include into the model because the year of exercise has collinearity with exercise practice while to analysis health status as the dependent variable, exercise practice and the duration of year in exercise were included into the health related behaviors factors, due to exercise practice and the duration of year in exercise were the main factor that could reduce the probability of having CVD disease (Jacob, 2012; Louis G & Richard K, 1992).

Third, before using the multiple logistic regressions, this research tested the assumptions by using Pearson's Correlation Coefficient statistics which present the level of the association between independent variables. The collinearity and multi-collinearity was assessed in order to clarify the relationship between variables and to select the independent variables for the equation. The independent variables should not have multicollinearity. If the correlation coefficient (r) is more than 0.5, I should take the independent that have multicollinearity out of the modelCohen (Cohen, 1988). Next, the Variance Inflation Factor (VIF) which measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is 1/Tolerance, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. Values of VIF that exceed 10 are often regarded as indicating Multicollinearity.

Moreover, The equation tested the power of the independent variables to predict the exercise and health status. Moreover, to increase predictive power of a given equation model, this study used restricted and unrestricted models in order to test the independent variables.

In addition, to predict the likelihood of a person to practice a recommended exercise or who did not report disease, this study applied the Log Likelihood Ratio value and Pseudo R^2 and predicted probability to the population to choose to exercise or having disease according to comparison-pairs from relative risk ratio values with statistical significance level at .05. If any independent variables had significant value equal to 50% or over of the comparison pairs, then this determines the relationship between the independent variable and exercise and health status. Finally, the simulation method is used to predict characteristics and pattern of exercise and health status.

CHAPTER IV
DESCRIPTION OF THE SAMPLE

The results of this study are divided into four sections. Section 1 describes the demographic characteristics (age, sex, marital status, region, residence area), and socio-economic status (education and occupation). Section 2 describes the cross tabulations between socio-economic-demographic factors and health behavior (exercise, smoking and drinking). Section 3 describes the cross tabulations between socio-economic-demographic factors and health status (hypertension, diabetes, CHD, hyperlipidemia and cancer). And Lastly section 4 describes the cross tabulations between place of exercise and health status including describes the descriptive of exercise characteristic Hearing sports campaigns, Involvement in campaigns, Heath/sports club, Exercise facility and Exercise leader) and Psychological factors (knowledge and attitude toward exercise; perceived benefits and barriers to exercise).

4.1 The basic socio-economic-demographic characteristics

The univariate presentations of individual's socio-economic-demographic characteristics are shown in Table 4.1. A total of 8,617 cases were sampled in which 5,288 are men (61.4 percent) and 3,329 are women (38.6 percent). Nearly half are age 40-59 years consisting of 4,281 (49.7 percent) and the average age is 52.8 years old. The age distribution revealed that 50 percent are in the working ages, and 25 percent are elderly (more than 60 years old).

This study found only 7.7 percent had no formal education. More than half have some primary school (62.2 percent). Less than a quarter of the individuals obtained a vocational certificate. Considering the marital status, 68.2 percent are married. 20.9 percent used to be married and 11.0 percent are single.

Table 4.1 Socio-economic-demographic characteristics of sample (8,617 cases)

Socio-economic-demographic Factors	Frequency	Percent
Gender		
Male	5,288	61.4
Female	3,329	38.6
Age (years)		
under 20	57	0.7
20-39	1,556	18.1
40-59	4,281	49.7
60-69	1,449	16.8
70-79	878	10.2
over 80	396	4.6
Average = 52.77, min = 15 , max= 96, S.D. =14.80		
Education		
No education	660	7.7
Primary school	5,359	62.2
High school	719	8.3
Vocational Certificate	1,039	12.1
University and over	840	9.7
Marital Status		
Single	944	11.0
Married	5,873	68.2
Ever married	1,800	20.9
Occupation		
Unemployed	1,106	12.8
Student	90	1.0
Agriculture	2,177	25.3
Business owners	1,815	21.1
Government	881	10.2

Table 4.1 Socio-economic-demographic characteristics of sample (8,617 cases) (cont.)

Socio-economic-demographic Factors	**Frequency**	**Percent**
Employee	247	2.9
Labor Contractors	1,906	22.1
Other	395	4.6
Area		
Urban	6,160	71.5
Rural	2,457	28.5
Sub-Region		
Central	1,225	14.2
Eastern	1,369	15.9
Northeastern	2,170	25.2
Western	1,443	16.7
Northern	894	10.4
Southern	1,516	17.6
Total	**8,617**	**100.0**

Regarding area of residence, most (71.5 percent) of the sample lives in urban areas, while one-fourth works in the agriculture sector (25.3 percent). Just above one-fifth are laborers (22.1 percent) and one-fifth are in the business sector (21.1 percent). The vast pluralities of individuals in this sample are Northeastern follow by Southern and Western residents, respectively.

4.2 Socio-economic-demographic characteristics and health behavior

The contribution of health-related behaviors to individuals' health status has been the object of countless medical and epidemiological studies because health-related behaviors are significantly associated with morbidity and mortality from chronic diseases, such as cancer, CVDs, and type 2 diabetes. In particular, four behaviors have emerged as major determinants of individuals' health status: Smoking, alcohol consumption, physical activity, and diet (Adler & Newman, 2002)

The importance of health-related behaviors in affecting the leading cause of CVD and deaths observed in developed countries suggests that investigating the determinants of such behaviors should be a primary public health goal, since it might help to inform targeted policies for reducing health inequalities and advancing people's health (WHO, 2008). As regards social determinants, empirical research has generally found that SES plays a key role in shaping health-related behaviors (Javadzade, 2012; Thammatach-aree, 2011; J. R. Thomas, Nelson, & Silverman, 2011). Analyzing the relationship between SES and health-related behaviors, then, can improve our understanding of the more general phenomenon of socio-economic health inequalities.

Table 4.2 presents the percentages of health behavior of the sample population by socio-economic-demographic characteristics. In this research, health behavior is divided into 3 categories: Smoking, alcohol drinking and exercise. In this sample, 71.7 percent reported non-smoking, 68.9 percent non-alcohol drinking, and exercise for health 48.5 percent.

4.2.1 Demographic characteristic and health behavior

- **Gender**

Considering gender, 57.7 percent of males are non-smokers, 55.5 percent are non-alcohol drinkers and 47.6 percent exercise for health. For females 94.0 percent are non-smokers, 90.4 percent are non-alcohol drinkers and 49.9 percent exercise for health as shown in Table 4.2. This study found males are more likely to practice unhealthy behaviors such as smoking, alcohol drinking and non-exercise than females. These findings are similar with global trends in which about 40% of men smoke and 56% of men drink compared with only 9% of women who smoke and 15% of women who drink. However, the epidemic of tobacco use among women is increasing in some countries (WHO, 2010).

Table 4.2 Health behavior (smoking, alcohol and exercise) by demographic factors (row, column)

Demographic Factors	Smoking (%)		Alcohol (%)		Exercise (%)		Total
	yes	No	Yes	no	yes	no	
Gender							
Male	42.3%	57.7%	44.5%	55.5%	47.6%	52.4%	5,288(100%)
Female	6.0%	94.0%	9.6%	90.4%	49.9%	50.1%	3,329(100%)
Age							
equal or below 19 year	17.5%	82.5%	17.5%	82.5%	70.2%	29.8%	85(100%)
20-39 year	34.8%	65.2%	39.3%	60.7%	48.3%	51.7%	1,556(100%)
40-59 year	31.1%	68.9%	35.8%	64.2%	48.7%	51.3%	4,281(100%)
60-69 year	22.9%	77.1%	24.6%	75.4%	50.4%	49.6%	1,449(100%)
70-79 year	18.1%	81.9%	13.4%	86.6%	46.4%	53.6%	878(100%)
over 80 year	16.2%	83.8%	12.1%	87.9%	41.2%	58.8%	396(100%)
total	**2,437**	**6,180**	**2,676**	**5,941**	**4,177**	**4,440**	**8,617**
	28.3%	**71.7%**	**31.1%**	**68.9%**	**48.5%**	**51.5%**	**100.0%**

People are influenced differently by tobacco use and cigarette smoking level differs between males and female. Females place higher value physical attractiveness more than males, including pleasant aroma, and tobacco odor detracts from that. Also, females who smoke are more likely to gain the weight from smoking than males, and are more vulnerable than men to adverse the consequences from alcohol drinking. Because women are generally more concerned about health issues, they have less smoking and drinking behavior than males (WHO, 2010).

Also, an important factor associated with health behavior is psychosocial. When people faced stress, anxiety, the lack of control or powerlessness, people tend to take action to reduce or not worsen the condition (Metcalfe, Smith, & Wadsworth, 2003). Normally, males tend to work hard, experience more stress from their job and work in the more hazardous environment than females, and this leads to increased smoking or drinking as a form of self-medication. According to psychological theory, the association between health related behavior (smoking, alcohol drinking) and psychological stress has been well documented in the literature. Metcalfe and

colleagues found that the level of stress related to smoking and drinking was positive. The higher the level of stress, the more drinking and smoking there was (Metcalfe et al., 2003). Another study found that the level of stress had a significant positive relationship with health behavior (Bradstock, Forman, & Binkin, 1988). The authors hypothesized that individuals used smoking and drinking as a stress reliever to reduce anxiety and tension. In addition, men are more likely to die than women because of their risky health behaviors. These risky health behaviors could be smoking, heavy alcohol consumption, low nutrition such as fatty eating habits, less eating of fruits and vegetables, and exposure to physical activity that is harmful for health or hazardous. Thus, it may be that the important determinants of higher mortality in males than females is because of their behavior and not in innate gender differences in physiology (Waldron, 1976).

- **Age**

When comparing between age groups, most of the sample who smoke, drink alcohol and did not -exercise were aged 20-39 and 40-59 years (34.8%, 39.3% and 48.3% for the younger cohort and 31.1%, 35.8% and 48.7% for the older cohort respectively). This shows that the risk of health poor health behavior get ingrained during young adulthood and the working ages. A study of mental health found that working males tend to drink alcohol or smoke alone and in groups more than females in order to reduce the stress that came from workplace (NHANES for 1999–2004); (Wright, 2009). It was reported that 84% of U.S. adults used alcohol moderately. In the UK people who work in the higher pressure jobs have a higher percentage of smoking and drinking than other occupations, and they reported the reason for smoking was to reduce the stress from workplace (Wardle & et, 1999).

This pattern not only shows that the working age groups have highest risk of poor health behavior, but risk is also compounded for those who have no education (34.8%) and work as a laborer (37.4%) as shown in Table 4.3. There is a well-established association between disadvantaged SES (SES) and higher cigarette consumption. Persons from lower socio-economic conditions are less likely to attend university/college or become professionals, and this is related with higher smoking (Daniel, Cargo, & Lifshay, 2004). Promoting higher education should result in

improved health behavior. Also, the home environment, school and work place may either sustain or reduce tobacco smoking. The dynamics of smoking behavior, particularly in the working age group, may be an interaction between SES, demographic factors and smoking control policies. Young adults with lower SES, including lower education, poverty and low occupation level may be more likely to stop smoking if the price of cigarettes is higher. Furthermore, if the workplace prohibits smoking, working age people will be more likely to reduce their overall frequency to smoking or quit in the end.

For exercise, some research studies found that people in the working ages do less exercise than other age groups. If jobs require people to get up in the early morning and return in the late evening, there is less spare time to exercise (Haskell & LEE, 2007). But the study found that people who exercise daily, tend to reduce time from work, watching TV, sleeping, cooking and relaxing (H. Chen, Yang, & Ning, 2007).

By contrast, the reason why elderly tend to exercise more than younger groups is because they are more aware and concerned about their health status (I. Ajzen, 2002; Cerin & Leslie, 2010; G. P Lovell et al., 2010). Most elderly face problems about health and disability. According to the theory of perceived health status, health related behaviors occur because people perceived their condition and how they feel. Impaired perception of health could result in lower engagement in self-care health or preventive practice. If people are sensitive about their health they will take care of their health and reduce risk behavior such as smoking, alcohol drinking and non-exercise (Notani, 1998). In another words, perceived health status appears to be an important determinant to promote and encourage health-promoting behaviors. Persons who perceive benefits from their health are more likely to have good health behavior and will try to maintain it (Chariyar, 2004; Pender, 1996).

4.2.2 Socio-economic characteristics and health behaviors

- **Marital status**

The health behaviors associated with marital status may result from selection effects or social causation effects. The relationship between marital status

and health behavior is a function of how social support could absorb stress and maintain positive health behaviors. In this study, marital status was classified into three groups: married (still staying with spouse), ever married (including widowed/divorced/separated) and single (never married). When comparing among groups, respondents who are married had the most smoking and alcohol drinking (34.0%, 36.5% respectively), while single respondents practiced more exercise for health (55.9%) (Table 4.3). The results somewhat contrast with the previous study which found that married people were healthier than the unmarried people, particularly in females. The data found that people who married are more likely to have a good diet and healthy lifestyles while ever married (widowed or divorced) reported unfavorable nutrition and mental health condition such as stress and depressive disorder (Ben-Shlomo, 1993). Studies of United States (U.S.) citizens have typically shown that married people have better physical and psychological health conditions compared to individuals in other marital status groups. This is particularly so when married individuals are compared to widowed, divorced, or separated individuals, which may reflect the strains of marital dissolution (Liu & Umberson, 2008; K. Williams & Umberson, 2004). The health advantage of the married has been attributed to many of reasons such as the economic benefits, health regulations, and the social support provided by marriage. Married people also presented lower rates of risk behaviors such as substance abuse (Kessler, Berglund, Demler, Jin, & Merikangas, 2005; Simon, 2002). Similar findings have been documented among military service members (Lyndon A. Riviere & Julie C. Merrill, 2011).

A few studies found married respondents reporting higher levels of health risk behavior than single or ever married persons. According to previous research, married soldiers are more apt to present with high stress, depression, and anxiety including high rate of alcohol abuse (L. A Riviere & J. C Merrill, 2011). Similarly, another study of the association between stress and health status found that married people have higher rates of reported physical and mental health problems, including alcohol and substance use disorders. The poorer well-being of such individuals has been principally explained by their greater stress exposure (Thoits, 2010), and which may be due a state-related increased risk behavior such as smoking or drinking (Killgore, Vo, Castro, & Hoge, 2006).

Table 4.3 Health behavior (smoking, alcohol and exercise) by socio-economic factors (row, column)

Socio-economic Factors	Smoking (%)		Alcohol (%)		Exercise (%)		Total
	yes	No	Yes	no	yes	no	
Marital Status							
Single	18.2%	81.8%	25.5%	74.5%	55.9%	44.1%	944(100%)
Married	34.0%	66.0%	36.5%	63.5%	48.6%	51.4%	5,873(100%)
Ever married	14.8%	85.2%	16.2%	83.8%	44.2%	55.8%	1,800(100%)
Education							
No education	34.8%	65.2%	31.4%	68.6%	28.2%	71.8%	660(100%)
Primary school	29.7%	70.3%	30.0%	70.0%	45.7%	54.3%	5,359(100%)
High school	31.7%	68.3%	38.9%	61.1%	50.8%	49.2%	719(100%)
Vocational Certificate	23.4%	76.6%	32.1%	67.9%	58.4%	41.6%	1,039(100%)
University or over	17.0%	83.0%	29.2%	70.8%	67.9%	32.1%	840(100%)
Occupation							
Unemployed	14.2%	85.8%	13.1%	86.9%	41.5%	58.5%	1,106(100%)
Student	11.1%	88.9%	7.8%	92.2%	70.0%	30.0%	90(100%)
Agriculture	39.0%	61.0%	36.6%	63.4%	52.0%	48.0%	2,177(100%)
Business owners	20.3%	79.7%	27.7%	72.3%	46.5%	53.5%	1,815(100%)
Government office	23.5%	76.5%	35.3%	64.7%	65.7%	34.3%	881(100%)
Employee	30.0%	70.0%	41.3%	58.7%	44.9%	55.1%	247(100%)
Labor Contractors	37.4%	62.6%	38.8%	61.2%	40.5%	59.5%	1,906(100%)
Other	14.9%	85.1%	18.5%	81.5%	54.9%	45.1%	395(100%)
total	**2,437**	**6,180**	**2,676**	**5,941**	**4,177**	**4,440**	**8,617**
	28.3%	**71.7%**	**31.1%**	**68.9%**	**48.5%**	**51.5%**	**100.0**

- **Education**

A main reason for disparity of health outcomes is because there are differences in health behaviors. The UN (2002) revealed that education attainment of people could change socio-economic level and the way they live. Regarding health behavior, encouraging people to have higher education may change the pattern of life styles including improved knowledge about benefits and perceived barriers which may change the attitudes and lead to changing behavior. Tables 4.3 show the pattern of health behavior by education level. Those with university education or higher are more

likely to be non-smokers (83.0 percent), non-drinkers (70.8 percent) and exercise for health (67.9 percent). Generally, exercising for health increases with education, while alcohol use is highest among those with only high school education.

Higher educational attainment makes it easier to absorb new information and also increase perspectives, attitudes and practices (Suwan, 1983). Education also has an influence on better lifestyle and better health practice, such as good diet and physical activity (Mahasittiwat, 1986). Lack of or low educational attainment could increase the probability of health risk. Thus, higher educated level increases health by applying the useful health information (Tunprayoon, 1989). Alder found an association between drinking, physical activity, consumption pattern, use of preventive care, and adherence to therapy with SES (Adler, et al., cited in Cutler, et al., 2006). Alcohol, drug abuse and tobacco smoking are all intimately related with socio-economic disadvantage (Wardle & et, 1999). The UN study found higher smoking rates for the less educated and only one-third the rate of smoking in the better educated group (Bradstock et al., 1988).

Better educated people are more likely to have higher rates of preventive/risk control behavior such as non-smoking and more exercise (United_Nation, 2003). Better educated women reported higher rates of using mammograms and Pap smears than lower educated women (Javadzade, 2012). Similarly another study found that the better educated males and females are more likely to get colorectal screening and other tests (Amaducci et al., 1998).

Nowadays, the information and knowledge are easy to find in the Internet. Everyone in Thailand has access to the Internet, but not everyone internalizes the information. The educational level represents the probability of people to access the information from the Internet or try to learn and find knowledge about health news by themselves. According to the study of Javadzade (2012) 50% of respondents who finished high school or less usually receive the information or health news only from a doctor, family or relative, while 25% of respondents who had at least some college got their health information from more than two sources such as personal sources (doctor) and media sources (newspaper and the Internet).

- **Occupation**

Regarding occupation, there are some variations in health behavior according to occupational structure. The agricultural workers had highest smoking behavior (39.0%) while employee workers had the highest alcohol consumption (41.3%) (Table 4.3).

Occupation and educational level are correlated. People who work in lower levels of occupations are likely to have less education and are more likely to smoke and have poor diet (Wilkinson & Marmot, 2002). According to Wilkinson and Marmot, health gradients by socio-economic class appear which are caused by differences in smoking, drinking, and other behavioral factors. Psychosocial theory stated that smoking behavior is influenced by psychosocial condition in one's life. Risk behavior may be practiced to cover up their problems from their school, workplace, and family. Smoking will help them to reduce the feelings of stress, lack of control, social isolation or unemployment. A study of association between occupation level and psychosocial status found lower occupational classes also experience disadvantaged social and financial status, financial strain, stigma, or loss of social community (Daniel et al., 2004). To sum up, to understand why people have different health behavior, it is necessary to take SES of the person into account. It was suggested that different behaviors across groups were caused by differences in information, costs, and value of longevity (Grossman, cited in Cutler, et al., 2006). However, it is argued that this explanation might not totally be true. There are still differentials in smoking by socio-economic classes even though knowledge about harms of smoking is universal and prices are similar for the rich and the poor.

In order to decrease the smoking rate, the role of workplace could be influential by introducing smoking cessation programs and workplace rules limiting smoking, including the role of the workplace policy against smoking and which provides the better access to smoking cessation programs.

Place of resident and health behaviors

- **Area of residence**

Poor/non-poor and socio-economic class differences within areas or countries and are associated with health differences. The poor in the Less Developed Countries (LDC), like the poor in the More Developed Countries (MDC), are less likely to access the health care services and have greater rates of untimely and less effective treatment than the non-poor (Eberhardt & Pamuk, 2004; Humphreys & Carr-Hill, 1991). They are more likely to live in an unhealthful environment, work at a hazardous job, and follow an unhealthful lifestyle, such as smoking and eating a non-nutritious diet. Specifically, SES tends to be positively associated with the advantageous health-promoting behaviors, for example exercise and avoid health-damaging behaviors such as smoking (House et al., 1988; Wilkinson & Marmot, 2002).

Considering the area of residence, there is a difference in health behavior between people who living in urban and rural areas (Table 4.4). In this study more urban people reported non-smoking (74.7 percent) and non-drinking alcohol (69.7 percent) than their rural counterparts (64.3% and 67.2% respectively). However, more rural respondents reported exercising for health than the urbanites.

Table 4.4 Health behavior (smoking, alcohol and exercise) by Place of resident Factors (row, column)

Place of resident Factors	**Smoking (%)**		**Alcohol (%)**		**Exercise (%)**		**Total**
	yes	**no**	**yes**	**no**	**yes**	**no**	
Area							
Urban	25.3%	74.7%	30.3%	69.7%	47.3%	52.7%	6,160(100%)
Rural	35.7%	64.3%	32.8%	67.2%	51.4%	48.6%	2,457(100%)
Region							
Central	23.8%	76.2%	28.1%	71.9%	53.4%	46.6%	1,225(100%)
Eastern	28.3%	71.7%	36.7%	63.3%	31.0%	69.0%	1,369(100%)
Northeastern	26.5%	73.5%	28.0%	72.0%	68.5%	31.5%	2,170(100%)
Western	31.2%	68.8%	33.6%	66.4%	27.2%	72.8%	1,443(100%)
Northern	17.3%	82.7%	39.3%	60.7%	46.4%	53.6%	894(100%)
Southern	38.1%	61.9%	25.5%	74.5%	53.2%	46.8%	1,516(100%)
total	**2,437**	**6,180**	**2,676**	**5,941**	**4,177**	**4,440**	**8,617**
	28.3%	**71.7%**	**31.1%**	**68.9%**	**48.5%**	**51.5%**	**100.0**

- **Regions**

When geographical regions are taken into account this study found the Southerners had the highest smoking (38.1while a highest percentage of alcohol drinking is among Northerners (39.3%), and highest exercise for health is in the northeastern (68.5%).

Regional differences in smoking, drinking and exercise found weak relationships. This I similar to the study in the Netherlands that found that the pattern of tobacco consumption did not significantly differ by geographical/area based on lung cancer mortality (Kunst, Looman, & Mackenbach, 1993).

4.3 Socio-economic-demographic factors and health status

The health inequality could be classified by demographic and socio-economic characteristics of persons such as age, gender, race, ethnicity, marital status, education attainment, and monthly income class. Chronic degenerative diseases are no longer afflictions only of the developed societies, but have become global problems. Chronic diseases, especially the CVDs, cancer, diabetes, and the chronic lower respiratory diseases were responsible for more than half of all mortality in the world (Keys, 1970). Health problems are the most important problem leading to worrying and anxiety of the population and it is associated with other types of living conditions. People will be happy if they have good health all of their life. In contrast, if not, not only do they have difficulty managing their own lives, but also could be a burden and responsibility for family and society. The health status of population is evolving as the society and economy changes. Increased budget must be allocated for medical cost (Bergner & Rothman, 1987). It is important to clarify the relationship between health status and socio-economic-demographic factors. The diagnosis or symptoms in this study comprise hypertension, diabetes, *Coronary heart disease* (*CHD*), hyperlipidemia and cancer.

- **Hypertension**

Hypertension is not a random disease for any kind of population. It affects persons by certain demographic characteristics. For example, there is a positive association between blood pressure and age, and it is well known that hypertension more likely affects persons of African ethnicity than those of Caucasian ethnicity (Absi & Wittmers, 2003). In this study 11.9% have hypertension, 61.1% did not have this condition, and 27.0% were not sure.

When considering to socio-demographic factors this study found both males and females had about the same level of reported hypertension (12%) (Table 4.5). Some chronic conditions of later life are particularly characteristic of men. Males have a more favorable response than females with respect to cholesterol metabolism, the clotting factor, the elasticity and proneness to injury of the vascular lining, and the immune function, in addition to the more favorable hormonal balance and response to

stress. The destructive bodily changes that result from stress are less pronounced for women (Jacob, 2012).

Table 4.5 Percentage distribution of Hypertension by Socio-economic-Demographic Factors (row, column)

Socio-economic-Demographic Factors	Hypertension			Total
	Yes	No	Don't know	
Gender				
Male	11.7%	61.2%	27.1%	5,288(100%)
Female	12.1%	61.0%	26.9%	3,329(100%)
Age				
equal or below 19 year	7.0%	54.4%	38.6%	85(100%)
20-39 year	12.1%	60.4%	27.5%	1,556(100%)
40-59 year	11.6%	62.4%	26.0%	4,281(100%)
60-69 year	12.4%	60.2%	27.3%	1,449(100%)
70-79 year	12.8%	59.0%	28.2%	878(100%)
over 80 year	10.9%	58.8%	30.3%	396(100%)
Marital Status				
Single	10.4%	60.6%	29.0%	944(100%)
Married	11.7%	61.5%	26.8%	5,873(100%)
Ever married	13.2%	60.3%	26.5%	1,800(100%)
Education				
No education	13.3%	60.6%	26.1%	660(100%)
Primary school	11.9%	62.7%	25.4%	5,359(100%)
High school	12.8%	62.0%	25.2%	719(100%)
Vocational Certificate	12.2%	56.9%	30.9%	1,039(100%)
University and over	9.5%	55.8%	34.6%	840(100%)

Table 4.5 Percentage distribution of Hypertension by Socio-economic-Demographic Factors (row, column) (cont.)

Socio-economic-Demographic Factors	**Hypertension**			**Total**
	Yes	**No**	**Don't know**	
Occupation				
Unemployment	13.5%	60.6%	25.9%	1,106(100%)
Student	12.2%	51.1%	36.7%	90(100%)
Agriculture	11.9%	65.5%	22.6%	2,177(100%)
Business	12.2%	59.3%	28.5%	1,815(100%)
Government office	9.5%	57.8%	32.7%	881(100%)
Employee	10.9%	61.5%	27.5%	247(100%)
Labor Contractors	11.6%	61.6%	26.7%	1,906(100%)
Other	12.7%	54.2%	33.2%	395(100%)
Area				
Urban	12.1%	62.5%	25.4%	6,160(100%)
Rural	11.3%	57.7%	31.0%	2,457(100%)
Region				
Central	11.4%	69.2%	19.3%	1,225(100%)
Eastern	18.1%	58.3%	23.6%	1,369(100%)
Northeastern	9.9%	55.6%	34.5%	2,170(100%)
Western	13.2%	51.9%	34.9%	1,443(100%)
Northern	10.9%	55.6%	33.6%	894(100%)
Southern	8.8%	77.1%	14.1%	1,516(100%)
total	**1,024**	**5,267**	**2,326**	**8,617**
	11.9%	**61.1%**	**27.0%**	**100.0**

Regarding age, this study found the prevalence of hypertension rates increases somewhat with age, particularly those age 60-69 years and age 70-79 years. However the proportions who do not know are rather high (about one-third of each age group). A study in Japan estimated the percentage of high BP among older adults to be as high as 73 percent (J. David & Sara, 1996).

The marital status and hypertension relationship has been established in many studies. This study found ever married persons reported hypertension (13.2%) more than the married (11.7%) and single (10.4%). A study in China found never married women were more likely to have high BP than married women (Haijiang, 2005). And the study of Schaefer, Lillard and Waite (1995) found that a surviving spouse had the highest incident of hypertension. This effect is the so-called "widower effect" and is especially severe on men (Schaefer et al. 1995; Lillard and Waite 1995). The premature death of a surviving spouse may result from the loss of the physical and emotional support of the ailing spouse which increases the risk of hypertension.

Some studies on the effect of marital transition on health found that marital disruption has an indirect effect on health status including hypertension intermediated by health risk practice and stress, and direct effects on cardiovascular, endocrine, immune system, neuro-sensory and other physiological disorder mechanisms (Kiecolt-Glaser, 2001). Another study showed that alcohol consumption, high sodium, lack of physical activity, and higher levels of stress significantly contribute on developing hypertension. Moreover, marital status and familial commitment relationship can impact on health risk behavior. Single persons or separated couples are more likely to engage in higher risk health behavior (Umberson, 1992).

In this study, self-reported hypertension decreases as educational attainment increases. (Table 4.5). The study of the National High Blood Pressure Education Program, which had the objective to reduce hypertension-related death and disability, found that people who are less concerned or neglected their condition are more likely to inadequately be treated (Guideliness_Subcomittee, 1999). Increasing the awareness and early diagnosis of hypertension may reduce the prevalence of hypertension among the Thai population. Other studies also found that educational attainment and hypertension have significantly negative association. People with lower education reported higher prevalence of hypertension and hypertension mortality rates as a cause of death (Vargas, Imgram, & Gillum, 2000). People with high education are more likely well informed and thus they will be more aware and have more access to effective treatment and, as a result, can significantly reduce their morbidity. This is less likely for the lower educated people who usually refuse to adjust their lifestyle,

medicine intake or access to proper treatment and health outlets, and they do not easily perceive danger from disease.

By occupation, the unemployed reported the highest level of hypertension (13.5%) with other groups not far behind Table 4.5. Other studies found that blood pressure and serum cholesterol concentration was related to employment status (before and after loss of a job) (Smith, 1991). Moreover, unemployed people feel the need to have medical consultation about cardiovascular conditions, including hypertension, more often than do employed people. In the United States, the self-reported rate of hypertension was higher for the unemployed group than those employed, particularly among low educated males (Franco et al., 1985). Moreover, normally males are more adversely affected by consequences from unemployment than females. Unemployed people involuntarily suffer and may experience adverse physical and mental health. A study about the association between hypertension and unemployment found self-reported hypertension is significantly related with job loss. Importantly, CHD could follow after stressful life events.

Regarding area of residence found urban people have only slightly higher hypertension than rural people (12.1% and 11.3%, respectively). Moreover, people living in the Eastern region of Thailand seem to have significantly higher self-reported hypertension than those in other areas. Residents of the South had the lowest hypertension. Urban people faced some negative consequences for health that rural people do not. A study explored the health outcome following urbanization and found the higher rate of reporting “poor or fair” on health status in people who experience urbanization. The health consequences might be affected by the changing environment. Some social and environmental situation are harmful for health, such as environmental pollution, poor lifestyles, congested residences, social isolation and tension, including the disadvantaged living conditions such as slums (A. Cohen, 2004). Moreover, Donnell and Van Doorslaer (2009), found that urbanization significantly increased to high fat food consumption and smoking, which are the most important risk factors for obesity or hypertension (Van, O’Donnell, & Van Doorslaer, 2009).

- **Diabetes**

Diabetes is a metabolic disease as indicated by high blood sugar. Diabetes can be prevented and be treated by a healthy diet, exercise, ceasing smoking, and having a normal body weight (Collaboration, 2010). The greater prevalence of diabetes is associated with the tremendous increase in obesity in the last several decades. A family history of obesity or diabetes, that is, having parents or siblings with these conditions, increases the risk of having diabetes in both childhood and adult life. Diabetes is associated with and is the cause of several other chronic conditions, including stroke, CHD, blindness, and kidney disease. The combination of heart disease and cerebrovascular disease, the main CVDs, accounts for over one-third of all of the deaths currently. In this study it was found that only 5.2% reported having diabetes disease, while 66.3% did not and 28.6% were unsure as shown in table 4.6.

This study found no difference between male and female reported diabetes (5.1% and 5.2%, respectively). One study in Kirirat Nikom District, Surat Thani Province of Thailand found that males tended to be more likely to have diabetes than females. The researcher concluded that prevalence of diabetes and pre-diabetes was higher in males than females (Ruangwarcharin, 2007).

Table 4.6 Percentage distribution of diabetes by socio-economic-demographic factors (row, column)

Socio-economic-Demographic Factors	Diabetes			Total
	Yes	No	Don't know	
Gender				
Male	5.1%	66.5%	28.4%	5,288(100%)
Female	5.2%	66.0%	28.8%	3,329(100%)
Age				
equal or below 19 year	1.8%	57.9%	40.4%	85(100%)
20-39 year	4.5%	66.1%	29.4%	1,556(100%)
40-59 year	5.2%	67.2%	27.6%	4,281(100%)
60-69 year	5.7%	65.7%	28.6%	1,449(100%)
70-79 year	5.8%	63.6%	30.6%	878(100%)
over 80 year	4.3%	66.2%	29.5%	396(100%)
Marital Status				
Single	3.5%	65.7%	30.8%	944(100%)
Married	5.3%	66.4%	28.3%	5,873(100%)
Ever married	5.6%	66.2%	28.2%	1,800(100%)
Education				
No education	4.8%	66.2%	28.9%	660(100%)
Primary school	5.3%	68.0%	26.7%	5,359(100%)
High school	6.0%	66.8%	27.3%	719(100%)
Vocational Certificate	4.9%	62.1%	33.0%	1,039(100%)
University and over	3.9%	60.2%	35.8%	840(100%)

Table 4.6 Percentage distribution of diabetes by socio-economic-demographic factors (row, column) (cont.)

Socio-economic-Demographic Factors	Diabetes			Total
	Yes	No	Don't know	
Occupation				
Unemployment	7.1%	66.3%	26.6%	1,106(100%)
Student	2.2%	57.8%	40.0%	90(100%)
Agriculture	4.6%	70.8%	24.6%	2,177(100%)
Business	4.7%	65.2%	30.1%	1,815(100%)
Government office	4.2%	61.4%	34.4%	881(100%)
Employee	4.9%	66.8%	28.3%	247(100%)
Labor Contractors	5.6%	65.9%	28.4%	1,906(100%)
Other	5.6%	60.5%	33.9%	395(100%)
Area				
Urban	5.5%	68.1%	26.3%	6,160(100%)
Rural	4.2%	61.6%	34.2%	2,457(100%)
Region				
Central	4.9%	72.7%	22.4%	1,225(100%)
Eastern	7.5%	69.5%	23.0%	1,369(100%)
Northeastern	4.5%	58.9%	36.6%	2,170(100%)
Western	5.0%	57.5%	37.5%	1,443(100%)
Northern	3.7%	61.9%	34.5%	894(100%)
Southern	5.3%	79.6%	15.0%	1,516(100%)
Total	**445**	**5,711**	**2,461**	**8,617**
	5.2%	**66.3%**	**28.6%**	**100.0%**

Some populations with a high prevalence of diabetes tend to have more males than females with type 1 diabetes, while some with low prevalence show more females than males. In people of European descent diagnosed at ages 15-40, more men than women are diagnosed with type 1 diabetes (Soltesz, Patterson, & Dahlquist,

2007). A plausible explanation is that females have higher duration of diabetes than males or, conversely, males are more likely to die before they get worse, suffer impairment or loss of vision (Icks, Trautner, Haastert, Berger, & Giani, 1997). In contrast, some researchers found the modified Thai Diabetes Risk Score in males and females were not different (S. Porntrakulphiphat, Arkaravichien, Thepsuthammarat, Treapkhunthong, & Pratipanawatr, 2012; Siwakorn Porntrakulphiphat et al., 2011).

Moreover, the prevalence of diabetes generally increases by age group, peaking at 5.7% for the 60-79 year olds. Surveillance data from CDC noted that the number of diabetes cases among the adult population in the USA found a concentration of type 2 diabetes among those ages more than 65 years. Importantly, older adults have greater risk of both diabetes and pre-diabetes (CDC, 2011).

The reason may be because the elderly are more susceptible to morbidity and diabetes complications are harder to cure and manage. Moreover, to engage in regular exercise and changing eating behaviors are more difficult for the elderly. Some elderly patients are allergic to drugs or other treatments for diabetes (Jacob, 2012).

Considering education class, self-reported diabetes disease increases with education and peaks with high school graduates (6.0%) and then declines for higher educational attainment. Education may be a proxy for access to and use of medical care. Less educated people may not consider individual health care as an important priority. In contrast, higher educated people tend to have positive health attitudes, better access to health care services, engage with friends that have positive attitudes and good perceptions about health behavior, and higher personality achievement (Collaboration, 2010).

In a study on the determinants of diabetes detection and treatment found that, over time, race has become less important while education has become more important in either early detection or treatment management of diabetes. The education probably increases patients' ability to adopt and adhere to complex diabetes treatments. The new diabetes treatment needs patient’s cooperation - for example, self-monitoring of blood glucose levels, insulin injection, controlling nutrition intake physical activity, and consult regularly (Rogers & Hummer, 2003).

Regarding marital status found that ever married and married respondents have about the same level of diabetes self-reports (5.6% and 5.3%). Many scholars

have clearly demonstrated that conflict between couples impairs health while kindness, thoughtfulness and care between couples are beneficial to health. There are factors that increase the blood sugar level and impair health generally. The study of Trief & Morin (2006) studied the link between stress during marriage and diabetes. They found higher marital stress correlated with adverse diabetes outcomes as represented by lower blood glucose control and higher blood pressure levels when compared to couples with more marital harmony (Trief & Morin, 2006). In order to maintain diabetes below dangerous levels, supporting behaviors one's spouse and good relational support could help to improve one's health condition by, for example, helping to remind each other about the time to take the medicine, physical activity, hospital visits and nutrition support which includes food purchases and preparation. Furthermore, the couple could help each other to develop knowledge about nutrition, how to control blood sugar and reduce tension (Trief & Morin, 2006).

For occupation, diabetes is highest for the unemployed subjects, and ranges from 4.6% to 5.6% for the other occupations. The relationship between unemployment and illness has been found in many studies. People who are unemployed have higher physical and mental illness than those who are employed (Montgomery, Bartley, Cook, & Wadsworth, 1996). Moreover, unemployment is related to health-risk behavior (Wilson, 1980) and the unemployed tend to have lower body weight, are more likely to drink and smoke (Arnetz, Brenner, Levi, & al., 1991). According to Ferrie (2001) the health effects of unemployment are linked to financial problems (debt) that have psychological consequences. The psychological health effects begin when people first feel anxious because their jobs are threatened. These processes start before they lose their job or become unemployed. It means that job insecurity is also a determinant of health. The economic health study found that people whose jobs aren't stable or are insecure have more illness and mental health problems such as depression and anxiety (Ferrie & et, 2001).

Slightly more urban residents reported diabetes than their rural counterparts (5.5% and 4.2% respectively). By region, diabetes in lower in the North (3.7%) and highest in the East (7.5%). Differences in longevity and health outcomes by race have been found in many studies, Despite the health improvements for different ethnic groups (e.g., American Indians, Asians and non-Hispanic

whites/blacks) bear an unequal burden of death and disease. The data from NCHS found a large part of the differences between the health of the races and Hispanic-origin groups were caused by disparity in the quality of health care service and availability to access the health programs. Hence, part of the difference in health outcomes is due to factors distinguishing the races independent of ability to pay or secure access to health care, such as less healthful lifestyle and behavior, less healthful work and home environments, genetic predispositions, and deficiencies in the quality of health care provided (U.S._Government, 2008).

- **CHD**

CHD is the most prevalent cause of several diseases, particularly chronic diseases such as hypertension, atherosclerosis, and diabetes, but, at a more basic level, death, and reduces quality of life. While a number of factors causes CVD, factors such as stress, unhealthful diet, poor lifestyle, and adverse environments, contribute to it and to the other chronic diseases associated with it. In this study it was found only 2% reported having CHD, while 66.7% said they did not and 31.3% did not know as shown in table 4.7.

Females reported CHD more than males (2.3% and 1.8%) and 2.1% of respondents aged 20-39 years and 20-39 years reported having CHD. Commonly, females have greater risk factors of CHD than males. According to a heart study, females were significantly less likely to smoke than males but more to take dietary fiber, triglycerides and vitamin C than males (Fowkes & Pell, 1994). CHD increases slightly for single, married and ever-married status.

Normally, married adults are generally found to have better health than single or ever-married adults. Marriage can improve health in a variety of ways, whether by imposing structure and stability in the partner's life, providing social support and hence reducing stress, and serving as an inducement for maintaining good health (Lillard and Panis 1996;Waite and Gallagher 2000). It is also possible, however, that people who get married are a selected group with superior health and remain married because of their superior health and ability to expand their income by staying together.

Table 4.7 Percentage distribution of CHD by socio-economic-demographic factors (row, column)

Socio-economic-Demographic Factors	CHD			Total
	Yes	No	Don't know	
Gender				
Male	1.8%	66.8%	31.4%	5,288(100%)
Female	2.3%	66.6%	31.1%	3,329(100%)
Age				
equal or below 19 year	0.0%	59.6%	40.4%	85(100%)
20-39 year	2.1%	65.0%	32.9%	1,556(100%)
20-39 year	2.1%	67.8%	30.0%	4,281(100%)
60-69 year	1.6%	66.9%	31.5%	1,449(100%)
70-79 year	1.9%	65.4%	32.7%	878(100%)
over 80 year	1.8%	65.7%	32.6%	396(100%)
Marital Status				
Single	1.6%	66.3%	32.1%	944(100%)
Married	1.9%	66.8%	31.2%	5,873(100%)
Ever married	2.4%	66.7%	30.9%	1,800(100%)
Education				
No education	2.3%	62.3%	35.5%	660(100%)
Primary school	1.8%	69.2%	29.0%	5,359(100%)
High school	3.1%	67.2%	29.8%	719(100%)
Vocational Certificate	2.1%	62.3%	35.6%	1,039(100%)
University and over	1.9%	59.8%	38.3%	840(100%)

Table 4.7 Percentage distribution of CHD by socio-economic-demographic factors (row, column) (cont.)

Socio-economic-Demographic Factors	**CHD**			**Total**
	Yes	**No**	**Don't know**	
Occupation				
Unemployment	2.6%	67.6%	29.7%	1,106(100%)
Student	2.1%	57.8%	40.0%	90(100%)
Agriculture	1.6%	68.9%	29.6%	2,177(100%)
Business	2.0%	65.7%	32.3%	1,815(100%)
Government office	2.3%	61.5%	36.2%	881(100%)
Employee	2.0%	66.0%	32.0%	247(100%)
Labor Contractors	2.2%	68.7%	29.2%	1,906(100%)
Other	1.3%	62.3%	36.5%	395(100%)
Area				
Urban	2.1%	69.8%	28.1%	6,160(100%)
Rural	1.7%	59.1%	39.2%	2,457(100%)
Region				
Central	1.5%	73.9%	24.7%	1,225(100%)
Eastern	2.6%	71.2%	26.2%	1,369(100%)
Northeastern	1.7%	58.4%	40.0%	2,170(100%)
Western	2.8%	55.0%	42.2%	1,443(100%)
Northern	1.7%	64.1%	34.2%	894(100%)
Southern	1.8%	81.6%	16.6%	1,516(100%)
total	**172**	**5,751**	**2,694**	**8,617**
	2.0%	**66.7%**	**31.3%**	**100.0%**

There is no clear pattern in this study for self-reported CHD prevalence by level of education. The study by Smith (2004) depicts the sharp inequality in the percent reporting fair health or CHD according to three broad educational attainment classes of 0–11 years of schooling, 12–15 years, and 16+ years based on the National Health Interview Surveys for 1991–1996. The health disadvantage of non-completing

a high school education is starkly evident throughout the age scale. Smith found that, even after controlling for all factors related to health, people who have lower education attainment were more likely to have negative health condition than those with more schooling, and this effect persists into old age and this was found that in almost all countries (Smith 2004, cited in (Jacob, 2012)). It should not be surprising that educational level is dominant among the socio-economic factors affecting health outcomes.

Higher education provides the intellectual and psychological background for taking advantage of newer developments in medical knowledge, adhering to instructions regarding the treatment for illness, seeking to maximize the level of one's health, and anticipating the consequences of failure to secure treatment and follow the prescribed treatment (Jacob, 2012).

Table 4.7 shows that 2.6% of respondents who are unemployed or have no job reported had CHD (2.6 percent), followed by government officer (2.3%) and laborer (2.2%). More urban residents reported CHD than their rural counterparts (2.1% and 1.7%) and there was no clear pattern of prevalence by geographic sub-region. Urban areas condition are more likely to have larger differentials in social, economic and occupation levels including higher rates of violence, that adversely affect the disadvantaged population (marginalized populations) which is linked with higher risk behaviors, and prevalence of psychological stressors of cities (Freudenberg, 2000). Marmot (2002) believes that racial differences in morbidity and mortality are largely or wholly due to socio-economic factors. More affluent groups routinely receive better and more extensive medical treatment than poorer, marginalized groups (Wilkinson & Marmot, 2002). The National Research Council (2008) found non-white racial groups and Hispanics are likely to receive poorer care because of less favorable public policies for allocating resources to them, their disproportionate representation in restrictive health plans, their greater lack of health insurance, and linguistic, cultural, and educational barriers (U.S._Government, 2008).

- **Hyperlipidemia**

Hyperlipidemia relates with abnormally increased levels of any abnormal lipids/lipoproteins level in the blood. It is the most common form of dyslipidemia. Hyperlipidemia may result from diseases such as diabetes, thyroid disease, and renal disorders. Hyperlipidemias are most often genetically determined, but can be caused by disadvantaged diet, drugs, and certain disease conditions. In this study it was found that only 4.6% of the sample reported having Hyperlipidemia syndrome, only 4.6%, while 63.4% said they did not, and 32.0% were not sure. Regarding gender, this study found (Table 4.8) males reported having hyperglycemia at the same level as females (4.4% and 4.9%, respectively).

For marital stats, 5.4% of ever-married respondents reported having hyperlipidemia followed by married (4.4%) and single (4.2%). By educational attainment, nearly all groups had about 4% prevalence of self-reported hyperlipidemia, but high school graduates stand out with 7.2%. Education promotes health in terms of better access to health care information and resources (Adler & Newman, 2002). People who have higher education are able to access standard health services better than people who have lower education.

Regarding occupation, employee workers had higher self-reported hyperlipidemia disease (7.7%), followed by the unemployed (5.5%) and laborers (5.2%). The work environment may put the worker’s health directly at risk for respiratory and lung diseases, such as asthma, chronic bronchitis, and lung cancer. Work in occupations that involve repetitive, boring tasks, low rewards with low prestige, and minimal control over one’s work life is associated with higher rates of musculoskeletal conditions, CVDs, and emotional disorders. Persons in manual labor occupations report poorer health than persons in other work (Case and Deaton 2003).

Table 4.8 Percentage distribution of hyperlipidemia by socio-economic-demographic factors (row, column)

Socio-economic-Demographic Factors	Hyperlipidemia			Total
	Yes	No	Don't know	
Gender				
Male	4.4%	63.4%	32.2%	5,288(100%)
Female	4.9%	63.5%	31.6%	3,329(100%)
Age				
equal or below 19 year	3.5%	56.1%	40.4%	85(100%)
20-39 year	4.4%	62.1%	33.4%	1,556(100%)
40-59 year	4.4%	64.4%	31.2%	4,281(100%)
60-69 year	5.6%	63.6%	30.8%	1,449(100%)
70-79 year	4.6%	61.5%	33.9%	878(100%)
over 80 year	4.0%	62.4%	33.6%	396(100%)
Marital Status				
Single	4.2%	63.1%	32.6%	944(100%)
Married	4.4%	63.5%	32.0%	5,873(100%)
Ever married	5.4%	63.2%	31.4%	1,800(100%)
Education				
No education	4.4%	59.7%	35.9%	660(100%)
Primary school	4.4%	65.6%	30.0%	5,359(100%)
High school	7.2%	62.9%	29.9%	719(100%)
Vocational Certificate	4.2%	60.0%	35.8%	1,039(100%)
University and over	4.0%	57.3%	38.7%	840(100%)

Table 4.8 Percentage distribution of hyperlipidemia by socio-economic-demographic factors (row, column) (cont.)

Socio-economic-Demographic Factors	Hyperlipidemia			Total
	Yes	No	Don't know	
Occupation				
Unemployment	5.5%	64.1%	30.4%	1,106(100%)
Student	4.4%	52.2%	43.3%	90(100%)
Agriculture	3.4%	66.1%	30.5%	2,177(100%)
Business	5.3%	61.8%	32.8%	1,815(100%)
Government office	3.4%	59.7%	36.9%	881(100%)
Employee	7.7%	61.9%	30.4%	247(100%)
Labor Contractors	5.2%	64.9%	29.9%	1,906(100%)
Other	3.5%	58.5%	38.0%	395(100%)
Area				
Urban	4.9%	66.2%	28.9%	6,160(100%)
Rural	4.0%	56.4%	39.6%	2,457(100%)
Region				
Central	1.6%	72.8%	25.6%	1,225(100%)
Eastern	7.1%	64.4%	28.5%	1,369(100%)
Northeastern	2.6%	57.4%	40.0%	2,170(100%)
Western	7.9%	49.5%	42.6%	1,443(100%)
Northern	5.0%	60.4%	34.6%	894(100%)
Southern	4.2%	78.6%	17.2%	1,516(100%)
Total	**397**	**5,465**	**2,755**	**8,617**
	4.6%	**63.4%**	**32.0%**	**100.0%**

Urban subjects presented a slightly higher percentage of Hyperlipidemia than rural subjects (4.9% and 4.0% respectively). Lower SES and minority ethnic groups usually stay in big cities but have less coverage of health insurance (Merzel, 2000). It could be increase the burden of health systems. Moreover, cities are over-

represented with undocumented populations which are immigrants and transient populations. Thus, these populations have less access to health care, receive inadequate care, and disproportionately use emergency systems which will lead to abundant disparities in health individual outcomes.

- **Cancer**

Cancer is well known medically as malignant neoplasms which is a large group of diseases and leading cause at every age, but it afflicts persons in late middle age and early old age particularly often.. The main causes of cancer are diverse, complex, and only partially understood. Cancer results from a variety of causes, not a single cause, but all cancers have a common characteristic, the uncontrolled proliferation of cells. Uncontrolled growth may result from a single defective or missing gene or, more commonly, from cumulative mutations that affect primarily adults, with advancing age. In addition it has been well known that smoking, dietary factors, infection, radiation exposure, lack of exercise, obesity and environmental pollutants increase the risk of cancer. In this study it was found 37 cases or 0.4% reported being diagnosed with cancer while 65.1% had not been diagnosed with cancer and 34.5% did not know.

In this study found males and females had the same, trace levels of reported cancer (Table 4.9). Generally, males are engaged in the more stressful, physically demanding, and hazardous occupations. Cigarette smoking has been a more common habit of men than women and has been indicted as a leading contributor to the sex difference in longevity. Women tolerate exposure to cigarette smoke more poorly than men and accordingly suffer the adverse health consequences of smoke ingestion more quickly and more severely than men (Kunst et al., 1993).

Table 4.9 Percentage distribution of cancer by socio-economic-demographic factors (Row, column)

Socio-economic-Demographic Factors	Cancer			Total
	Yes	No	Don't know	
Gender				
Male	0.4%	64.7%	34.9%	5,288(100%)
Female	0.5%	65.7%	33.8%	3,329(100%)
Age				
equal or below 19 year	0.0%	56.1%	43.9%	85(100%)
20-39 year	0.4%	63.6%	36.1%	1,556(100%)
40-59 year	0.5%	66.3%	33.2%	4,281(100%)
60-69 year	0.4%	65.1%	34.4%	1,449(100%)
70-79 year	0.3%	62.6%	37.0%	878(100%)
over 80 year	0.5%	63.6%	35.9%	396(100%)
Marital Status				
Single	0.3%	65.3%	34.4%	944(100%)
Married	0.5%	64.9%	34.6%	5,873(100%)
Ever married	0.6%	65.4%	34.3%	1,800(100%)
Education				
No education	0.6%	62.3%	37.3%	660(100%)
Primary school	0.5%	66.7%	32.8%	5,359(100%)
High school	0.3%	65.5%	34.2%	719(100%)
Vocational Certificate	0.3%	62.7%	37.1%	1,039(100%)
University and over	0.5%	59.2%	40.4%	840(100%)

Table 4.9 Percentage distribution of cancer by socio-economic-demographic factors (Row, column) (cont.)

Socio-economic-Demographic Factors	Cancer			Total
	Yes	No	Don't know	
Occupation				
Unemployment	1.6%	56.2%	33.2%	1,106(100%)
Student	0.0%	56.7%	43.3%	90(100%)
Agriculture	0.3%	66.3%	33.4%	2,177(100%)
Business	0.4%	64.3%	35.3%	1,815(100%)
Government office	0.6%	61.5%	37.9%	881(100%)
Employee	0.4%	66.4%	33.2%	247(100%)
Labor Contractors	0.4%	66.6%	32.9%	1,906(100%)
Other	0.8%	60.0%	39.2%	395(100%)
Area				
Urban	0.5%	67.4%	32.2%	6,160(100%)
Rural	0.4%	59.2%	40.4%	2,457(100%)
Region				
Central	0.3%	73.8%	25.9%	1,225(100%)
Eastern	1.4%	66.6%	31.9%	1,369(100%)
Northeastern	0.5%	55.4%	44.1%	2,170(100%)
Western	0.3%	53.2%	46.5%	1,443(100%)
Northern	0.6%	64.5%	34.9%	894(100%)
Southern	0.4%	81.1%	18.5%	1,516(100%)
total	**37**	**5,606**	**2,974**	**8,617**
	0.4%	**65.1%**	**34.5%**	**100.0%**

Regarding age, this study found no age group differentials for prevalence of cancer. When taking education into account, this study found no different relationship between education level and cancer. It is unlikely that education level indirectly causes cancer, but because education leads to later childbearing women with

a risk of breast cancer may have greater risk of disease by prolonging childbirth and breastfeeding (Link, Northridge, Phelan, & Ganz, 1998). As with the other indicators, the proportion of cancer cases is too small to detect significant differentials by marital status, occupation or residence.

- **Don't reported disease**

One-fourth of the sample did not know whether they have disease or not and probably reflects the fact that they did not go for an annual checkup regularly. The percentage who don't know their disease status is 27.0% for hypertension, diabetes (28.6%) CHD (31.3%) hyperlipidemia (32.0%) and cancer (34.5%). As discussed earlier, perceiving a health threat is a significant determinant for ceasing harmful health behavior. According to the Health Belief Model framework, individuals who sense they are more prone to disease (health problem) are more likely to change to a healthier lifestyle or even try stopping risky behavior. The individual who perceives that they are susceptible to health problems tend more to adopt a prevention activity or reduce his/her risky behavior in order to decrease his/her disease or health problem. Curiously, it is necessary to know about health risks in order to change health behaviors (Glanz et al., 2002).

A longitudinal study of German and Korean samples examined whether perceived risk had an impact on motivational behavior to change. The study found younger adults, in comparison to middle-aged and elderly people, believe they are less vulnerable to diseases. Moreover, with increasing age, risk perception appears to become a more important motivational drive to change behavior (Renner, Knoll, & Schwarzer, 2000). A study about a person's awareness of CVD found perceived CVD risk could be used as the trigger to improve health-related behavior (Imes & Lewis, 2014).

Based on the above, it is important to encourage people to have regular check-ups in order to identify the risk factors of disease, for example, by measuring blood pressure, screening blood glucose for diabetes, receiving the high cholesterol blood test, and screening for cancers. When this is done, the person is more likely to accept the recommendations from a doctor or nurse for the prevention or treatment of

disease in a timely way, including effective treatment and control of disease before the disease progresses to an irreversible stage.

4.4 The current situation of health status and health behavior of the Thai population

Lifestyle and behavior are two important determinants of an individual's health status (D. R. Williams & Collins, 2010). Health-related behaviors, including eating habits, smoking, alcohol consumption, drug abuse, and physical activity affect health. Some studies have examined eating, smoking, alcohol consumption, physical activity and sleep patterns (Jacob, 2012; Louis G & Richard K, 1992). According to Mokdad et al. (2004) the risk factors for disease for some health conditions are symptoms of disease while others are diseases in their own right. Among the lifestyle practices and behaviors examined for their potential health impact are tobacco use, alcohol consumption, sleep, exercise/inactivity, nutrition and diet, immunization history, social support and stress. Moreover, studies have found an association between exercising such as running, swimming, cycling etc. (Mokdad et al. 2004, cited in(Jacob, 2012) and CHD risk (Morris cited in (Adrianne & David J, 2009). Furthermore, the Women's Health Study found a relationship between walking and CDV (Hamer and Chida cited in (Adrianne & David J, 2009). The Stampfer Study (2000) found that people who have healthy diets, non-smokers, and exercise (more than 30 minutes per day) will have low risk of CHD (Adrianne & David J, 2009).

This section presents results for people who already have disease or syndromes, and whether they reduced their health risk behavior or not. Among the diseased subjects, the question is whether they still kept smoking or drinking and exercising for health. This investigation has limitations because it is a cross-sectional study and cannot show causality between health behavior (smoking, drinking and non-exercise) and health status. But the strength of the analytic cross-sectional study is that the sample may be more representative of the target population than in other analytic or experimental studies since it is easier to obtain a target population from a representative sample. Another strength of the analytic cross-sectional study is that it may be the only appropriate design to use when the onset of disease is difficult to

establish and when care is only sought in the advanced stages of the disease (Jo, 2014).

Data in Table 4.18 shown that people who have hypertension, diabetes, CHD, hyperlipidemia or cancer reported the same pattern and level of health behavior (for smoking, alcohol consumption and exercise). It is surprising that one-fourth of people with these diseases still maintain poor health behavior even though they already have a serious disease. The results are as follows:

- **Smoking**

Cigarette smoking could lead to increased risk of heart disease and stroke for males and females. Cigarette smoking is the main important cause of CHD. According to a survey in industrialized countries, 22% of CVD are caused by cigarette smoking, and accounts for nearly five million who died from CVD (Solar & Irwin, 2010). The smoking behavior in developing countries is increasing to levels in developed countries. WHO has estimated by the year 2020, tobacco will be the most important cause of death globally. More than 12 percent of tobacco-related mortality was contributed by India, China, and countries in the Middle Eastern Crescent. (J. Wardle, 1999).

In this study the one-fourth of respondents who reported disease, are still smoking within hypertension (27.1%), diabetes (28.1%), CHD (27.9%), hyperlipidemia (25.2%) and cancer (24.3%) (Table 4.10). In addition to the potential harm smoking causes smokers, secondary inhalation of smoke by non-smokers is also a risk for CVD (World Health Organization, 2002c). According to the WHO, smoking behavior may increase risk of CVD threefold. Moreover, a project that aimed to reduce cardiovascular mortality through reduction of heath behavior risk such as smoking was able to reduce almost half of cardiovascular mortality (Willett, 2012).

Table 4.10 Percentage distribution of smoking, alcohol consumption and exercise by sample respondents, by disease

Disease	Smoking		Alcohol		Exercise		Total
	Yes	No	Yes	No	Yes	No	
Hypertension							
Yes	27.1%	72.9%	32.5%	67.5%	46.3%	53.7%	1,024 (100%)
No	29.1%	70.9%	31.6%	68.4%	49.1%	50.9%	5,267(100%)
Don't know	26.8%	73.2%	29.1%	70.9%	48.0%	52.0%	2,326(100%)
Diabetes							
Yes	28.1%	71.9%	31.7%	68.3%	48.3%	51.7%	445(100%)
No	28.7%	71.3%	31.7%	68.3%	48.5%	51.5%	5,711(100%)
Don't know	27.3%	72.7%	29.5%	70.5%	48.4%	51.6%	2,461(100%)
Coronary heart disease							
Yes	27.9%	72.1%	27.3%	72.7%	34.9%	65.1%	172(100%)
No	28.4%	71.6%	31.6%	68.4%	49.1%	50.9%	5,751(100%)
Don't know	28.0%	72.0%	30.2%	69.8%	48.1%	51.9%	2,694(100%)
Hyperlipidemia							
Yes	25.2%	74.8%	30.2%	69.8%	34.5%	65.5%	397(100%)
No	28.5%	71.5%	31.4%	68.6%	49.9%	50.1%	5,465(100%)
Don't know	28.2%	71.8%	30.4%	69.6%	47.7%	52.3%	2,755(100%)
Cancer							
Yes	24.3%	75.7%	35.1%	64.9%	48.6%	51.4%	37(100%)
No	28.3%	71.7%	31.2%	68.8%	49.0%	51.0%	5,606(100%)
Don't know	28.3%	71.7%	30.7%	69.3%	47.4%	52.6%	2,974(100%)
Total	**2,437**	**6,180**	**2,676**	**5,941**	**4,177**	**4,440**	**8,617**
	28.3 %	**71.7 %**	**31.1 %**	**68.9 %**	**48.5 %**	**51.5 %**	**100.0**

Moreover, Rogers et al. (2005) calculated life expectancies at age 20 for persons with different smoking histories and different social and lifestyle histories, using data in the NHIS-MCD file for 1990–1997. The result was that smoking reduces life expectancy sharply for both males and females, particularly current smokers who have certain other unfavorable characteristics. Current smokers whose lives are characterized by unmarried status, low income, less than some college education, stressful lives, relative physical inactivity, and overweight have only about half the life expectancy of those without these risk co-factors.

Thai government should be more concerned about people who already have NCD but still have risk behavior. New strategies are needed to help them stop smoking. Health behavior change models such as the Health Belief Model (Glanz et al., 2002) identify the important variables that could encourage or restrain the smokers who want to stop smoking. The perceived negative outcome of smoking can cause some smokers to quit smoking. If they believe that cigarette smoking is dangerous and harmful for their health, the perceived benefits will make the may give persons more confidence to quit smoking. Moreover, the Thai government should more encourage people to go for checkups for people who may be at risk for NCD.

- **Alcohol**

Research findings differ as to the amount of certain drugs that would have to be ingested to be harmful. Alcohol consumption in small amounts each day has been found to be helpful in retarding CVD. On the other hand, no one is advised to begin drinking alcohol for this purpose, and consumption of more than several drinks a day is considered unhealthful. Indeed, some studies found that lowering alcohol consumption is related with reducing the risk of CVD such as CHD. That said, other studies found that alcohol consumption of 1-2 drinks per day is related with the decreased cardiovascular risk by approximately 30 to 50 percent (Cutler et al., 2006). In this study, people who have cancer are mostly still drinking alcohol (35.1%), followed by those with hypertension (35.1%), diabetes (31.7%), hyperlipidemia (30.2%) and CHD (27.3%). One study found that the lower rate of alcohol drinking is associated with a lower rate of cardiovascular problems, for example, CHD (Klatsky, 2004). Another study of the association and consequences of alcohol consumption

and CHD found that several cardiovascular biomarkers are proxies for CHD (Susan, 2011). However, other studies found no relationship between the intake of vitamin C and T2D (Montonen, Knekt, J¨Arvinen, & Reunanen, 2004), and alcohol consumption and smoking were not associated with diabetes (Aekplakorn et al., 2006).

- **Exercise**

Every field study seeking to identify the factors contributing to health and longevity concludes with a recommendation for regular exercise suitable to the health condition of the person. According to one cohort study (follow-up of six years) it was found that more than half of the diabetic patients who exercise regularly were in remission and had improved glucose tolerance, weight reduction and higher rate of fitness. The mortality rate for the intervention group was a third lower than the rest of the cohort who were controls (Eriksson & Lindgarde, 1991). Physical activity was included in a randomized controlled study that compared diet with exercise for reducing the development of diabetes among adults in Da Qing, China. The results were that the intervention group had lower rates of diabetes than the control group, independent of whether participants were lean or overweight (Foggin, Amijo-Hussein, Marigaux, Zhu, & Liu, 2001). Thus, regular exercise has been shown to have many positive effects, such as reducing stress and anxiety, boosting immunity, and reducing excessive weight and obesity. In addition, regular exercise could help to reduce BP, and the risk of heart disease and several types of cancers (especially breast and colon cancer), diabetes, and depression.

In this study, the sample 11.9% have hypertension ((N=1,024), 5.2% have diabetes (N= 445), 2.0% have CHD (N=172), 4.6% have hyperlipidemia (N=397), and 0.4% have cancer (N= 37). As noted earlier, decision-making theory states that people will decide to engage in a particular behavior based on their perceptions of risk-benefit (Janis & Mann, 1977). In other words if they have disease they are more likely to perceive the benefits of being active (e.g., improved health by doing exercise). By contrast, in this study, it was found that more than half of those having disease reported not exercising for health: Hypertension (53.7%), diabetes (51.7%), and CHD (65.1%), hyperlipidemia (65.5%) and cancer (51.4%) (Table 4.10). A study in the United Kingdom found that the perceived barriers toward exercise was significant

influence on exercise followed by the lack of time, expense, exercise environment, and family discouragement barriers (Geoff P. Lovell et al., 2010). The reason that people who have disease but still do not exercise may be due to a combination of several barriers, e.g., no facility to exercise, don't like to exercise, and no place to exercise. The policy of government should promote exercising for health at least three 30-minute sessions, three times per week. Government should also try to reduce the cost barriers to exercise by promoting daily walks, riding a bicycle, and running or walking with house pets.

4.5 Place of exercise and disease

The types of environmental support and restrictions may be related to health behavior. The environmental context could be consisting of individual-to-individual relationships in the city, business influences and government policy influences. A person's decision to exercise for health could be influenced by their environment's characteristic, such as availability of sports facility (Winett, 1985).

The data as shown in Table 4.11 present the place of exercise as related to health status. It has been found that living in the place with high density of exercise facilities is associated with increased exercise. The subjects who have hypertension (28.1%), diabetes (31.7%), CHD (18.0%), hyperlipidemia (20.9%) and cancer (24.3%) reported mostly doing their exercises in and around the house. Moreover, healthy people (non-diseased) also reported mostly having exercise in and around the house. Thus, the place of exercise did not have a relationship with health status and means that people with healthy or unhealthy condition tend to prefer to exercise near their house, as long as it has the exercise facilities available. Studies on exercise facilities availability do not give consistence results. The closeness to an exercise facilities does, however, enable an individual to exercise for health more than their counterparts that live further away (R. K. Dishman, 1982). However another research study found that the nature of the facility was the significant predictor for someone to participate to exercise program (Teraslinna & Partanen, 1969). A later study found that vigorous exercise correlated with the density of exercise facilities and could reduce psychological barriers to exercise (R. Dishman, 1985).

Table 4.11 Percentage distribution of disease by place of exercise

Disease	House and Around the House	Public parks	School / temple / sanatorium	Space place / Parking place	Sports facilities	Other *	No exercise	Total
Hypertension								
Yes	28.1%	4.8%	2.9%	2.5%	2.6%	5.6%	53.4%	1,024 (100%)
No	30.0%	4.6%	4.1%	4.3%	2.8%	3.8%	50.4%	5,267(100%)
Don't know	26.8%	7.7%	4.6%	3.2%	2.3%	4.1%	51.3%	2,326(100%)
Diabetes								
Yes	31.7%	5.6%	3.1%	2.7%	2.0%	3.6%	51.2%	445(100%)
No	29.4%	4.5%	4.1%	4.1%	2.9%	4.0%	51.0%	5,711(100%)
Don't know	27.3%	7.7%	4.2%	3.3%	2.2%	4.3%	50.9%	2,461(100%)
CHD								
Yes	18.0%	7.6%	2.3%	2.3%	1.7%	2.9%	65.1%	172(100%)
No	30.0%	4.6%	4.1%	4.1%	2.9%	3.9%	50.4%	5,751(100%)
Don't know	27.2%	7.2%	4.2%	3.3%	2.2%	4.6%	51.3%	2,694(100%)
Hyperlipidemia								
Yes	20.9%	4.3%	3.3%	1.5%	1.8%	3.0%	65.2%	397(100%)
No	30.6%	4.8%	4.1%	4.2%	3.0%	3.8%	49.6%	5,465(100%)
Don't know	26.8%	7.0%	4.3%	3.4%	2.2%	4.7%	51.7%	2,755(100%)
Cancer								
Yes	24.3%	13.5%	0.0%	.0%	8.1%	2.7%	51.4%	37(100%)
No	29.7%	4.8%	4.2%	4.1%	2.9%	3.9%	50.5%	5,606(100%)
Don't know	27.5%	6.7%	4.0%	3.2%	2.2%	4.5%	52.0%	2,974(100%)
Total	2,491	471	353	327	230	351	4,394	8,617
	28.9%	5.5%	4.1%	3.8%	2.7%	4.1%	51.0%	100.0%

***"other" refers to work sites such as office, factory**

There are several reasons why exercise facility density could motivate physical activity. Firstly, the mere appearance of exercise facilities could encourage people practice exercise behavior. People in and around the facility who appear to be exercisers may strengthen the impact of the stimulus by making exercise appear to be the social norm. Second, to live near the exercise facilities could decrease the barriers toward exercise. The time to travel from school or workplace to places to exercise may be a barrier to exercise. The closer an exercise facility is to one's home, the more person is likely to use it. Similarly, the study of Sallin (1989) presented perceived barriers to exercise, and found that these are important factors associated with reducing exercise behavior (J. F. Sallis, 1989).

However, one needs to be cautious in asserting a significant correlation between facilities and exercise because the majority of people in Thailand do have access to these types of exercise facilities. Mostly, people in cities are jogging in parks or cycling in public places.

4.6 Respondent's exercise experiences

Table 4.12 presents the respondent's exercise experiences. More than half of respondents have heard about the sports campaigns before (57.5%) and one-third have been involved in a sports campaign (33.7%). The sports campaigns used *social* media *marketing* such as media advertising, billboards, magazines, public relations and newspapers to communicate directly to defined target groups. However, under half (42.5%) of respondents did not know about sports campaigns two-thirds were not involved in the campaign (66.3%).

Table 4.12 Respondent's exercise experiences (8,617 cases)

Respondent's exercise experiences	**Number**	**Percentage**
The duration of year in Exercise		
No exercise	4,440	51.5%
Less than 1 year	63	0.7
1-3 year	1,195	13.9
4-6 year	613	7.1
7-9 year	729	8.5
10 year and over	1,577	18.3
Hearing sports campaigns		
Yes	4,957	57.5
No	3,660	42.5
Involvement in campaigns		
Yes	2,902	33.7
No	5,715	66.3
Heath/sports club		
Yes	618	7.2
No	7,999	92.8
Exercise facility		
have	4,114	47.7
no have	1,667	19.3
don't know	2,836	32.9
Exercise leader		
Yes	3,302	38.3
No	1,543	17.9
don't know	3,772	43.8
Total	**8,617**	**100.0**

The sports campaign is an important factor to encourage people to exercise. According to a recent study of the successes of mass media advertising, campaigns and health behavior, it was found that health campaigns could reduce the

disadvantages of health related behavior. The mass media advertising emphasized channels of communicating with the target groups which were low cost and easy to deliver (Grunbaum, Kann, Kinchen, Ross, & Hawkins, 2004). Similarly, another study found exercise campaigns to significantly influence the higher rate of exercise in the target population (NSO, 2014). To motivate people to change and adopt new behavior such as a new physically active lifestyle is not always easy however. By promoting through advertising and mass communication campaigns the target population could be persuaded to attempt more exercise and encourage persons in this process.

Regarding the duration of year in Exercise, most of the respondent reported the duration of exercise within 10 year and over (18,3%) followed by 1-3 year (13.9). For the health/sports club, this study found only 2.7% who joined such a club. When considering the facility, the data show that less than half (47.7%) said they have an equipment in their community. While one-third (32.9%) of respondents don't know whether their community has the exercise facilities and 17.9% said there were no exercise equipment in their community. The availability of exercise facilities is the important determinant which leads people to practice more exercise. The communities that have good availability of exercise facilities and the support from peers or coaches/leaders are significantly more likely to exercise (Robert, 2003; J. Sallis et al., 2000).

For the exercise leaders, a plurality of the sample did not know whether their community had such a leader (43.8%) while over one-third said they did (38.3%). About one–fifth of the respondents (17.9%) said there was no exercise leader in their community.

Table 4.13 Type of exercise

Type of exercise*	**Number**	**Percentage**
Aerobic	1,367	5.3
Running	4,995	19.2
Biking	1,238	4.8
Dance Stick	49	0.2
Chinese Dance	179	0.7
Petanque	54	0.2
Rattan Ball	473	1.8
Basketball	123	0.5
Football	1,974	7.6
Indoor Football	216	0.8
Badminton	580	2.2
Tennis	4	0.0
Table Tennis	49	0.2
Volleyball	521	2.0
Pajsrisabut	10	0.0
Robber Ban	21	0.1
Muscle Building	13	0.0
Swimming	281	1.1
Fitness	150	0.6
Local Sport	67	0.3
Saba Blowing	10	0.0

* can answer more than one choice

Regarding Type of exercise (table 4.13), the data showed 19.2% of respondent exercised by running followed by aerobic (5.3%) and biking (4.8%)

4.7 Psychological factors

Psychological factors may influence the decisions to seek care from government health services and could encourage people to exercise more or less. In this study the psychological factors are including knowledge and attitude toward exercise; perceived benefits and barriers to exercise.

- **Knowledge of exercise**

In Table 4.14, the mean score for knowledge of exercise was 8.39 and with a standard deviation of 2.01. In detail, the respondents know that exercise promotes better health (93.0 percent) and understanding that exercise consists of at least 3 parts, i.e., warm up, training and stretching (88.7 percent). Most of the respondents (89.4 percent) know that they should exercise 30 minutes a day and 3 day a week. The proportion of respondents who know that should not exercise after a meal and know that they should not exercise very hard the first time are 86.0 percent and 80.7 percent respectively.

Most of the sample know exercise can improve health and that it can help stretch and shrink their muscles (87.5 percent and 82.7 percent). In addition, the sample knows that an exerciser uses more oxygen and burns more calories (82.8 percent) and knows that they should choose the right exercise for the right age and gender (88.8 percent). On the other hand, one-third of respondents still thought (incorrectly) that sick people should not exercise (33.6 percent).

Table 4.14 Percentage distribution of knowledge of exercise (8,617 cases)

Knowledge of exercise	Correct	Wrong	Not sure	Total
1. Do you think that exercise will give you better health?	93.0	3.0	4.0	100.0
2. Do you believe that exercise consists of at least 3 parts such as warm up, training and stretching?	88.7	2.7	8.6	100.0
3. Do you think that we should exercise 30 minutes a day and 3 day a week?	89.4	3.9	6.7	100.0
4. Do you think that you should exercise right after a meal?	86.0	9.5	4.5	100.0
5. Do you think that you should exercise very hard the first time?	80.7	12.7	6.6	100.0
6. Do you think sick people should exercise?	55.5	33.6	10.9	100.0
7. Do you think that exercise helps you to have a better health?	87.5	4.2	8.3	100.0
8. Do you think that exercise will stretch and shrink your muscles?	82.7	6.7	10.7	100.0
9. Do you think when you exercise you will use more oxygen and burn more calories?	82.8	7.3	7.9	100.0
10. Do you think you should choose the right exercise for the right age and gender?	88.8	5.8	5.4	100.0

Mean = 8.39, SD = 2.01, minute = 0, Max=10

According to the score of knowledge of exercise, there is still some lack of knowledge about exercise as shown in Item 6 (“Do you think sick people should exercise?”).Moreover, for Item 5 (“Do you think that you should exercise very hard in first time?”) and Item 8 (“Do you think that exercise will stretch and shrink your muscles?”) d around 20 percent did not know the correct answer.

Based on these results, government should still promote knowledge about exercise including benefits, and reduce barriers by continually supporting exercise campaigns. Moreover, schools and universities should consider that all students

participate in the recommended exercise regimen for at least 30 minutes during each school day. Also, there is a need to develop physical activity and increasing exercise opportunities by supporting sports clubs, exercise lessons, certified coaches and other appropriate leaders. According to the study of physical activity in 2003, increased knowledge about exercise is increasing the opportunities of physical activity. The study found that high school students are more likely to enroll in physical education classes, more attended physical education classes daily, and almost 80 percent of those attending physical education spent more than 20 minutes being physically active (Grunbaum et al., 2004).

- **Attitude toward exercise**

The average score for male and female attitudes toward exercise were nearly the same (4.08 and 4.06 respectively). When considering by attitude item, the highest male attitude score (4.32) is for Item 6 (“Local sports should be preserved” followed by Item 8 (“Local sports should be used to help people to promote local solidarity??”) with a score of 4.29, and Item 3 (“Local sports should be used to promote represent the love of the people toward their locality) with a score of 4.15. The lowest attitude score of exercise score is for Item 7 (“Local sports are not up to date”) with a score of 3.39.

The attitude toward exercise of females followed the same pattern as for their male counterparts: The highest score is for Item 6 Local sports (4.30) followed by Item 8 Local sports (4.26) and Item 3 Local sports (4.22). The lowest attitude score is for Item Local sports (3.32)

Table 4.15 Attitude scores toward exercise (8,617 cases)

Attitude toward exercise	Mean		
	Male	**Female**	**Total**
1. Local sports should be use more in exercise	4.11	4.12	4.12
2. Local sports should be used to promote local relationships	4.20	4.22	4.201
3. Local sports should be used to promote and represent the love of people toward their locality	4.22	4.22	4.22
4. Local sports should be used more in exercise because the people already play sports (with no extra equipment needed because they already have it in their area)	4.08	4.09	4.08
5. Local sports should be used more in exercise to save the local people money (no extra equipment needed because their already have it in their area)	4.15	4.13	4.14
6. Local sports should be preserved	4.32	4.30	4.32
7. Local sports is not up to date	3.39	3.32	3.37
8. Local sports could be a mechanism for developing social solidarity.	4.28	4.26	4.28
9. Local sports should be used to help people in different ages to have a better relationships	4.07	4.04	4.06
10. Local sports will help to develop a new way for the locals to exercise	3.97	3.95	3.96
11. I like the idea of using Local sports to exercise	4.03	3.98	4.01
Total	**4.08**	**4.06**	**4.07**

Attitudes toward exercise should be improved since the average in this study was only 50% favorable. According to theory attitude-related behavior could explain the relationship among an individual's decision to exercise. "Self-efficacy", "attitudes towards exercise", "perceived benefit and barriers toward exercise" are strong predictors of behavioral intention or observed behavior. Thus, promoting exercise behavior should focus on initial attitudes toward exercise (Conner, 2002; Glanz et al., 2002; Russell E. Glasgow, 2013).

- **Benefit of exercise**

The average male belief in the benefit of exercise was 4.16, while the average

For females were 4.16. When considering each item for males, the highest rated benefit of exercise is Item 1 ("Do you think exercise will help you to have flexible muscles?") with a score of 4.39 followed by Item 2 ("Do you think exercise will help you to have better movement?") (4.39) and Item 11 ("Do you think exercise will help you to sleep better?") (4.38). The lowest perceived benefit of exercise score is Item 6 ("Do you think exercise will reduce a chance to get a headache?") (3.86).

For females, the most perceived benefit of exercise score is Item 1 (4.38) followed by Item 2 (4.38) and Item (4.37). The lowest perceived benefit of exercise score is Item 6 (3.845)**.** Perceived benefit is applied to health behaviors and is specific to an individual's perception of the benefits by accumulating and engaging in a specific health action. The top perceived benefit of exercise is physical performance followed by a healthy mind and prevention, including life enhancement and social interaction (Lovell et al., 2010 March;). The benefit of exercise score ranges from 4.00-4.30

Table 4.16 Scores for perceived benefit of exercise (8,617 cases)

Benefit of exercise	**Mean**		
	Male	**Female**	**Mean**
Physically	**4.15**	**4.15**	**3.98**
1. Do you think exercise will help you to have flexible muscles?	4.39	4.39	4.39
2. Do you think exercise will help you to have a better movement?	4.39	4.38	4.38
3. Do you think exercise will reduce sore muscles?	4.16	4.17	4.16
4. Do you think you will have a better body if you exercise?	4.31	4.33	4.31
5. Do you think you will have bigger lungs?	4.24	4.24	4.243
6. Do you think exercise will reduce a chance to get a headache?	3.86	3.85	3.86
7. Do you think exercise will protect you from flu?	4.03	4.04	4.04
8. Do you think exercise will protect you from diabetes?	3.79	3.77	3.78
Mentally	**4.28**	**4.28**	**4.27**
9. Do you think exercise will help you to relax?	4.28	4.29	4.29
10. Do you think exercise will help you to have a better concentration?	4.28	4.28	4.28
11. Do you think exercise will help you to sleep better?	4.38	4.37	4.37
12. Do you think exercise will help you to feel more relaxed?	4.33	4.33	4.33
13. Do you think exercise will help you to feel better about yourself?	4.12	4.11	4.12
Socially	**4.10**	**4.07**	**4.09**
14. Do you think exercise will help you to meet new friends?	4.15	4.12	4.14
15. Do you think exercise will help you to party better with friends?	4.13	4.10	4.12
16. Do you think exercise will help you to be closer with your friends?	4.16	4.12	4.14
17. Do you think exercise will help you to become more popular?	3.96	3.94	3.95
Total	**4.17**	**4.16**	**4.17**

There is still a need to encourage and promote the benefit of exercise in target group. For example, breast self-exam (BSE) has a perceived benefit because breast cancer can be found earlier and there is more chance of survival. However, not all women check with BSE. Women should believe about the benefits by adopting this behavior (Graham, 2002).

- **Barriers to exercise**

As shown in table 4.17, the average male score for perceived barriers to exercise was 2.11, while the average female score was 2.12. When considering by item, for males, the greatest perceived barrier to exercise score is for Item 1 ("Do you think exercise will make you sore?") (2.38) followed by Item 14 ("Do you think there are a small number of sports centers in Thailand?") (2.32), and Item 15 ("Do you think exercise is less fun without friend?") (2.29). The lowest perceived barrier to exercise is Item 11 ("Do you think exercise is a waste of money?") (1.89).

Regarding the barriers to exercise scores of female, the greatest perceived barrier to exercise score is Item 1 (2.37) followed by Item 14 (2.32) and Item 15 ("Do you think exercise is less fun without friends?") (2.28). The lowest perceived barrier to exercise is Item 10 ("Do you feel shame when do the exercise?") (1.92).

Table 4.17 Scores of perceived barriers to exercise (8,617 cases)

Barriers to exercise	**Mean**		
	Male	**Female**	**Total**
Physically	**2.24**	**2.24**	**2.24**
1. Do you think exercise makes you sore?	2.38	2.37	2.38
2. Do you think you will get fatter when you exercise because you will eat more?	2.13	2.16	2.15
3. Do you think exercise will make you feel tired?	2.26	2.26	2.26
4. Do you think exercise will give you big muscles, which is unpleasant?	2.18	2.16	2.17
5. Do you think that exercise makes the muscle ache?	2.24	2.22	2.23
Mentally	**1.954**	**1.974**	**1.962**

Table 4.17 Scores of perceived barriers to exercise (8,617 cases)

Barriers to exercise	**Mean**		
	Male	**Female**	**Total**
Socially	**2.13**	**2.15**	**2.14**
6. Do you think exercise is an inconvenient hobby?	1.99	2.02	2.00
7. Do you think wearing sportswear would make you feel silly?	2.00	2.01	2.00
8. Do you think exercise is boring?	1.92	1.94	1.92
9. Do you think exercise is a hard activity?	1.97	1.98	1.97
10. Do you feel embarrassed when exercising?	1.89	1.92	1.90
14. Do you think there are a small number of sports centers in Thailand?	2.32	2.32	2.32
15. Do you think exercise is less fun without friends?	2.29	2.28	2.28
Total	**2.11**	**2.12**	**2.11**

The barriers to exercise scores revealed that the respondents still have high perception of barriers toward exercise, with scores ranging from 1.90-2.40. The sports institutes and government policy should encourage and promote exercise through the strategy to reduce perceived barriers to exercise. Because a person needs to believe in the benefits of the new behavior to adopt it (Centers for Disease Control and Prevention, 2004). Still, it is difficult to change behavior, developing new habits, and there are fears or embarrassment of not being able to exercise correctly (Umeh & Rogan-Gibson, 2001).

A study about exercise in the United Kingdom found that physical exertion was a big perceived barrier and more influential than other barriers such as time wasting, exercise background, and unsupportive family. The physical activity program needs to be designed to create the perception of high benefit/barrier ratio (Geoff P. Lovell et al., 2010)**.**

CHAPTER V
THE ASSOCIATION OF SOCIOECONOMIC-DEMOGRAPHIC FACTORS HEALTH STATUS AND EXERCISE

This chapter investigated the relationship of socioeconomic-demographic factors, health status and exercise. Multivariate Logistic Regression Analysis was used to determine the relationship of socioeconomic-demographic factors, health status and exercise.

5.1 Determinants of exercise and health status

The dependent of this study are exercise practice and health status. The relationships between physical activity and individual's health are examined by numerous scientific reports. To identify what factor that related to recommended exercise should be considering in order that I could provide the benefit of finding to develop health status among population. This study employed Multivariate Logistic Regression to analysis the association, however the assumption of Multivariate Logistic Regression method should be consider as the author could eliminate the error of the calculation which explain as follow;

To analyses by using logistic regression, part of the process involves checking to make sure that the data can actually be analyzed. There are five assumptions that are required for logistic regression to give this study a valid result.

Assumption 1: the dependent variable should be measured on a dichotomous scale.

Assumption 2: the independent variables can be either continuous or categorical

Assumption 3: the independence of observations and the dependent variable should have mutually exclusive and exhaustive categories.

Assumption 4: There needs to be a linear relationship between any continuous independent variables and the logic transformation of the dependent variable by using the analysis of variance ANOVA procedures to test for linearity which interprets the SPSS output from this test and report the results in appendix A. The result presented the significant in the both model include the exercise model and health model; it means both models have linearity relationship.

Assumption 5: The assumption of multicollinearity will be tested before running the multivariate logistic regression models. The independent variables should not have multicollinearity. If the correlation coefficient (r) is more than 0.5, I should take the independent that have multicollinearity out of the model (Cohen 1988). I interpret the SPSS output from this test and report the results in appendix 2. The result presented the pairwise correlations of independent and dependent variables. All of variables were not multicollinearity; so, all of independent variables were used to include in model. Moreover, I also test the Variance Inflation Factor (VIF) which measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is 1/Tolerance, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. Values of VIF that exceed 10 are often regarded as indicating Multicollinearity. The result of VIF testing as shown in appendix 3 found the VIF of all variables are less than 10.

This study presented the concept that there are 17 main determinants that are related to the disparity of exercise practice and health status which this study will classify into 4 important groups of factors:

1. Socioeconomic-demographic factors such as gender, age, marital status, education, occupation, area and region.

2. Psychological factors such as knowledge about exercise, attitude toward exercise, perceive of benefit of exercise and perceive of barrier toward exercise

3. Health related behaviors factors such as cigarette smoking, alcohol consumption, Involvement of exercise campaign, member of health/sport club and the duration of year in exercise.

4. Community factors such as exercise facility and leader on exercise.

In addition, when the author analyzed exercise as the dependent variable, the duration of year in exercise did not include into the model because the year of exercise has collinearity with exercise practice while to analysis health status as the dependent variable, exercise practice and the duration of year in exercise were included into the health related behaviors factors, due to exercise practice and the duration of year in exercise were the main factor that could reduce the probability of having CVD disease (Louis G and Richard K 1992; Jacob 2012).

To analyze the relationship between dependent such as exercise and health status and independent variables such as Socioeconomic-demographic factors, Psychological factors, Health related behaviors and Community factors, it was necessary to control the influence of potentially confounding factors and analyzed by using multiple logistic regression. Controlled factors in this study are included Socioeconomic-demographic factors such as gender, age, marital status, education, occupation, area of reside and region. Psychological factors including knowledge about exercise, attitude about exercise, perceive about benefit and barrier of exercise. Regarding health behavior included smoking, alcohol drinking, involvement on campaign, member of health/sport club and the duration of year in exercise. Community factor compounded with leader of exercise and exercise facility. Dependent variable was determined in terms of exercise practice and health status of the respondent.

For the exercise practice, if the respondent exercise 3 times per week and 30 minute per time, the value of the dependent variable (exercise practice) was set into one and if the respondents never exercise, the value was set to zero. For another dependent variable (health status) if the respondent reported having one of five cardiovascular disease such as hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer, the value was set into one, and if respondents did not report any kind of diseases will be set into zero. The five diseases were compiled into one categories because there is a strong correlation between hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer (Marchand, Wikens et al. 2000). Diabetes also affects the arteries and lead they tend to better develop atherosclerosis and arteries. Normally, the effect of Atherosclerosis could increase blood pressure and hypertension. And if they did not get some treatment , it could be affected to health

disease , blood vessel damage and stroke (Wannamethree, Shaper et al. 2000). Moreover, the priority causes of death and disability of population are heart diseases and stroke. The data also found 65 percent of people who have diabetes, died from some kind of heart disease or stroke(WHO 2008). The study about the association of diabetes with colorectal cancer risk: the Multiethnic Cohort confirmed that Diabetics have been found to have a greater risk of colorectal cancer than non-diabetics (He, Stram et al. 2010).

Furthermore I also test to confirm the relationship among hypertension, diabetes, coronary heart disease, hyperlipidemia, it was found that each of diseases has high correlation with r correlation more than -0.50 or 0.50 (appendix A).

5.1.1 Socioeconomic-demographic factors, Psychological factors, Health behaviors, Community factors and exercise

An individual's social environment also affects exercise behavior in many different ways. In this study, Theory of Reasoned Action (TRA) is applied to study the exercise practice affected by addressed personal and environmental factors. Self-efficacy, physical environment, social environment factors affecting physical activity. Moreover social economic status brought economically disadvantaged individuals including less educated. There isn't a common knowledge of the benefits of a balanced exercise, or the understanding that smoking and drinking present a large number of health problems. This study will be analysis the relationship among Socioeconomic-demographic factors, Psychological factors, Health behaviors and Community factors toward exercise practice. To understand what factor that influence people to exercise including Psychological factors and Community factors could encourage people more physical activity by controlling the personal characteristic that hardly to change or not so that we could provide the useful information to health supporting in future.

The findings of the analysis of the determinants of exercise practice with demographic, socio-economic, psychological factors, Health behaviors and Community factors by using the multiple logistic regressions. There are four models constructed from the logistic regression analysis of exercise practice with independent variables by socioeconomic –demographic factors (sex, age, marital status, education,

occupation, area of resident and region), psychological factors (Knowledge about exercise, Attitude toward exercise, Perceive of Benefit of exercise and Perceive of Barrier toward exercise) , Health related behavior factor (Smoking, Alcohol consumption, involvement of exercise campaign and member of health/sport club) and Community factors (Exercise Facility and Leader on exercise).

The first model included only socioeconomic–demographic factors such as sex and age education. To examine the relationship between socioeconomic–demographic factors with exercise practice regardless the affected of psychological factors Health related behavior factor and Community factors in order to know that is there any differential on exercise if people have differed in socioeconomic–demographic factors. Because social determinants, empirical research has generally presented that personal' socioeconomic status plays a key role in shaping their health-related behaviors (Thammatach-aree 2011; Thomas, Nelson et al. 2011; Javadzade 2012). Analyzing the relationship between SES and health-related behaviors, then, can improve our understanding of the more general phenomenon of socioeconomic health inequalities.

The second model included psychological factors such as knowledge about exercise, attitude toward exercise, perceive of benefit of exercise and perceive of Barrier toward exercise. The author want to know that if people had the same socioeconomic status, psychological factors could influence on exercise practice or not because it is hard to change the personal' socioeconomic status, to improve knowledge about exercise, attitude toward exercise, perceive of benefit of exercise and perceive of Barrier toward exercise may be the solution to increase the probability to exercise among Thai population. According to Health behavior change models and the Health Belief Model (Glanz, Rimer et al. 2002) identify the important variables that could encourage or restrain the people who want or attempt to exercise. The perceive of negative outcome on exercise affected a perceived threat of smokers which are more act to exercise.

The third model added health related behavior factor such as smoking, drinking, involvement of exercise campaign and member of health/sport club. The author controlled the influence of socioeconomic–demographic factors and psychological factors. To examine that health related behavior are influence in a

positive or negative way to the exercise practice or not. According to many study reported if people had one kind of adverse health risk behavior such as smoking or alcohol drinking, they tend to present other disadvantage health risk behavior such as the lack of exercise or adequate sleep. This study included involvement of exercise campaign and member of health/sport club into Health-related behavior. To involve the exercise campaign or to be as the member of health/sport club, it could enhance to access information or important strategy to encourage people to exercise or become more physically active. The last model is introduced to run the whole model including socioeconomic–demographic factors, psychological factors, and health related behavior factor and community factors. The result of multiple logistics regression analysis of 4 models will describe in Table 5.1 as follow;

Model 1: The logistic regression analysis of the relationship of the characteristics of respondent with exercise practice, suggested that age and area of resident had no significant relationship with exercise practice. This model could explain the dependent variable 16.3%. Regarding sex, females had a lower odds ratio of exercise practice than males. Married and marital Used to married have lower change to exercise than single respondents. Education had a significant positive relationship with exercise practice. Those who are having more education are more likely to exercise practice than no education. It has been observed that University and over level of educated respondent have 3 times more likely to exercise practice than no education. Similarly, Vocational Certificate and High school level of educated respondent have 2.5 and 2 times more likely to exercise practice compared to no education respectively.

Table 5.1 Odds ratios of demographic, socio-economic, health perceive, psychological factors and community factor associated with exercise

Variables	Model 1	Model 2	Model 3	Model 4
Socioeconomic-Demographic Factors				
Gender (ref. Male)				
Female	.843**	.844**	.896*	.896*
Age (year)	1.003	1.003	1.002	1.002
Marital Status (ref. Single)				
Married	.850*	.853*	.863	.851*
Used to married	.691**	.688**	.699*	.698**
Education (ref. No education)				
Primary school	1.407**	1.414**	1.418**	1.445**
High school	1.908**	1.918**	1.932**	2.010**
Vocational Certificate	2.478**	2.500**	2.486**	2.549**
University and over	3.325**	3.339**	3.310**	3.376**
Occupation(ref. Unemployment)				
Student	1.961*	1.961*	1.925*	1.932*
Agriculture	1.396**	1.380**	1.370**	1.392**
Business	1.138	1.129	1.117	1.128
Office	1.328*	1.305*	1.284*	1.285*
Other	.894	.890	.892	.902
Area (ref. Urban)				
Rural	1.008	1.039	1.026	1.074

Table 5.1 Odds ratios of demographic, socio-economic, health perceive, psychological factors and community factor associated with exercise (cont.)

Variables	Model 1	Model 2	Model 3	Model 4
Region (ref. Northeastern)				
Central	.243**	.247**	.259**	.259**
Eastern	.633**	.640**	.652**	.652**
Western	.183**	.184**	.192**	.194**
Northern	.458**	.452**	.462**	.437**
Southern	.627**	.625**	.611**	.564**
Psychological factor				
Knowledge about exercise		1.023	1.021	1.011
Attitude toward exercise		1.181**	1.127*	1.186**
Perceive of Benefit of exercise		.791**	.791**	.797**
Perceive of Barrier toward exercise		1.034	1.029	1.040
Health related behavior factors				
Smoking			1.085	1.087
Alcohol consumption			1.095	1.091
Involvement on sport campaign			1.258**	1.184**
Member of health/sport club			1.147	1.133
Community factors				
Exercise Facility				1.459**
Leader on exercise				.893
-2 log likelihood	10798.801	10777.722	10745.312	10701.958
R-square	.163	.166	.170	.176

*** p>0.05, **p>0.01**

In regard to occupation, Respondents who worked in Student, Agriculture and Office jobs had a higher odds ratio of exercise practice than respondents who had no job. The respondents who lived in Northeastern areas had the highest odds ratio of exercise practice while the result presented other areas includes Central, Eastern, Western, Northern and Southern a lower odds ratio of exercise practice than respondents who lived in Northeastern areas.

Model 2: I put the psychological factors including knowledge about exercise, attitude toward exercise, perceive of benefit of exercise and Perceive of Barrier toward exercise inside the model which could explain the exercise practice 16.6% (R-square = 0.166). The result found after I take psychological factors into account. Area of resident still is no significant with exercise practice. Moreover, females had 26 % lower chance to do recommend exercise practice compared to males. In marital status, Married and Used to married respondents had 15.5% and 32.2% lower chance to do recommend exercise practice compared to single respondents. In regard to education, University and over 3.380 times and Vocational Certificate level of education 2.522 times more likely to exercise practice compared to no education respectively. Inoccupation, those who are from Students are nearly two times, Agriculture 1.396 times and Office 1.334 times more likely to exercise practice compared to Unemployment. Regard to region, this study found the similar result with the first model which respondents who live in Northeastern area reported the highest chance to exercise practice.

When considering the Psychological factor, the author found Knowledge about exercise and Perceive of Barrier toward exercise show no significant association with exercise practice. For Attitude toward exercise, this study found Attitude toward exercise has positive significant relationship with exercise practice. While respondents who had higher score of Attitude toward exercise are more likely 1.181 times to exercise practice than respondents who had lower score of Attitude toward exercise. Contract with Perceive of Benefit of exercise, those who had low Perceive of Benefit of exercise tend to had 21% lower chance to do recommended exercise practice compared to those who had high Perceive of Benefit of exercise.

Model 3: the author add the Health related behavior factor including Smoking ,Alcohol, Involvement on sport campaign and Member of health/sport club into the equation which could explain the exercise practice 17.0% (R-square = 0.170). The result found after the author considered the psychological factors and Health related behavior factor into model. Age, Area of resident, Smoking, Alcohol and Member of health/sport club are no significant with exercise practice. Regard to gender, female respondents had a higher odds ratio of probability to exercise practice than male respondents. For education, Primary school, high school, Vocational

Certificate and University and over level of education are more likely to exercise practice compared to no education respectively. Those who are Students, agriculture work and Office had a higher odds ratio of exercise practice than the sampling that had no job. Regard to region, this study found the similar result with the first and second model which Northeastern people presented the highest chance to exercise practice. Furthermore, Knowledge about exercise and Perceive of Barrier toward exercise still shows no significant association with exercise practice the same with first model. Similar with Attitude toward exercise which found positive significant relationship with exercise practice and Perceive of Benefit of exercise shows negative association with recommended exercise practice. For Health related behavior factors, it found people who involve on sport campaign tend to have higher chance to exercise with odd ratio 1.258.

Model 4: the last model added the community factor. This study found age, area, Knowledge about exercise , Perceive of Barrier toward exercise ,smoking, Alcohol consumption, exercise facility and Leader on exercise had no significantly with exercise practice and this equation could explain the exercise practice 17.6% (R-square = 0.176).

Regarding Demographic-Socioeconomic status, females are 11% less likely to exercise practice than males with odd ratio 0.888. The married and used to married respondents were 15% and 31% less likely to exercise practice than single respondents (odds ratio = 0.851 and 0.698). The respondents who educated university and vocational certificate had 3.4 times and 2.6 times more likely to exercise practice than uneducated respondents (odds ratio = 3.376 and 2.549). Those who educated high school and primary school had 2.0 times and 1.5 times more likely to exercise practice than uneducated respondents (odds ratio = 2.010 and 1.445).

Moreover, respondents who work as student, agriculture and office had 1.9 times, 1.4 times and 1.3 times more likely to exercise practice than those who had no job/did not work (odds ratio = 1.932, 1.392 and 1.285). The respondent who live in Central region, Eastern region, Western region, Northern region and Southern region had 74%, 35%, 81%, 66% and 44% less likely to exercise practice than Northeastern respondents (odds ratio =0.259, 0.652, 0.194, 0.437 and 0.564). It means the

respondents who lived in Western region had the highest people who did not recommended exercise.

Considering Psychological factor, the odd ratio of Attitude toward exercise is 1.186, it mean that even though it had significantly association but someone who had higher attitude toward exercise doesn't affected people different on exercise much. Importantly, when I look in Perceive of Benefit of exercise, it found negative association with recommended exercise practice which presented odd ratio 0.797. It means respondent who had high Perceive of Benefit of exercise are 20% less likely to exercise practice. Moreover, this study found those who involved in sport campaign are 1.2 times more likely to exercise practice (odd ratio 1.184).

After added the Community factors into model, Exercise facility is significantly affected with recommended exercise practice. Respondents who are available to access exercise facility had 1.5 times more likely to exercise practice than those who are hardly to access the exercise facility (odd ratio 1.459).

From the above results, these factors could increase the explanation of exercise practice from 16.3 % in first model to 17.6 % in last model (R-square increase from 0.163 to 0.176). Hence, the socioeconomic–demographic factors including sex, marital status, education, occupation, area of resident and region. Psychological factors e.g., attitude toward exercise and perceive of benefit of exercise, regard health related behavior factors such as Involvement on sport campaign is a significant factor with recommended exercise practice. With community factors like Exercise facility is a significant factor with recommended exercise practice. It is also worth noting that age, place of residence, Knowledge about exercise, Perceive of Barrier toward exercise, Smoking, Alcohol consumption, Member of health/sport club and Leader on exercise shows no significant association with recommended exercise practice.

The findings presented above may be summarized in light of objectives 1-3 and hypotheses 1- 4.

Issues	Findings
Objective 1: To find out the relationship among exercise of Thai population based on the differential of socioeconomic-demographic factors. - **Hypotheses** 1: There is a relationship between socioeconomic-demographic factors and exercise practice.	• To assess the first objective, the study reveals that female, single, higher level of education, student, agriculture and office and Northeastern region are facilitating factors to increase the chance to exercise practice among Thai population.
Objective 2: To identify the relationship among psychological factors and exercise practice - **Hypotheses** 2: There is a relationship between psychological factors (such as; Perceived of benefit and barrier of exercise, knowledge and attitude about exercise) and exercise practice.	• Attitude toward exercise has positive and Perceive of Benefit of exercise has negative association with the chance to exercise practice among Thai population

Issues	Findings
Objective2: the relationship among health related behavior factors and exercise practice - **Hypotheses** 3 : There is a relationship between health related behavior factors (such as; smoking, drinking, involvement to sport campaign and member of sport/health club) and exercise practice.	• Thai People who involvement to sport campaign are more likely to practice exercise.
Objective 2: the relationship among community factors and exercise practice - **Hypotheses** 4 : There is a relationship between the community factors (such as; exercise facilities and community exercise leader) and exercise practice.	• Thai People who had Exercise facility are more likely to practice exercise.

5.1.2 Socioeconomic-demographic factors, Psychological factors, Health behaviors, Community factors and health status

Many factors go along together to affect the health status. People will have good health or not, is influenced by their circumstances which represent by socioeconomic status (SES). How the socioeconomic status plays an important role to health status. Why within low SES are more likely to reported poor health condition including usually have a disadvantage action that harm their health than high-SES groups. In this study will investigate Are demographic, social, economic factor influence health status or not and Health behaviors such as use of tobacco, exercise, and alcohol consumption contribute importantly to their health or not. Health behavior as the moderator factor could reduce the influence of socioeconomic status and

decreasing disparity in health and mortality (Rogers et al. 2000). It is important to find the relationship among demographic, social, economic factor and health status alongside considering the health related behavior importantly exercise which could reduce the probability of disease and increase the life expectancy among population.

To analyze the relationship between independent variables such as Socioeconomic and demographic factors, psychological factors, Health related behaviors and Community factors affected health status, it was necessary to control the effects of potentially confounding factors and analyzed by using multiple logistic regression. Controlled factors in this study included demographic- socioeconomic factors such as sex, age, marital status, education , area of resident and region. Dependent variable was measured in terms of reported health status of the respondent. If the respondent had at least one of five kinds of diseases including hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer, the value of the dependent variable was set into one, and if the respondents never had disease, the value was set to zero.

Four logistic regression models were presented to predict health status. The first model included only Demographic- socioeconomic factors such as sex, age, marital status, education, occupation, area of resident and region. The second model included psychological factors such as Knowledge about exercise, Attitude toward exercise, Perceive of Benefit of exercise and Perceive of Barrier toward exercise. The third model included Health related behavior factor such as Exercise practice, Smoking, Alcohol consumption, Involvement on sport campaign, Member of health/sport club and the duration of year in exercise. And the last model added Community factors such as Exercise Facility and Leader on exercise. As shown in table 5.2 presented the odd ratio of demographic, socio-economic, health perceive, health behavior, psychological factors and community factor associated with health status (hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer)

Model 1: The analysis of relationship between characteristics of respondent and health status, using logistic regression (table 5.2) found that sex, age, marital status and education had no significant relationship with health status. This model could explain the dependent variable 2.6%. In regard to occupation, Respondents who worked in agriculture, business and Office had 1.2 times, 1.3 times

and 1.6 times higher odds of having disease than respondents who had no job. The respondents who lived in Central region and Western region had 53% and 36% significantly less likely of having disease compared to those who lived in Northeastern areas (odd ratio = 0.473 and 0.636).

Table 5.2 Odds ratios of demographic, socio-economic, health perceive, health behavior, psychological factors and community factor associated with health status (hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer)

Variables	Model 1	Model 2	Model 3	Model 4
Socioeconomic-Demographic Factors				
Gender (ref. Male)				
Female	.998	.999	1.014	1.013
Age (year)	1.002	1.002	.996	.996
Marital Status (ref. Single)				
Married	.863	.874	.894	.889
Used to married	.810	.826	.848	.843
Education (ref. No education)				
Primary school	.977	.952	.966	.973
High school	.869	.845	.856	.861
Vocational Certificate	.893	.871	.883	.889
University and over	1.027	.970	.985	.993
Occupation(ref. Unemployment)				
Student	1.141	1.138	1.138	1.140
Agriculture	1.242*	1.262*	1.252*	1.251*
Business	1.276*	1.277*	1.279*	1.284*
Office	1.555**	1.558**	1.542**	1.541**
Other	1.212	1.191	1.177	1.179
Area (ref. Urban)				
Rural	.863*	.913	.907	.912
Region (ref. Northeastern)				
Central	.473**	.441**	.463**	.475**
Eastern	.929	.902	.918	.920
Western	.636**	.573**	.596**	.599**
Northern	.975	.898	.924	.938
Southern	1.003	1.001	.910	.897

Table 5.2 Odds ratios of demographic, socio-economic, health perceive, health behavior, psychological factors and community factor associated with health status (hypertension, diabetes, coronary heart disease, hyperlipidemia and cancer) (cont.)

Variables	Model 1	Model 2	Model 3	Model 4
Psychological factor				
Knowledge about exercise		.906**	.904**	.900**
Attitude toward exercise		.869*	.852*	.837*
Perceive of Benefit of exercise		1.014	1.008	1.014
Perceive of Barrier toward exercise		.976	.992	.997
Health related behavior factors				
Exercise practice			.941	.940
Smoking			1.115	1.116
Alcohol consumption			1.117	1.118
Involvement on sport campaign			1.100	1.066
Member of health/sport club			2.047**	1.990**
the duration of year in exercise			1.076	1.074
Community factors				
Exercise Facility				1.008
Leader on exercise				1.117
-2 log likelihood	7517.196	7475.202	7442.823	7440.506
R-square	.026	.036	.042	.043

*** p>0.05, **p>0.01**

Model 2: I put the psychological factors including knowledge about exercise, attitude toward exercise, perceive of benefit of exercise and Perceive of Barrier toward exercise inside the model which could increase to explain health status among population 3.6% (R-square = 0.036). It was observed that sex, age, marital status, education, area of resident, perceive of benefit toward exercise and perceive of barrier toward exercise did not significant to having chronic illness. The result found after I take psychological factors into account. Those who worked in

agriculture, business and office had significantly 1.3 times, 1.3 times and 1.6 times more probability to have disease compared to those who are lack of job (odd ratio =1.262, 1.277 and 1.558). The respondents who lived in central region and western region had significantly (at 95 % confidence interval) 56% and 43% less chance to have disease compared to those who lived in Northeastern region (odd ratio =0.441, and 0.573). When considering the Psychological factor, I found respondents who had knowledge about exercise and attitude toward exercise with higher score had significantly 10% and 13% less chance to have chronic illness compared to those who get lower score (odd ratio =0.906 and 0.869).

Model 3: I add the Health related behavior factor including exercise practice, Smoking, Alcohol drinking, Involvement on sport campaign ,Member of health/sport club and the duration of year in exercise into the equation which could explain the health status 4.2% (R-square = 0.042). The result found after I consider the psychological factors and Health related behavior factor into model. Sex, age, marital status, education, area of resident, perceive of benefit toward exercise, perceive of barrier toward exercise, Exercise practice, smoking, alcohol drinking , Involvement on sport campaign and the duration of year in exercise is no significant with health status.

The result found after I take psychological factors into account. Those who worked in agriculture, business and office had significantly 1.24 times, 1.3 times and 1.6 times more chance to have disease compared to those who did not have job (odd ratio =1.252, 1.279 and 1.542). The respondents who lived in central region and western region had significantly (At 95% confidence interval) 53 percent and 40 percent less likely to have disease compared to those who live on Northeastern region (odd ratio =0.463, and 0.596). When considering the Psychological factor, I found respondents who had knowledge about exercise and attitude toward exercise with higher score had significantly 10% and 15% lower probability to have disease compared to those who get lower score (odd ratio =0.904 and 0.852). Moreover, those who are member of health/sport club had 2.047 times more likely to having chronic illness.

Model 4: the last model added the community factor. This study found Sex, age, marital status, education, area of resident, perceive of benefit toward exercise, perceive of barrier toward exercise ,smoking, alcohol consumption,

involvement on campaign, the duration of year in exercise ,exercise facility and leader on exercise had no significantly with health status and this equation could explain the health status 4.3% (R-square = 0.043).

Moreover, respondents who work as agriculture, business and office tend to have diseases 1.3 times, 1.3 times and 1.5 times higher than those who had no job or did not work (odds ratio = 1.251, 1.284 and 1.541). The respondents who lived in central region and western region had significantly (at 95 % confidence interval) 52% and 40% lower probability to have disease compared to those who lived in Northeastern region (odd ratio =0.475, and 0.599). When considering the psychological factor, respondents who had higher knowledge and attitude about exercise had less chance to having chronic illness compared to those who got lower score. Those who involved in health and sport club are 2 times more likely to having chronic diseases (odd ratio 1.990).

From the above results, these factors could increase the explanation of health status from 2.6 % in first model to 4.3 % in last model (R-square increase from 0.026 to 0.043). Hence, the socioeconomic–demographic factors including occupation and region psychological factors e.g., knowledge toward exercise and attitude toward exercise, health related behavior such as member of health and sport club, are significant factors with health status. It is also worth noting that sex, age, marital status, education, place of residence, perceive of benefit and barrier toward exercise, smoking, alcohol consumption, involvement on campaign, the duration of year in exercise, exercise facility, and leader on exercise shows no significant association with health status.

The findings presented above may be summarized in light of objectives 1-4, and hypotheses 4-7.

Issues	Findings
Objective 1: To find out the relationship among health status based on the differential of socioeconomic-demographic factors. - **Hypotheses 5**: There is a relationship between socioeconomic-demographic factors and health status. **Objective 3:** To identify the relationship among psychological factors and health status. - **Hypotheses** 6: There is a relationship between psychological factors (such as; Perceived of benefit and barrier of exercise, knowledge and attitude about exercise) and health status.	• To assess the first objective, the study reveals that agriculture, business and office are more chance to having chronic disease. Central region and western region are less likely chance to having chronic disease. • Thai People who had higher knowledge toward exercise and higher attitude toward exercise are less likely chance to having chronic disease.
Issues	**Findings**
Objective 3: the relationship among health related behavior factors and health status. - **Hypotheses** 7: There is a relationship between health related behavior factor (such as; exercise practice, smoking, alcohol drinking, involvement of exercise campaign , member of health/sport club and the duration of year in exercise) and health status. **Objective 3:** the relationship among community factors and health status. - **Hypotheses** 8 : There is a relationship between the community factors (such as; exercise facilities and exercise leader) and health status.	• Thai People who involved in sport and Health clubs are more chance to having chronic disease. • Not found significant

5.2 Discussions of results

The results of this study are divided into 2 parts. First part is the discussion of factor including the characteristics of socioeconomic-demographic factors, community factors and psychological factors which related to exercise practice among Thai population. The second is the discussion of the factor which associated to health status.

5.2.1 Exercise practice

Exercise has been defined differently across studies. Physical activity is linked with diabetes and cardiovascular disease risk, and therefore several prevention programs have been implemented to reduce NCD risk. The United State National Institution of Health proposed that exercise is one of the types of physical activity are patterned formal representation and energy utilization in order to help , develop and improve individual's health (Robert 2003).

This study tries to investigate the factor that related to exercise practice by using cross sectional data and employ logistic regression to analysis. The result found 8 variables including gender, marital status, education, occupation, Attitude toward exercise, Perceive of benefit of exercise, Involvement on campaign and Exercise facility have significantly influence with exercise practice. The discussion in each variable will be as follow;

- **Socioeconomic–demographic factors**

This study found females are 11% less likely to exercise practice than males with odd ratio 0.888. According to the several studies found gender have the different of smoking and drinking consequence because of female s are more likely to concern their health than males which has contributed significantly to be different in smoking and drinking level (Annandale 1998; Adler and Newman 2002; Donkin, Goldblatt et al. 2002; WHO 2010).

Regard to marital status, the married and used to married respondents were 15% and 31% less likely to exercise practice than single respondents. Similar with The data found people who married are more likely to have a good diet , healthy lifestyles while used to married(windows or divorce) reported insufficient nutrition and mental

health condition such as stress and depressive disorder (Ben-Shlomo 1993). And also Studies of United States (U.S.) civilians have typically shown that married people presented better in both physical and psychological health condition compared to individuals in other marital status groups. This is particularly so when married individuals are compared to widowed, divorced, or separated individuals, which may reflect the strains of marital dissolution (Williams and Umberson 2004; Liu and Umberson 2008). The health advantage of the married has been attributed to a many of reasons such as the economic benefits, health regulation, and the social support provided by marriage. Married people also presented lower rate of risk behaviors such as substance misuse (Simon 2002; Kessler, Berglund et al. 2005). Similar findings have been documented among military service members (Riviere and Merrill 2011).

Considering education, the respondents who are high educated had more likely to exercise practice than uneducated respondents. This may be because high educated attainment make population easier to adopt the new information and also increasing perspectives ,attitude and practice (Suwan 1983). Education also have influence on better lifestyle and better health practice; such as good diet and physical activity more than low educated people (Mahasittiwat 1986). Lack or low education attainment could increase the probability to health risk. Thus, high educated level make people increase their health by using the useful health information, while the low educated people will not hardly understand and accept the new information that improve their health (Tunprayoon 1989). According to the study of Alder found physical activity has positive association with higher socio-economic status (Cutler, et al., 2006).

Furthermore, when considering in term of region, northeast region should be promote the exercise program and health promotion more than other regions

- **Attitude toward exercise**

Leary (1992) has suggested that many of the reasons generally given for participation in the exercise clearly reflect their incentive offerings. Desire to improve or maintain their physical appearance through exercise or create some social identity or image (such as being fit or athletic) clearly reflect acquisitive self-presentational motives.

This study found the odd ratio of Attitude toward exercise is 1.186 which represented the higher Attitude toward exercise the greater proportion of exercise individual. WHO encourages to people awareness on diet and physical activity suitable for improving cardiovascular behavior (Mendis, Puska et al. 2011). To achieve the desired health behavior should a deeply understand about the underlying social context of disease (Pearson, Bazzarre et al. 2003). The knowledge, attitude and practice (KAP) understating would help to acknowledge in cardiovascular health and community behavior (Khan, Jafary et al. 2007) as well as the report was showed the lacking of knowledge and attitude in diabetes had related with high prevalence to behavioral risk factors, especially in consumption of tobacco and alcohol in Nepal (Vaidya 2011).

- **Perceive of benefit of exercise**

This study found Perceive of Benefit of exercise; it found negative association with recommended exercise practice which presented odd ratio 0.797. The perceived benefits are defined as beliefs of positive end results to a perceived threat with a behavioral reaction. The construct of perceived benefit is recognize the benefits of applied health behavior and is specific to the individual's perception of benefits by accumulating and participate in the implementation of health-specific. The perceived benefits of exercise were physical performance as became the first priority concern and followed by healthy in mind and prevention including life enhancement and social interaction as latest consequence to concern (Lovell, Ansari et al. 2010 March;).

According to the study of the relationship between a breast self-exam (BSE) and perceive of benefit because breast cancer is found earlier that is more chance of survival. After BSE have done that is the effective earlier detection but not all women check with BSE. Women should believe about the benefits by adopting this behavior like groups of black women who believed BSE have benefit did them more frequently (Graham, 2002).

- **Involvement on campaign**

Part of a comprehensive approach to promoting participation in regular physical activity is to raise awareness in the community about moderate-intensity

physical activity, usually using mass media communication campaign. “Mass media campaigns” in order to promote regular moderate-intensity physical activity has increased recently. These campaigns focused on the accessibility of the population, usually using mass communication channels of access to television, radio and print media. Mass media campaign has purpose to raise awareness of the community to inform and change attitudes towards behavior and ultimately influencing exercise behavior.

This study found those who involved in sport campaign are 1.8 times more likely to exercise practice (odd ratio 1.184). according to research presented the conditional support during people’s exercise activities that have strong significant to increasing the percentage of exercise people (Sallis, Prochaska et al. 2000; Robert 2003) and also Marcus and his colleague (1998) which Literature review on intervention materials published between 1983 and 1997 as a result of they show that despite the audience of all media in general have little demonstrated effect on exercise behavior. (Marcus, Owen and Forsyth, 1998), After examining a more comprehensive campaign that covers published between 1970 and 2003. It also reviewed the high level of awareness campaigns again. However, few studies reported any increase in population fitness (Cavill & Bauman, 2004). They analyze the evaluation methods used and concluded that it is necessary for the evaluation of the campaign improved by using a valid and reliable measure of fitness. In addition, they suggested that there should be an ongoing effort to develop and operate correctly and reliable measures of physical activity(Bauman, Phongsavan et al. 2006). Similar with Auncharee, B (2007) study Bangkok's consumer behavior of health products found Information-seeking, through academic, entertainment, advertising and familiar news, and through mass media, interpersonal and other related media, is positively correlated with consumer behavior of health products.

- **Exercise facility**

This study found Respondents who are available to access exercise facility had 1.5 times more likely to exercise practice than those who are hardly to access the exercise facility (odd ratio 1.459). It means people who live near exercise facility tend to have good health. Some research found that the facility significant predictor for

someone to participate to exercise program (Teraslinna and Partanen 1969). A later study clearly found that vigorous exercise practice correlate with the density of exercise facilities, hereinafter exercise practice re related with high density of exercise facilities which the nearby facilities could reduce psychological barriers to exercise (Dishman 1985). Similar with exercise research presented the community that have availability exercise facilities such as providing the exercise location , sports clubs , equipment and physical presenters or coach as conditional support during people's exercise activities that have strong significant to increasing the percentage of exercise people (Sallis, Prochaska et al. 2000; Robert 2003) and Sallis JF and Hovell MF (1990) found Volunteers who participate in the three or more workouts per week reported statistically greater density of pay facilities near their homes than those who reported no physical activity after controlling for age, education and income. This finding suggests a relationship between the proximity of amenities and frequency of physical exercise (Sallis, Hovell et al. 1990).

To sum up, it is importantly to note that the knowledge of exercise and attitude of exercise plays an important role to increase exercise practice, the government should develop more effective interventions to change in physical activity by broad-based, community-wide education program.

5.2.2 Health Status

A framework studies all Factors that affect health and the process to improve Health Whitehead (1991) have defined the framework into two categories. The first is inevitably factor that cannot be changed and the second is avoidable factor, unnecessary and unfair factors.

Age and gender are important to our health. They are relatively unchanged Differences in health between children and the elderly, men and women are the cause of biological changes rather than by an unfair influence on society and the environment.

Recent advances in medical technology that may cause genetic changes, some of which are possible. However, the development will affect only a very small fraction of the population(Kawachi,1998). There are other factors that affect health

can be avoided. Health status is affected by changing individual and social behaviors. These factors include:

1. Individual lifestyle factors such as drinking, smoking, and exercise.
2. Social community influence such as social network.
3. Living and working conditions.
4. Culture and ethnicity.
5. General socioeconomic and environmental conditions such as income, education.

- The factors affecting health status

Health status of the respondents in this study was defined as whether or not they had disease. Logistic regression analysis was used to analyze the relationship between the characteristics of respondents and health status. The results of Model 1, 2 and 3 showed that when socio-economic factors and health behaviors included the effect of demographic factors were decreased

In last model, the analysis of the characteristics of the respondents and health status found 2 variables including occupation and region had statistically significant associations with chronic illness; and, in psychological factor, Knowledge about exercise and Attitude about exercise had statistically significant associations with chronic illness. Regarding, health related behavior factor, it found Health and sport club had statistically significant associations with chronic illness.

- **Demographic-Socioeconomic factors**

This study found that the respondents who lived in central Region and western region had significantly 52% and 40% less probability to have disease compared to those who lived in Northeastern region. The gap between the proportions of the respondents who had chronic illness among regions was high. The reason that it is difficult to access healthcare because of costs they cannot afford the cost of travel and the cost of health care. So the poor, who are sick, have higher mortality rates than the rich. (United Nations, 1999)

In addition, respondents living in urban areas could earn more income than the others and have better health than those who live in the rural area, they can live better. Also, they have more opportunities to rest and not become too stressed out from work. The results are consistent with those from previous studies. (Chavarangkul 1995; Pochanapun, 1995) In addition, health behaviors such as smoking, drinking alcohol and eating a healthy diet with a statistically significant effect (Heidrich, 1998).

Similar with the study in Kanchanaburi Province , the structure of public health in Kanchanaburi Province, a rural area is the location of the health center; Thus, respondents in rural areas that use health due to its comfort and is the closest to their home, while respondents in urban areas is used to provide medical care in public hospitals. Chooprapawan et al (1996) found that respondents in urban areas tend to go to private clinics and public hospitals, while those in rural areas also goes to health center or government hospital. Also a study by the Division of Health Plans (1979) similarly found that people in the area who want a private health services as more municipalities that want the public.

- **Knowledge about exercise**

This study found that the odds ratio of respondents who had higher knowledge about exercise was 10% times less chance to having chronic illness those who get lower score. According to the theories of health behavior such as social cognitive theory and the theory of reasoned action represented the knowledge and attitude which are only two attributes of pathways that induce behavior (Avis NE, Smith KW et al. 1989). Many literature identified that health information can facilitate bringing awareness about benefits of healthy practices. Several studies explain positive influence of health information on health practice. For example, one study stated people use hearing aids when they received knowledge about how to use hearing aids and benefits (Chamroonsawasdi 2010) that similar to in Bangladesh the cholera has more affected to patients and their families in financial and social aspects as the study accessibility of people to get knowledge, attitudes and preventive action involving cholera and oral cholera vaccine in a high cholera area in the city Dhaka (Tasnuva Wahed and Kaukab 2013). Similar with the study found satisfactory level of knowledge about cardiovascular disease was revealed among four fifths of

participants. Moreover, most of them have a positive attitude all. These figures are higher than similar ones in other studies (Lori, Anjanette, Rosalind & Rose, 2004) is also a relationship between knowledge of cardiovascular and attitudes toward prevention among participants in the current study. This means that the increase of knowledge of cardiovascular will lead to a better attitude. This is consistent with research that has emphasized that interventions based on simple messages, such as knowledge of the presentation and management of this disease, it is still recommended. (National Framework for Coronary Heart Disease Services: Department of Health, 2000).

- **Attitude about exercise**

On the theory of action, reasoning (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), attitude is thought to represent an evaluation by the subject and affects all aspects of the most important. Another view of the dominant attitude is considered to be multidimensional, composed of relationship. But relatively independent thought and emotional elements conative (Rosenberg and Hovland, 1960). The reason for the attitude of behavioral health interventions have been strengthened by the discovery in fundamental research documents the relationship between attitudes and behavior.

This study found that the odds ratio of respondents who had higher attitude about exercise was 16% times less chance to having chronic illness those who get lower score. According to the study in Nepal were determined the knowledge, attitude, practice and behavior of cardiovascular health and found lack of knowledge was causes of CVD identified behavioral factors such as smoking more frequently. Responses delay related unhealthy diet and obesity (Chen, Yu et al. 2009). And the study about attitudes towards smoking and health of faculty personnel, medical students and hospital clients found the association between attitudes and smoking behavior among smokers and non-smokers. By In non-smoking has higher attitude which should not behave towards cigarettes (Viriyachaiyo V, Lim A, 2006). Auncharee, B (2007) study Bangkok's consumer behavior of health products found Attitudes toward health products are positively correlated with consumer behavior of health products.

- **Health and sport club**

This study found those who involved in health and sport club are 12 times more likely to having chronic diseases (odd ratio 1.990). It means people who had some kind of disease tend to more concern about their health and involve into sport or health club. According to the study found the community that have availability exercise facilities such as sports clubs have strong significant to increasing the percentage of exercise people (Sallis, Prochaska et al. 2000; Robert 2003) which lead to better health condition. This finding represented that people who involved in the sport or health club already got disease. It means they start to concern their health after they know that they got disease and concern about health problem. This finding is go along with health believe model, those who have perceived of susceptibility toward a disease are more likely to change their behavior. This study, confirmed that those who had disease tend to go to the health and sport club. Similar to the study of Munro et al. (2007), perceived severity might have correlation with health action and might even result in avoidance of protective action.

Regarding the community factor, it has been found that having or not having facility and exercise leader did not influence the health status among people. Most of the disease in this study are chronic disease which does not emerge in short time, while this study design is the cross sectional survey, so the relationship between exercise facility and exercise leader toward health status is unclear.

CHAPTER VI
SUMMARY AND RECOMMENDATIONS

In this chapter, the important themes are highlighted, conclusions are summarized, and recommendations are made for policy implications. In particular, consideration is given to how this study might be used to assist the development of priority action for reducing inequality in health status and the exercise practice.

6.1. Summary

Ever since the developing countries started importing medical technology from western countries, the success of medical, public services and health, including the improvement of socio-economic conditions, has caused the rapid decline of fertility and mortality (demographic transition). Thailand where birth and death rates are both low, leading to a total population which is high and stable.These changes have influenced the population structure by reducing the proportion of child population and increasing the proportion of elderly population; while the disease pattern has been replaced from acute disease (such as yellow fever and cholera) to cardiovascular disease (CVD) or non-communicable disease (such as hypertension and diabetes) as the primary cause of morbidity and mortality (epidemiologic transition) (Omran, 1971).

Chronic diseases are more likely to be linked to the population's characteristic, lifestyle and psychological status. Socio-economic-demographic factors contribute to health inequality as well as the changing lifestyles or (non-)health behaviors such as lack of physical activity, poor diet, smoking and drug use. Regular exercise is a major factor for reducing health problems, including CVD, diabetes mellitus, obesity, hypertension and some forms of cancer. However, despite the obvious evidence based on the benefits of exercise with health, there is still a large segment of the population who does not exercise despite knowing the consequences.

Thus, Health related behavior or exercise practice are necessary to increase life expectancy and to conduct the factor influence health status will gain advantage to identify the surrounding environment supporting all population having good health.

This research consider on the relationship among the health status and exercise of the Thai population based on the differential socio-economic-demographic factors. The purpose want to know that if people have differ gender, age group, different occupation will be affected to health status or not and there are any factor that related to health status and exercise. Moreover this research wants to explore psychological factor such as knowledge, attitude, benefit and barrier of exercise and also community factors including exercise facility and exercise leader related to exercise and health status. To understand what factor that influence people to exercise or having disease which could encourage people more physical activity by controlling the personal characteristic that hardly to change or not so that we could provide the useful information to health supporting in future.

Health Belief Model (HBM), the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA) used in this study provide basic for exploring differential and describe how a range of different factors could have affected exercise-behavior and the individual's health status. The TPB/TRA are applied to knowledge and attitudes which could be predisposing factors to encourage someone to practice an advantageous health action. Moreover, the HBM explains the relationship among demographic-socio-economic factors and perceived benefits/barriers of exercise and health status. The demographic-socio-economic factors drive someone to have varied percepitons of benefits/barriers of preventive action, such as exercise, which may influence the likelihood of disease and premature mortality. Importantly, the community factors including sport campaigns, exercising peers, exercise facilities, community exercise leaders and community sports clubs, take part in changing the knowledge, attitudes and practice in exercise.

The study employed data from the 2010 Evaluation of Health Promotion and Sports in Local Regions conducted by the Institute for Population and Social Research (IPSR) Mahidol University. This study was a cross-sectional study for the period of September to November 2010, and investigated factors affecting exercise among the Thai population. Although this survey cannot test for causality between

health behavior (e.g., smoking, alcohol consumption, non-exercise) and health status, the sample may be more representative of the general population than a small, prospective study. Strength of the analytic cross-sectional study is that it may be the only appropriate design to use when the onset of disease is difficult to establish and when care is only sought in the advanced stages of the disease (Jo, 2014).

The sample was selected through a multi-stage stratified random sampling procedure among the population age over 15 years and living in both rural and urban areas. The resulting sample size is 8,617 cases. The dependent variable in this study consists of two factors. Firstly was “exercise.” And the second dependent variable was measured in terms of reported illness of the respondent (hypertension, diabetes, CHD, hyperlipidemia, or cancer)

The findings of the analysis of the determinants of exercise practice and health status with demographic, socio-economic, psychological factors, Health behaviors and Community factors used the multiple logistic regressions. There are four models constructed from the logistic regression analysis of exercise practice with independent variables by socioeconomic –demographic factors (sex, age, marital status, education, occupation, area of resident and region), psychological factors (Knowledge about exercise, Attitude toward exercise, Perceive of Benefit of exercise and Perceive of Barrier toward exercise) , Health related behavior factor (Smoking, Alcohol consumption, involvement of exercise campaign and member of health/sport club) and Community factors (Exercise Facility and Leader on exercise).

The result showed that females tend to less likely to exercise practice than males. The married and used to married respondents were less likely to exercise practice than single respondents. The respondents who educated university and vocational certificate are more likely to exercise practice than uneducated respondents. Moreover, respondents who work as student, agriculture and office had more likely to exercise practice than those who had no job/did not work. The respondents who lived in Western region had the highest people who did not recommended exercise.

Considering Psychological factor, Attitude toward exercise had significantly association but someone who had higher attitude toward exercise doesn’t affected people different on exercise much. Importantly, when I look in Perceive of Benefit of exercise, it found negative association with recommended exercise practice

which means respondent who had high Perceive of Benefit of exercise are less likely to exercise practice. Moreover, this study found those who involved in sport campaign are more likely to exercise practice. Respondents who are available to access exercise facility had more likely to exercise practice than those who are hardly to access the exercise facility.

Regarding dependent as health status, the result showed respondents who work as agriculture, business and office tent to have diseases than those who had no job or did not work. The respondents who lived in central region and western region had lower probability to have disease compared to those who lived in Northeastern region. When considering the Psychological factor, I found respondents who had knowledge about exercise and attitude toward exercise with higher score had significantly less chance to having chronic illness compared to those who get lower score. Due to if they have positive knowledge and attitude about exercise, they must have a good knowledge and good practice on others health related behavior. Those who involved in health and sport club are more likely to having chronic diseases because those who have disease will more aware to their health condition which lead them to join health or sport club.

6.2. Recommendations for Policy Formulation

When analyzing the demographic dimension, this study suggests that we should be focusing on physical activity promotion for female. And the working age population including those with chronic diseases should be encouraged to turn to health care more. Moreover, it should encourage the general population turned annual health check. Exercise infrastructure and facility should be subject to ongoing support including the exercise Fitness exercise leader and place foe exercise. The recommendation for policy identified as follow

1. This study revealed some interesting finding which deserved attention. First it confirmed many studies that underpinned the important role of education. This study found some findings that exercise practice is evident different among group. High educated group had more likely to Exercise practice than uneducated group. Though the exact mechanism of education attainment still remain unknown, high

educated attainment makes population easier to adopt the new information and also increasing perspectives, attitude and practice. Applying this knowledge through community health programs to prevent CVD by exercise practice would be the best option for Thailand.

2. These result linked to the finding of Attitude toward exercise and knowledge about exercise strongly related with having chronic illness and exercise individual. The health information may let them to gain knowledge which would benefit for people in terms of prevention and treatment. However, the policy implementation on health education should be concerned and considered of which perceptions or behavior should maintain or modify have their local wisdoms which are useful for health individual.

3. The sport campaign and exercise facility are important factor that lead population to practice regular exercise. Finding indicates a strong relationship between involvement in sport campaign exercise facility and exercise practice which the rate 1.8 and 1.5 times than those who did not involve in sport campaigns and are hardly to access the exercise facility. It means people who live near exercise facility and having sport campaign in their community tend to have good health. Government policy in the future needs to promote exercise adherence in a more rigorous way, because it is a key to both individual and societal health. Exercise habits need to be instilled from youth, and physical education requirements in school need to be re-established at all levels through high school. Adults also need encouragement with better neighborhood planning of exercise trails for walking and biking, as well as planned community activities to encourage fitness through one's lifetime.

4. Government should continuing the sport campaigns with suitable in each region and also more promoting mass media advertising which are very successful to encourage exercise among people in many country which were low cost and easy to deliver. Similarly with Exercise facility, government should provide the exercise facility, public fitness or exercise center are *available* for people in community which it could be the park outside for example; playgrounds, basketball courts, tennis court or multi-purpose area.

5. This study confirms that People who have hypertension, diabetes, CHD, hyperlipidemia or cancer reported the same pattern and level of health behavior (for

smoking, alcohol consumption and exercise). It is surprising that one-fourth of people with these diseases still maintain poor health behavior even though they already have a serious disease. This should be the consideration for government to provide more knowledge and information about benefit and barrier about the risk of health behavior.

6. This study confirmed that those who involved in health and sport club are 2 times more likely to having chronic diseases. People who had some kind of disease tend to more concern about their health thus they are more likely to involve into sport or health club. They start to give more attention their health after they know that they got disease and concern about health problem. Even it is good that they start to exercise and caring about their health but it is always better to prevent a *disease than* to *treat* it after it occurs. These could be enlightened for the government to play more attention to encourage people to have regular check-up and should develop exercise instruction for particular disease.

6.3 Recommendation for Further Study

1. The study found that health status and exercise practice vary according to sex, age, and socioeconomic characteristics and vary according to the type of infrastructure that exists in the community which could encourage people to exercise. However, a limitation of this study is it is impossible to investigate the relationship between physical activity and increasing life expectancy by comparing between people who are regularly recommended exercise and those aren't. Moreover, it couldn't compare the differential of probability of having NCD within exercise group and non-exercise group. Because NCD is not only affected by exercise but also diet, sleep pattern, and stress too. In this study is particularly interested in the relationship between exercise and health status. Thus, the future study may be considered other health related behavior and comparing the differential of probability of having NCD between disadvantage and advantage health related behavior groups after controlling by socioeconomic factors.

2. The further study should investigated on the probability of having NCD regarding gender, age group, socioeconomic level and related factors such as smoking alcohol consumption.

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APPENDICES

APPENDIX A

Exercise model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.767	17	.927	6.879	.000[a]
	Residual	1159.474	8599	.135		
	Total	1175.241	8616			

a. Predictors: (Constant), leader_n, age group, area, gender, region, barrier_all, occupation, education, sportclub_n, benefit_all, alchol_n, married status, involve_n, knowlenge_all, smoking_n, facility_n, attritude_all

b. Dependent Variable: disease_all_dep

Health status model

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	141.995	17	8.353	35.729	.000[a]
	Residual	2010.248	8599	.234		
	Total	2152.243	8616			

a. Predictors: (Constant), leader_n, age group, area, gender, region, barrier_all, occupation, education, sportclub_n, benefit_all, alchol_n, married status, involve_n, knowlenge_all, smoking_n, facility_n, attritude_all

b. Dependent Variable: exercise_n

APPENDIX B

Table 1 shows pairwise correlations of independent and dependent variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1																		
2	-.082**	1																	
3	-.225**	.310**	1																
4	.038**	-.252**	-.200**	1															
5	.103**	-.253**	-.186**	.229**	1														
6	-.019	.010	-.044**	.061**	.056**	1													
7	.021	.000	-.006	-.094**	.031**	.069**	1												
8	-.007	.002	.017	-.031**	-.018	.087**	.006	1											
9	.017	-.026*	.022*	-.036**	-.062**	.012	-.071**	.362**	1										
10	.008	-.002	.020	-.024*	-.013	.147**	-.083**	.400**	.573**	1									
11	-.011	.014	-.023*	.037**	.023*	-.043**	-.080**	-.339**	-.345**	-.336**	1								
12	-.392**	.114**	.069**	.094**	-.074**	.103**	-.052**	-.021	-.048**	-.042**	.039**	1							
13	-.367**	.160**	.097**	-.007	-.119**	.024*	.002	-.013	-.028*	-.021	.047**	.489**	1						
14	-.006	.031**	-.001	.003	-.022*	-.018	-.011	.129**	.259**	.156**	-.052**	.000	.022*	1					
15	.016	.011	-.022*	-.004	.049**	-.007	.158**	.089**	.089**	.083**	-.126**	-.024*	-.016	.275**	1				
16	.004	.014	.035**	-.035**	-.034**	-.137**	.159**	.238**	.278**	.143**	-.169**	-.037**	.008	.328**	.200**	1			
17	.017	-.011	.014	-.014	-.021	-.081**	.101**	.247**	.321**	.165**	-.180**	-.050**	-.015	.390**	.280**	.529**	1		
18	.002	.004	-.021*	.019	.022*	-.029**	.019	-.062**	-.031**	-.029**	.033**	-.001	.017	.038**	.062**	.023*	.037**	1	
19	-.023*	-.010	-.062**	.177**	.001	-.037**	-.097**	.038**	.063**	.009	.030**	.047**	.047**	.111**	.055**	.124**	.091**	.039**	1

1=gender, 2=age, 3=marital status, 4=education, 5=occupation, 6=area, 7=region, 8=knowledge, 9=attitude toward exercise, 10=perceive of benefit toward exercise, 11= perceive of barrier toward exercise,12=smoking, 13=alcohol consumption, 14=involvement on campaign, 15=health/sport club, 16=facility, 17=leader on exercise

APPENDIX C

Exercise model

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	gender	.767	1.303
	age group	.820	1.220
	married status	.836	1.196
	education	.880	1.137
	occupation	.910	1.099
	area	.922	1.085
	region	.909	1.100
	knowlenge_all	.750	1.333
	attritude_all	.574	1.743
	benefit_all	.596	1.679
	barrier_all	.794	1.260
	smoking_n	.680	1.470
	alchol_n	.709	1.410
	involve_n	.773	1.293
	sportclub_n	.856	1.168
	facility_n	.656	1.525
	leader_n	.621	1.610

Health status model

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	gender	.767	1.303
	age group	.820	1.220
	married status	.836	1.196
	education	.880	1.137
	occupation	.910	1.099
	area	.922	1.085
	region	.909	1.100
	knowlenge_all	.750	1.333
	attritude_all	.574	1.743
	benefit_all	.596	1.679
	barrier_all	.794	1.260
	smoking_n	.680	1.470
	alchol_n	.709	1.410
	involve_n	.773	1.293
	sportclub_n	.856	1.168
	facility_n	.656	1.525
	leader_n	.621	1.610

APPENDIX D

Survey Questionnaire

"health with Local Administration"

Institute for Population and Social Research

Mahidol University

House No.....

Lane / Alley.....

District / Area.....

Sub-district .....

Village No.....

Province.....

Interviewee's name. .....Number of residences

Name of residential owner..... .....

house code number ..... Village No. ..... Village. .....

District .....

Sub-district. .....Province .....

Location ○ 1. Municipality ○ 2. Countryside

Time that has been interview ○ *first time* ○ *second time* ○ *thirth time*

last interview dd.....MM.....YYYY.....

started.....finished.....time in total.....result

○***1. complete*** ○***2. Incomplete*** ○***3. no***

the reasons that the interview has not been complete are.....

---

interviewer.....

Location leader.....DD .....MM..... YYYY 2014

officer.....DD .....MM..... YYYY 2014

code officer .....DD .....MM..... YYYY 2014

Interviewer : Interview all the residences

Part 1 : Basic information about residential

1.1	1.2 **name-lastname** Individuals who live regular in this household. **(From 1 October 2552 to the present, or a person living in this house for 6 months or more).**	1.3 birthday		1.4 age	1.5 sex 1.male 2.female		1.6 relationship between the residential owner (See code)	1.7 education (See code)
		day	month	year				
1.							**01**	
2.								
3.								

1.6 relationship between residential owner:

1. Residential owner 2. Live partners 3. Farther

4. Mother 5. father or mother in-law 6. children

7. Stepchild 8. Grandchild(from son or Daughter) 9. Brother or sister

10. Brother-in-law 11.Daughter-in-law 12. Grandchild 13. great grandchild 14.Grand(maorpa) 15. Relatives 16. Friend
17.residence 18.emplyee 19. etc.....

1.1	ข้อ 1.8-1.11 Interviewee who is over 13 year old				ข้อ 1.12-1.17 Interviewee who is over 6 year old	
	1.8 **status** 1. Single 2. Married 3. Engaged 4. Divorce 5. Separate	**1.9** **occupation** (see code)	**1.10** **Does interviewee smoke?** 1. Smoke 2. None smoker 3. Uncertaun 4. Quit 0. None of above	**1.11** **Does interviewee drink alcohol?** *(ex. beer, cocktail, alcoholic drinks.)* 1. Drink 2. Not drinking 3. Uncertain 4. Quit 0. None of above	**1.12** **interviewee exercise at least 30 min a day and 3 day a week** 1. Yes 2. No 0. Never(ask the next person)	**1.13** **how often interviewee exercise?** 1. Once a week 2. Twice a week 3. 3 time a week 4. 4 time a week 5. 5 time a week 6. 6 time a week 7. Everyday 8. uncertain 0. never
1.						
2.						
3.						

รหัสข้อ **1.9 occupation:**

0. unemploy
1. job pending
2. student
3. farmer
4. business owner
10. etc (define).....
5. Government officer
6. Ex-government officer
7. Local government officer
8. Private company employees
9. freelancer (define).....
99. unknown

1.12-1.17 ask the interviewee above 6 year old

1.14 **How long does interviewee e exercise?** (ระยะ).....min	**1.15** **How does interviewee exercise?** *(Can be more than one answer)* (see code)	1.16 How long has interviewee been exercise? (since the age of)			**1.17** **Where does interviewee exerices?** *(Only one answer)* 1. At home 2. Public park PAO. 3. Public park municipality 4. Public park SAO. 5. Village hall 6. School 7. temple 8. health station 9. Free space around the house 10. park in village 11. Private park 12. Publich park 13. Parking lot 14. (define).....
		year	month	since the age of	

1.15 how your exercise (*can be more than one answer)* :

0. Never	6. Petanque	12. tennis	18. swimming	24. chuckyor	30. yoy dance	36. rorap dance	42. sarmai dance
1. aerobic	7. rattan ball	13. table tennis	19. fitness	25. kingkork	31. payouk dance	37. rarobic	43. serpongrang dance
2. Running	8. basketball	14. volleyball	20. local sport	26. pow rok dok	32. sailing	38. nora dance	44. chicken dance
3. Biking	9. football	15. pajsrisabut	21. saba blowing	27. tubmapub	33.tarosabutchai	39. rabin dance	45. mamod dance
4. dance stick	10. indoor football	16. raber ban	22. pakkuy run	28. jeck dance	34. rattan basket ball	40. mon dance	46. masri dance
5.chinese dance	11. batminton	17muscle building	23. karyog run	29. dumb dance	35. rorak dance	41. pemon dance	47. etc (ระบุ).....

Interviewer: Part 2, from 2.1 to 2.6, ask only those from the first interview only.

part 2 : health and attitude

2.1 how did you know about health with Local Administration?

1. **ever** 2. never

↓

2.1.1 Have you ever heard or know of any source. (Can answer more than one answer).

1. TV
2. Radio
3. poster
4. letter
5. website
6. news paper
7. meeting
8. goverment employee
9. friend/family
10. Office of Tourism and Sports, Thailand
11th. Department of Local / Ministry of Interior
12th. Municipal District / Revenue office.
13th. Organization Management District /.General S.
14. Local administrator
15. Provincial committee
16th. Committee at district level
17th. Committee district level
18th. Committee at village level
19th. Committee Project Management
20th. Health Stations
21. school
22. Sport club
23. sub district sport center
24. public sport center
25. village headman
26. annoucemenet
27. Etc (ระบุ).....

interviewer : 2.2-2.5 use ○ to choose the number that fit you most

2.2 The following order: Questions to ask your opinion about health. Please answer Yes or No to the following sub-clauses.

Knowledge about exercise	1. Yes	2. NO	3. Not sure
1. Do you think that exercise will give you a better health?	1	2	3
2. Do you believe that exericse consist of 3 part suck as warm up, training and stretching?	1	2	3
3. Do you think that we should exercise 30 min a day and 3 day a week?	1	2	3
4. Do you think that you should exercise right after a meal?	1	2	3
5. Do you think that you should exercise very hard in first time?	1	2	3
6. Do you think sick people would exercise?	1	2	3
7. Do you think that exercise help you to have a better health?	1	2	3
8. Do you think that exercise will stretch and shrink your muscle?	1	2	3
9. Do you think when you exercise you will use more oxygen and burn more calories?	1	2	3
10. Do you think you should choose the rigth exercise fo the right age and gender?	1	2	3

2.3 Next part with be the question about benefit of exercise?

Benefit of exercise	5. strongly agree	4. agree	3. not sure	2. dsiagree	1. strongly disagree
physically					
1. Do you think exercise will help you to have flexible muscle?	5	4	3	2	1
2. Do you think exercise will help you to have a better movement?	5	4	3	2	1
3. Do you think exercise will reduce you to have sore muscle?	5	4	3	2	1
4. Do you think you will have a better body if you exercise?	5	4	3	2	1
5. Do you think you will have a bigger loug?	5	4	3	2	1
6. Do you think exercise will reduce a chance to get a headache?	5	4	3	2	1
7. Do you think exercise will protect you from flu?	5	4	3	2	1
8. Do you think exercise will protect you from diabetes?	5	4	3	2	1
mentally					
9. Do you think exercise will help you to relax?	5	4	3	2	1
10. Do you think exercise will help you to have a better concentration?	5	4	3	2	1
11. Do you think exercise will help you to sleep better?	5	4	3	2	1
12. Do you think exercise will help you to feel more relax?	5	4	3	2	1

13. Do you think exercise will help you to feel better bout yourself?	5	4	3	2	1
socially					
14. Do you think exercise will help to to meet new friend?	5	4	3	2	1
15. Do you think exercise will help to help you to party better with friend?	5	4	3	2	1
16. Do you think exercise will help you to be closer with your friend?	5	4	3	2	1
17. Do you think exercise will help you to become more popular?	5	4	3	2	1

2.4 this part will be about the difficulty in exercise

Difficulty in exercise	5. strongly agree	4. agree	3. not sure	2. disagree	1. strongly disagree
physically					
1. Do you think exercise make you sore?	5	4	3	2	1
2. Do you think you will get fatter when you exercise because you will eat more?	5	4	3	2	1
3. Do you think exercise will make you feel tried?	5	4	3	2	1
4. Do you think exercise will give you big muscle, which is unpleasant?	5	4	3	2	1
5. Do you think exercise will make you sore?	5	4	3	2	1
mentally					
6. Do you think exercise is an inconvenience hobby?	5	4	3	2	1
7. Do you think by wearing sport wear would make you feel silly?	5	4	3	2	1
8. Do you think exercise is boring?	5	4	3	2	1
9. Do you think exercise is a hard activity?	5	4	3	2	1
10. Do you thnik exercise make you feel	5	4	3	2	1

socially					
11. Do you think exercise is a waste of money?	5	4	3	2	1
12. Do you think exercise is a waste of time?	5	4	3	2	1
13. Do you think exercise is inconvenience?	5	4	3	2	1
14. Do you think there are a small number of sport center in Thailand?	5	4	3	2	1
15. Do you think exercise is less fun without friend?	5	4	3	2	1

2.5 This part will be about opinion about exercise toward health with local administration

opinion about exercise	5. strongly agree	4. agree	3. not sure	2. disagree	1. strongly disagree
1. local sport should be use more in exercise	5	4	3	2	1
2. local sport should be used to get local people to have stronger relationship with each other	5	4	3	2	1
3. local sport should be used to promoted and represent the love of people toward their area	5	4	3	2	1
4. local sport should be use more in exercise because the people already use to the sport (no extra equipment needed because their already have it in their area)	5	4	3	2	1
5. local sport should be use more in exercise to save the local people money (no extra equipment needed because their already have it in their area)	5	4	3	2	1
6. Local sport should be preserve	5	4	3	2	1
7. local sport is not up to date	5	4	3	2	1
8. local sport should be used to help people to have a good them work among the local	5	4	3	2	1
9. local sport should be used to help people in different age to have a better relationship	5	4	3	2	1
10. local sport will help to develop a new way for the local to exercise	5	4	3	2	1
11. Do you like the idea of using local sport to exercise	5	4	3	2	1

2.6 ○ numbers correspond to the opinions of those interviewed most.

2.6 Exercise behavior

2.6.1 Do you ever exercise?

1. yes 2. no ***(skip to 2.6.4.1)***

2.6.2 Do you ever play your local sport?

1. yes 2. no ***(skip to 2.6.4.1)***

2.6.3 Have you ever not exercise more than a month?

1. yes 2. no

2.6.4 Within 3 month, what kind of sport have you play?

1. **exercise** 2. **not exercise**

How

(Can be more than one answer)

2.6.4.1 are you planning on exercise whitin a month?

1. yes (see code).....
2. no
3. not sure

(skip to 2.6.11 page 9)

0. Never	6. Petanque	12. tennis	18. swimming	24. chuckyor	30. yoy dance	36. rorap dance	42.sarmai dance
1. aerobic	7. rattan ball	13. table tennis	19. fitness	25. kingkork	31. payouk dance	37. rarobic	43. serpongrang dance
2. Running	8. basketball	14. volleyball	20. local sport	26. pow rok dok	32. sailing	38. nora dance	44.chicken dance
3. Biking	9. football	15. pajsrisabut	21.saba blowing	27. tubmapub	33.tarosabutchai	39. rabin dance	45. mamod dance
4. dance stick	10. indoor football	16. raber ban	22. pakkuy run	28. jeck dance	34. rattan basket ball	40. mon dance	46.masri dance
5. chinese dance	11. batminton	17muscle building	23. karyog run	29. dumb dance	35. rorak dance	41. pemon damce	47.etc (ระบุ).....

2.6.5 Do you do the following activity during you exercise?

step of exercise	1. always	2. sometime	3. never
1. warm up	1	2	3
2. none stop exercise	1	2	3
3. cool down	1	2	3

2.6.6 Do you exercise untill you are tired?

1. always 2. sometime 3. never

2.6.7 Do you exercise more than 30 min at a time?

1. always 2. sometime 3. never

2.6.8 Are you exercise t least 3 time a week?

1. always 2. sometime 3. never

2.6.9 **Do you have a following condition**

	1. yes ***ask*** ⟶ 2. no *(ask if they know it from a doctor)* 3. don't no			**(if yes)** since when		
				mm	yyyy	since the age of
1. hypertension	1	2	3			
2. diabete	1	2	3			
3. heart disease	1	2	3			
4. hyperlipaemia	1	2	3			
5. cancer	1	2	3			

2.6.10 After the exercise what kind of change that you can see in your body?

	1. better	2. same	3. worst	4. no condition
1. physically	1	2	3	
2. mentally	1	2	3	
3. Your condition	1	2	3	4

2.6.11 participated in promotional events with local sports fitness / folk, organized by the local government. (SAO / PAO. / Municipality / city) or not (the control field work: to explain to interviewers understand this activity. The language used in the area called anything).

1. did not participated ***(skip to 2.6.13)***
2. participated but not in the local administration ***(skip to 2.6.13)***
3. participated but not always in the local administration ***(skip to 2.6.12)***
4. **Participate in the activities and exercises with local administration.**

2.6.11.1 how often do you participate in local activities with local administration?

1. least than 30 min a time and least than 3 day a week
2. 30 min at a time and 3 day a week.
3. more than 3 time a week and more than 30 min a time

(move to 2.6.12)

2.6.12 After you have attended promotional events with local sports fitness organized by the local government. (SAO / PAO. / Municipality / city) you think you will continue to exercise.

1. will continue to exercise.
2. will continue to exercise but not often
3. will continue to exercise. least than 30 min a time and least than 3 day a week
4. will continue to exercise. 30 min at a time and 3 day a week.
5. will continue to exercise. more than 3 time a week and more than 30 min a time

2.6.13 exercise with a local sports organized by the local government. (SAO / PAO. / Municipality / city) to promote healthy exercise in one day

1. participate 2. not participate 3. not sure 4. No promotional

↓

2.6.13.1 physical activities that you done on that day. (Can answer more than one answer).

0. Never	6. Petanque	12. tennis	18. swimming	24. chuckyor	30. yoy dance	36. rorap dance	42. sarmai dance
1. aerobic	7. rattan ball	13. table tennis	19. fitness	25. kingkork	31. payouk dance	37. rarobic	43. serpongrang dance
2. Running	8. basketball	14. volleyball	20. local sport	26. pow rok dok	32. sailing	38. nora dance	44. chicken dance
3. Biking	9. football	15. pajsrisabut	21. saba blowing	27. tubmapub	33.tarosabutchai	39. rabin dance	45. mamod dance
4. dance stick	10. indoo football	16. raber ban	22. pakkuy run	28. jeck dance	34. rattan basket ball	40. mon dance	46. masri dance
5. chinese dance	11. batminton	17muscle building	23. karyog run	29. dumb dance	35. rorak dance	41. pemor damce	47. etc (ระบุ).....

2.6.14 does your community have an equipment that is used in all types of exercise, including sports equipment?

1. yes(define) 2. no 3. not sure

1.	6. .....
2.	7. .....
3.	8. .....
4.	9. .....
5.	10. .....

2.6.15 are there any leader in your community who organized the local sport event?

1. yes

total	.....people
male	.....people
female	.....people

2. no
3. not sure

2.6.16 what kind of sport that your local administration has organizes?
(can be more than one answer)

2.6.17 **Are you in any kind of sport club?**

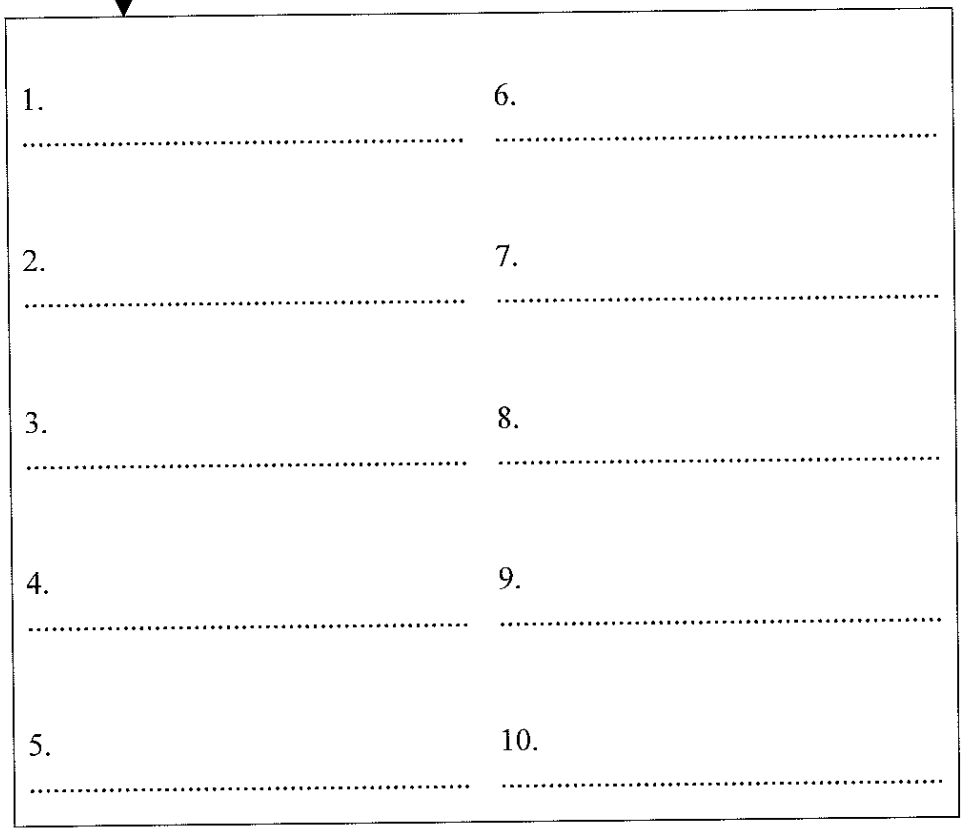
1. **yes** 2. no ***(skip to 2.6.18 page 12)***

2.6.17.1 what club?.....

0. Never	6. Petanque	12. tennis	18. swimming	24. chuckyor
1. aerobic	7. rattan ball	13. table tennis	19. fitness	25. kingkork
2. Running	8. basketball	14. volleyball	20. local sport	26. pow rok dok
3. Biking	9. football	15. pajsrisabut	21. saba blowing	27. tubmapub
4. dance stick	10. indoor football	16. raber ban	22. pakkuy run	28. jeck dance
5. chinese dance	11. batminton	17muscle building	23. karyog run	29. dumb dance
0. Never	6. Petanque	12. tennis	18. swimming	24. chuckyor
1. aerobic	7. rattan ball	13. table tennis	19. fitness	25. kingkork
2. Running	8. basketball	14. volleyball	20. local sport	26. pow rok dok
3. Biking	9. football	15. pajsrisabut	21. saba blowing	27. tubmapub

2.6.18 **Do you have any role in your area?**

1. **yes**(what role) 2. no



2.6.19 in your own word, what is exercise?.....

.....

2.6.20 if a job make you sweat it consider a sport?

1. yes 2. no

2.6.21 In order to have have a good health you should exercisr at least .....day/ a day per.....min

**********END**********

BIOGRAPHY

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