

Determinants of Health Promotion Service Consumption in
Thailand



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ปัจจัยที่ส่งผลต่อการตัดสินใจรับบริการส่งเสริมสุขภาพในประเทศไทย



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แม้ว่ากลุ่มโรคไม่ติดต่อเรื้อรัง (NCDs) เป็นโรคที่สามารถป้องกันได้ โรคไม่ติดต่อเรื้อรังยังคงเป็นหนึ่งในสาเหตุสำคัญในการเสียชีวิตของคนไทย โดย 4 กลุ่มหลักของโรคไม่ติดต่อเรื้อรัง ได้แก่ โรคหัวใจและหลอดเลือด มะเร็ง โรคปอดและทางเดินหายใจ และเบาหวาน โรคไม่ติดต่อเรื้อรังเหล่านี้ส่งผลเสียต่อภาระทางเศรษฐศาสตร์และคุณภาพชีวิตของคนไทย ฉะนั้นหากสามารถลดปัจจัยในการก่อโรคไม่ติดต่อเรื้อรัง ความเสี่ยงต่อโรคไม่ติดต่อเรื้อรังจะลดลงเช่นเดียวกัน ส่งผลให้ประชากรมีคุณภาพชีวิตดีขึ้น รวมถึงลดภาระทางเศรษฐศาสตร์ระดับประเทศ ซึ่งการใช้บริการส่งเสริมสุขภาพเป็นหนึ่งในเครื่องมือในการลดความเสี่ยงต่อโรคไม่ติดต่อเรื้อรังโดยตรง ดังนั้นการวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่ส่งผลต่อการตัดสินใจรับบริการส่งเสริมสุขภาพในประเทศไทยและค่าผลกระทบส่วนเพิ่ม (marginal effect) ของแต่ละปัจจัย โดยใช้การวิเคราะห์การถดถอยโลจิสติกและการเลือกตัวแปรทำนายเข้าวิเคราะห์แบบ backward stepwise กับข้อมูลปี พ.ศ. 2558 จากสำนักงานสถิติแห่งชาติ ผลการวิจัยครั้งนี้พบว่าปัจจัยที่ส่งผลต่อการตัดสินใจรับบริการส่งเสริมสุขภาพของเพศชายและเพศหญิงมีความแตกต่างกัน ที่นัยสำคัญทางสถิติที่ระดับ 0.01 พบว่าปัจจัยที่มีความสัมพันธ์ทางบวกกับความน่าจะเป็นในการตัดสินใจใช้บริการส่งเสริมสุขภาพของเพศชายคือ การมีโรคประจำตัว การศึกษา การประเมินว่าตนมีสุขภาพที่ดีกว่าผู้อื่นที่มีความเป็นอยู่คล้ายคลึงกัน และอายุที่มากขึ้น ปัจจัยที่มีความสัมพันธ์ทางลบกับความน่าจะเป็นในการตัดสินใจใช้บริการส่งเสริมสุขภาพของเพศชาย ได้แก่ การดื่มเครื่องดื่มในอาหาร การดื่มสุราหรือเครื่องดื่มแอลกอฮอล์ และการสูบบุหรี่ ส่วนผลการวิเคราะห์ในเพศหญิงพบว่าที่นัยสำคัญทางสถิติที่ระดับ 0.01 ปัจจัยที่มีความสัมพันธ์ทางบวกกับความน่าจะเป็นในการตัดสินใจใช้บริการส่งเสริมสุขภาพของเพศหญิง คือ การเป็นเจ้าของยานพาหนะทางถนน การตระหนักถึงความเจ็บป่วยหรือไม่สุขสบาย และอายุที่มากขึ้น ปัจจัยที่มีความสัมพันธ์ทางลบกับความน่าจะเป็นในการตัดสินใจใช้บริการส่งเสริมสุขภาพของเพศหญิง ได้แก่ คะแนนที่มากขึ้นในการประเมินตนเองว่าไม่สามารถดูแลตนเองได้ การสูบบุหรี่ การดื่มเครื่องดื่มในอาหาร และการอาศัยอยู่ในเขตเทศบาล

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Despite being preventable, noncommunicable diseases (NCDs) rank among leading causes of death in Thailand. Four main groups of NCDs involve cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. These chronic diseases worsen economic burden and the quality of life. To ease the burden, health promotion service is one of the tools that can directly cope with risk factors of NCDs. Therefore, increasing health promotion service consumption potentially leads to risk reduction of an individual to develop NCDs. Hence, this research aims to identify the factors influencing health promotion service consumption in Thailand along with marginal effects of each factors. The analysis applies backward stepwise logistic regression with the national-level data from National Statistical Office of Thailand (NSO) collected in 2015. Overall, factors affecting health promotion service consumption for Thai male and female are different. At 1 percent significance level, Thai male's probability of utilizing health promotion services is positively influenced by status of having chronic diseases, education, better score of self-assessment on health comparing with others, and age. The unhealthy behavioral factors including preference of adding extra-seasoning, alcohol consumption, and smoking negatively impact the probability of health promotion service consumption. For Thai female, at 1 percent significance level, the prospect to utilize health promotion services increases when she owns a road vehicle, has worse self-assessment on severe health condition, and grows older. On the other hand, the probability of health promotion service consumption plunges for an additional score on problem of self-caring. The other negative determinants on the chance of using health promotion services are smoking, preference of adding-extra seasoning, and living in municipal district.

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Chapter 1 INTRODUCTION

1.1 Problem and its significance

“Good health is a major resource for social, economic and personal development and an important dimension of quality of life” (World Health Organization, 2009). It is undeniable that quality of life affects the way of people interaction and economy as a whole. Throughout the process of value-adding in the economy, factors of production are utilized by human either mentally or physically. Hence, maintaining good health leads to crucial supports for creativity and innovation as well as stamina to perform labor-intensive works. Apart from economic benefits, lifting quality of life is one of the ultimate goals for sustainability development from United Nations. Good health and well-being are included as one of the 17 sustainable development goals.

Among approaches to stay healthy, proactive and reactive approaches can be observed. Curing is considered as a reactive approach trying to tackle to the health problems after they have taken place by consuming medical goods and services. The healing process costs money, time, and higher possibility of failure since the symptoms have worsen body's conditions. On the other hand, proactive approach such as health promotion focuses on reducing risk of harmful activities to health before the diseases take place. Health promotion is defined as the process of enabling people to increase control over and to improve their health conditions (World Health Organization, 2009). More than prevention from diseases, health promotion allows people to improve one's own health condition and capability to perform various functions. Therefore, finding the methods to encourage health promotion practice is worth to be researched.

Many attentive studies have been conducted to identify factors affecting health promotion and preventive activities across countries and find the implication to increase health promotion behaviors. Difference from demand for health care that becomes a necessity to maintain present body function, demand for health promotion

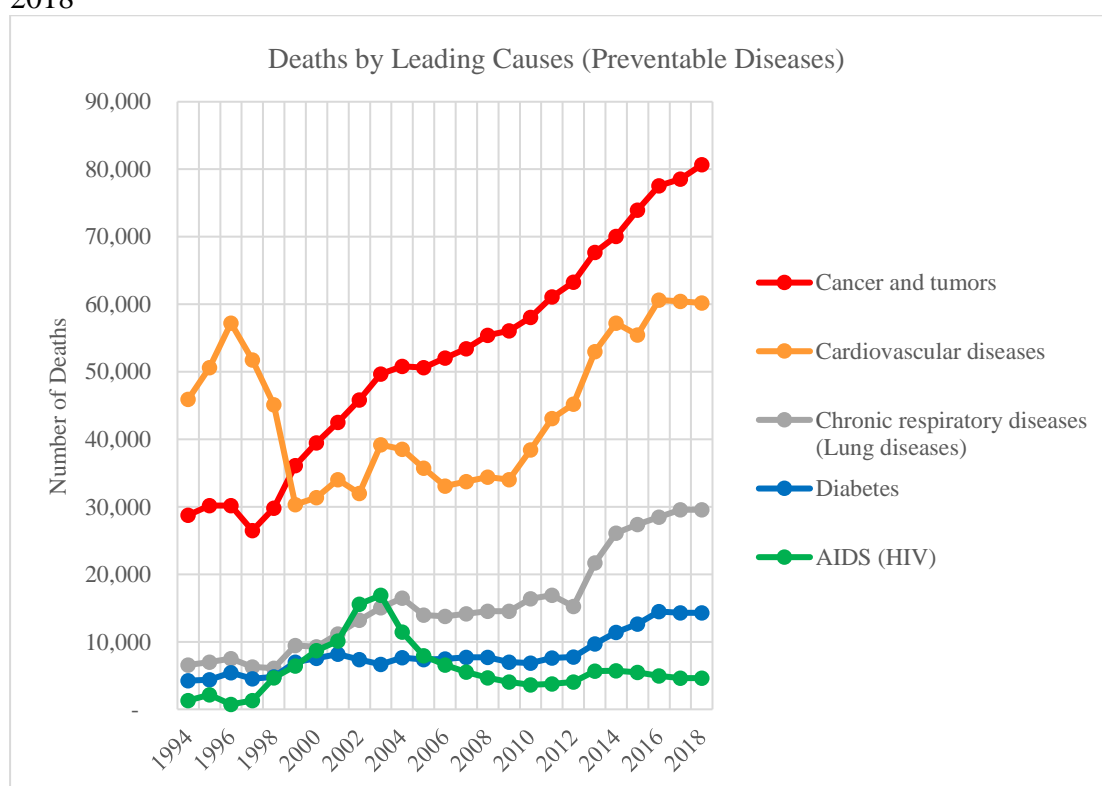
demonstrates less effects to current body system comparing to health care in short-run but aims to improve health condition in long-run. Moreover, health promotion practices directly reduce the risk of NCDs (noncommunicable diseases) which are ranked among the top leading lethal but preventable causes of death in Thailand (Office of the National Economic and Social Development Council, 2020a).

Despite the fact that they are preventable, they are responsible for the top causes of worldwide and Thailand deaths. Over eighty percent of global premature NCDs deaths can be classified into four main groups including cardiovascular diseases, cancers, respiratory diseases, and diabetes (World Health Organization, 2018a). By reducing the four main behavioral risk factors including tobacco use, physical inactivity, alcohol abuse, and unhealthy diet, burden from NCDs can be alleviated (World Health Organization, 2011). Hence, these behavioral disorders signal the opportunities to be influenced by effective intervention. World Health Organization Regional Office for Europe addressed that *“A more equitable share of the benefits from effective interventions would bring significant health and economic gain to all Member States.”* With comprehensive approach, the influences of risk factors are needed to be identified to develop a successful intervention and policies to tackle with NCDs.

From economic perspective, NCDs is one of the causes of losing large-scale productivity due to absenteeism and inability to effectively perform tasks which turns out to decrement of national income. NCDs costs are projected to increase remarkably to individuals, households, businesses, and governments. The analysis for macroeconomic impact suggests that for 10 percent increase in NCDs patients, annual economic growth rate is lower by 0.5 percent. Among critical threat to economic development comprises financial crisis, natural disasters, and pandemic influenza, the World Economic Forum clarified NCDs as one the severe economic threats in 2010 (World Health Organization, 2011).

Thailand is a middle-income country (The World Bank, 2020) with over 66.56 million citizens as of 2019 (Office of the National Economic and Social Development Council, 2020b) in South-East Asia where recorded highest incidents of NCDs (World Health Organization, 2018b). In Figure 1, from 1994 to 2018, deaths by leading causes which are preventable diseases. The surge historical records of lethal NCD threats sharply hint health problem of Thai people.

Figure 1 Deaths by leading causes (preventable diseases) in Thailand from 1997 - 2018



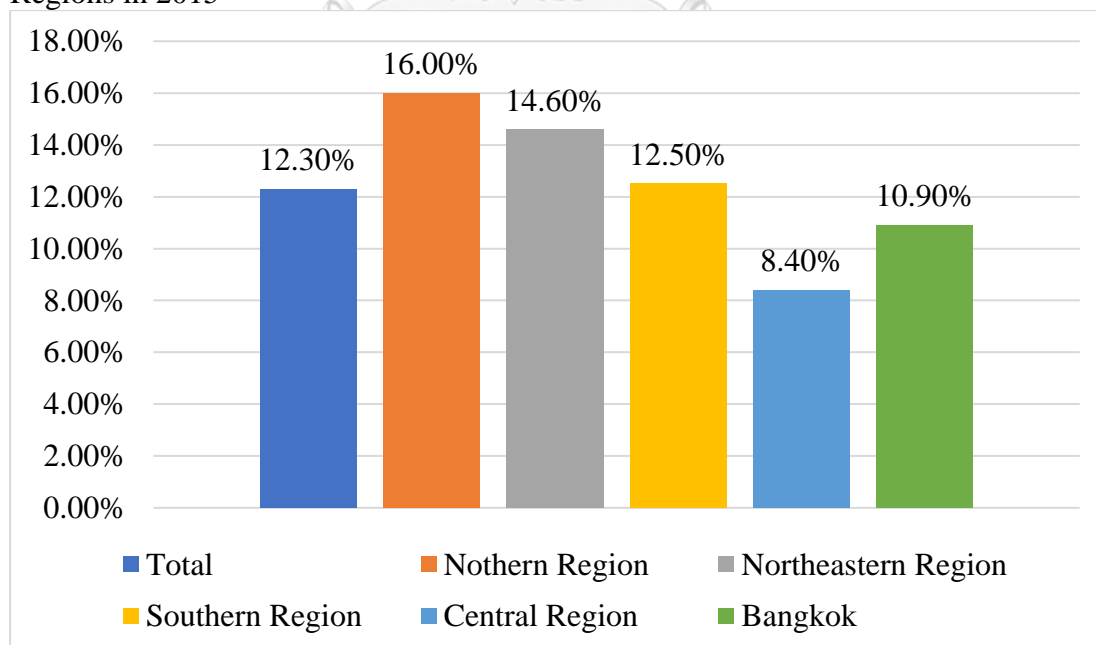
Source: Office of the National Economic and Social Development Council

Thai people lifestyle becomes unhealthier as time passes, NSO National Statistical Office (2017) points that Thai people consumes more high-fat food comparing 2009 to 2013, from 8.1 percent to 8.7 percent. In the same period of comparison, the percentage of consumed fruit and vegetable which are sources of vitamins and minerals fell from 58 percent to 54.5 percent. With higher cholesterol and less vitamins and minerals, the unhealthy diet can be clearly noticed. Thai people become more inactive and percentage of exercise activities fall from 29.6 in 2007 to

23.4 percent in 2015. Moreover, alcohol consumption had increased from 31.5 percent in 2011 to 34 percent in 2015. Abuse of alcohol consumption is one of the causes of health underlying conditions and cancers.

Although health promotion services can positively contribute to healthy habits which reduce NCDs in Thailand, low percentage of health promotion service consumption can be observed. In 2013, only 2.8 percent had consumed health promotion services during a past month of the interview date (Hfocus, 2013). In 2015, NSO has updated the questionnaire to observe the health promotion service consumption during past 12 months. Nonetheless, relatively low percentage persists. In 2015, overall, less than 13 percent of Thai people had used health promotion services in past 12 months (National Statistical Office, 2015). Figure 2 illustrates the percentage of Thai people who consume health promotion service during the past 12 months. The popularity of health promotion service consumption varies across regions.

Figure 2 Comparing Health Promotion Service Consumption in Thailand across Regions in 2015



Source: National Statistical Office

Ministry of Public Health (2017) issued 12th National Health Development Plan (2017 - 2021) in accordance with 12th National Development Plan (2017 - 2021) goals. In 12th National Health Development Plan, health promotion is included in strategy I: Health Promotion + Disease Prevention + Consumer & Environmental Protection Excellence. One of the concerns under strategy I is to aggressively develop health system through health promotion. Promoting health awareness and healthy behaviors are mentioned to prevent death from preventable diseases. In the section of situations and factors influencing health development, it indicates that although the idea of “prevention is better than cure” have been cultivated in norm of Thai society for long time, only 9 percent of total health care expenditure was spent for health promotion signaling the gap to be filled in policy implementation. Therefore, the micro-level data analysis is essential to explore the factors that can inform future interventions aimed at increasing health promotion service consumption.

Apart from Ministry of Public Health, there is another organization founded to specifically promote health promotion in Thailand named Thai Health Promotion Foundation or ThaiHealth. ThaiHealth is an autonomous government agency established by the Health Promotion Foundation Act in 2001 with the vision “*All people living in Thailand have capability and live in society and environment conducive to good health.*” Main funding source of ThaiHealth comes from tobacco and alcohol taxes which is worth approximately 120 million US dollars a year. These sin taxes are used to support health promotion movement. For each year more than 90 percent of ThaiHealth funding is spend for projects to handle major factors causing health risks.

Although large amount of budget had been invested to promote health promotion practices, among top five ranked causes of death for Thai people, three out of five are NCDs or Non-Communicable diseases (Ministry of Public Health, 2019). These diseases are caused by unhealthy habits including drinking, smoking, sedentary lifestyle, unhealthy diet, and stress which can be prevented by changing to healthy habits. If these unhealthy habits are changed, the risk of NCDs can be reduced by 80 percent (Thailandplus, 2021).

These chronic diseases are expected to further cause government a large health expenditure burden for subsidies due to their characteristic of long-term treatment requirement. Thailand health care expenditure per annum is approximately 0.5 trillion baht (Bangkok Biz News, 2019). Nonetheless, Wichitaksorn (2018) under Thailand Development Research Institute (TDRI) revealed that health care expenditure for next 15 years is expected to continuously increase to 1.8 trillion baht. Moreover, given the condition that Thailand becomes aging society and experiences increasing in the number of NCDs incidents, without appropriate government intervention, health expenditure for Thailand is projected to surge up to 1.825 trillion baht. In contrast, with the proper government interventions, health care expenditure is supposed to increase to only 1.4 trillion baht (Hfocus, 2018). Hence, the effective health promotion programs can lift government burden and enhance healthiness of Thai society as well as economy. To encourage health promotion service consumption in Thailand, various factors relating to Pender's Health Promotion Model including biological factors, sociocultural factors, psychological factors, and behavioral factors are selected to be analyzed and estimated their marginal effects.

1.2 Research Question

What are biological factors, sociocultural factors, psychological factors, and behavioral factors that affect consumption of health promotion services in Thailand?

1.3 Objectives of Study

- To determine biological factors, sociocultural factors, psychological factors, and behavioral factors influencing health promotion service consumption in Thailand
- To estimate the marginal effect of the statistically significant biological factors, sociocultural factors, psychological factors, and behavioral factors influencing health promotion service consumption in Thailand

1.4 Scope of Study

In this research, the binary logistic regression is applied to study the factors affecting health promotion service consumption in Thailand using the 2015 data collected across regions in Thailand from NSO. Logit model is employed to study the effects of each interested independent variables to decision to consume the health promotion services.

1.5 Research Contribution

Extensive number of researches in Thailand on health promotion behavior are conducted on very specific places such as university, hospital, village of sample group. National and regional level factors and insights remain limited. Thus, this research aims to prove factors affecting health promotion consumption in regional and national level which benefits macro-level planning along with solid proofs for effective interventions. Moreover, several factors beyond previous studies are included in the study.

1.6 Expected Benefits

The study is anticipated to benefit public sector, private sector, and the society as a whole. The findings of significant factors affecting health promotion service consumption can provide the evidence for government to implement productive health-promotion promoting policies to enhance consumption of health promotion services. Insights from the research can also be utilized by health-related business to increase sales of health promotion services, for example, customer targeting and marketing campaigns. Encouraging consumption of health promotion services can benefit the economy and society due to the characteristic of positive externality. As a result, health promotion service consumption contributes to not only lowering projected health expenditure burden but also supporting people's health condition to enhance labor productivity which improve GDP as well as quality of life.

Chapter 2 THEORY AND LITERATURE REVIEW

2.1 Definition and Theories

2.1.1 Health Promotion

Ottawa Charter for Health Promotion defines health promotion as the process of enabling people to increase control over and to improve their health conditions. Health promotion is not limited to healthy lifestyle but wellbeing (World Health Organization Regional Office for Europe, 1986).

World Health Organization (2016) explains that health promotion enables people to increase control over their own health. Furthermore, the society, environment, and public interventions can significantly influence health promotion to prevent root causes of illness rather than solely focus on treatment and cure.

National Health Security Office or NHSO defines health promotion as services or activities which directly positively affect awareness and capability of an individual, a family, or a group of people to take care of one's own health. Along with health promotion, disease prevention is explained as the services or activities which are provided to an individual, a family, or a group of people to prevent diseases.

National Health Security Office (2017) combines health promotion and disease prevention under the same section. Scope of health promotion service and disease prevention services under NSHO are identified as follow:

1. Health risk factor screening

Health risk factor screening is conducted when no symptom of illness has shown on an individual. Health risk factor screening can be done with single or multiple set of activities, including health risk assessment, physical examination, blood test, urine test, etc. to identify risk factors of health problem and cope with

them. Health risk factor screening should be done periodically which can be yearly, every 3 years, and every 5 years depends on personal conditions.

2. Promoting behavioral changes, consultation, education, and demonstration to enhance health promotion and disease prevention.

The examples of the services are children development consultation, family planning consultation, HIV prevention, smoking cessation, and obesity.

3. Immunization, medication, medical procedure for health promotion and disease prevention.

The examples are vaccination for pregnancy, vaccination for children, iron supplements, iodine supplements, folate supplements, antiretroviral drugs to prevent mother-to-child transmission of HIV, fluoride treatment, and family planning.

Overall, health promotion service can be identified as services which allow an individual to strengthen control over one's own health to prevent diseases and reduce risks of illness.

2.1.2 Demand

Demand is the quantity of goods and services that an individual is willing and able to buy at different price levels in a certain period of time.

Law of demand explains the reverse relationship between the quantity demanded of goods and services and price levels. It states that as price increases, quantity demanded falls, holding other factors constant.

Demand and need for healthcare are not the same. Need is evaluated by medical authorities. However, demand is the actual use of medical care services. For example, an individual may demand less services of medical care than medically

needed due to unaware of the necessary, unavailable of facilities and services, or lack of financial resources. Conversely, an individual may demand more care than medically needed (Feldstein, 1966). In addition, the overutilization of health care is not merely caused by moral hazard. People can make mistakes and demand care that does not benefit himself or herself. Moreover, it can be even be harmful (Baicker, Mullainathan, & Schwartzstein, 2015).

2.1.3 Expected Random Utility Framework

An individual i will decide to consume health promotion service consumption to maximize their expected utility of consumption. Let $E(U_{1i})$ represents the expected utility from consuming health promotion service consumption, and $E(U_{0i})$ represents the expected utility from not consuming health promotion service. The difference of the expected utility between two choices (consume and not consume) is defined by U_i .

An individual i will consume health promotion service if the expected utility of consumption exceeds the expected the utility of non-consumption. Health promotion service is consumed when $U_i > 0$.

Utility of an individual i is stochastic, and the deterministic component of utility is a function of exogenous variables (X_i) including biological factors, sociocultural factors, psychological factors, and behavioral factors.

$$U_i^* = \beta X_i + e_i \quad (1)$$

Nonetheless, U_i is not observable, but the decision to consume health promotion service (HPS_i) is observable as a binary variable.

An individual consumes health promotion service $HPS_i = 1$ if $E(U_{1i}) > E(U_{0i})$

An individual does not consume health promotion service $HPS_i = 0$ if $E(U_{1i}) < E(U_{0i})$

Equation (1) can be empirically estimated as equation (2) using a univariable logit model that uses maximum likelihood estimation.

$$\text{HPS}_i = \beta X_i + e_i \quad (1)$$

$\text{HPS}_i = 1$ if an individual consumes health promotion service, which is observable and occurred only if $U_i^* > 0$, and $\text{HPS}_i = 0$ if an individual does not consume health promotion service (Sinha & Bunyasiri, 2021).

2.1.4 Health Promotion Model (HPM)

To study determinants of health promotion related behavior, Pender's Health Promotion Model (HPM) was applied. HPM is a framework that incorporates nursing and behavioral science perspectives with determinants influencing health behaviors. The framework aims to explore biopsychosocial processes that motivate individuals' engagement in behaviors enhancing health (Pender et al., 2011). The revised Pender's health promotion model in 1996 assumes relationships between selected individual characteristics, cognitions, and affects to predict and explain health-promoting behavior (McCullagh et al., 2002). McCullagh et al. (2010) put HPM in application to study the relationship among selected individual characteristics, cognitions, and effects to predict and explain health-promoting behaviors. Lusk et al. (1997) described that HPM is developed from social learning theory which aims to explain people's participation in health promotion with an assumption that cognitive-perceptual factors influence health-promoting behavior. Several studies employed HPM to explore the linkage of human characteristics and behaviors, and health promotion habits (McCullagh et al., 2002; Guedes et al., 2009).

The model applies for explanation and predication of health promoting behaviors thorough combination behavioral science perspectives with nursing. Variety of factors that influence health-promoting behavior are illustrated in the model. The main purpose is to motivate individuals to engage in health-promoting behaviors. Many of previous foreign and local researches on health promotion

employed HPM to study the linkage of human characteristics and behaviors and health promotion (McCullagh, Lusk, & Ronis, 2002; Guedes, Moreira, Cavalcante, de Araujo, & Ximenes, 2009; Rerkluenrit et al., 2010). There are 3 main parts of the model composing of individual experiences and characteristics, specific behavior, and results from that behavior. Figure 3 shows the framework of Pender's health promotion model.

The first component is individual experiences and characteristics. They are prior related behavior and personal factors. Prior related behavior can directly and indirectly impact the probability of health promotion engagement. Personal factors including biological factors (such as age and health condition), psychological factors (self-esteem, and perceived health status), and socio-cultural factors (such as education and socioeconomic status).

The second component is behavior-specific cognitions and affect. The second part is to create motivation for a person to practice health promotion. The second component can be influenced via interventions. Elements of the second parts compose of perceived benefit of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situation influences.

The perceived benefits of health promotion component influence both direct and indirect motivation of a person. Although expectation of positive outcome is necessary, it is not sufficient to engage in specific health behavior.

The barriers to action component such as time constraint, inconvenience, and limited budget directly obstruct health promotion practice and further reduce motivation for health-promoting behavior.

Self-efficacy is the judgement of personal capability to perform a specific behavior. With positive self-efficacy, a person not only enhance decision-making to pursue health-promoting practices but also reduce the barriers to health promotion practices. Self-efficacy can directly be health-promotion motivation with expectation

of achievement, and indirectly decrease barriers and increase determination of health promotion practices.

Feelings regarding the behavior or activity-related affect refers to both positive and negative impacts. The feeling before, during, and after the action of health promotion depends on stimulus properties. The feelings directly affect health promotion practice and habit whether health-promoting behavior will be carried on in long-term. Moreover, the activity-related affect indirectly influences self-efficacy and commitment to health promoting behavior.

Interpersonal influences covering norms, modeling, and social supports from family, friends, and health care providers. Interpersonal influences directly affect health-promoting practice and indirectly encourage commitment to health promotion practice.

The last element under the second component of the model is situation influences. Situation influences refer to personal cognition and perceptions of situations which can either encourage or discourage health-promoting behaviors. A person can evaluate available options, demand characteristics, and pleasant environment. Positive situation influences can encourage health-promoting practice such as exercising with a group of people in a park.

The third part of the model is behavioral outcomes. This final section consists of commitment to a plan of action, immediate competing demands and preferences, and health-promoting behavior.

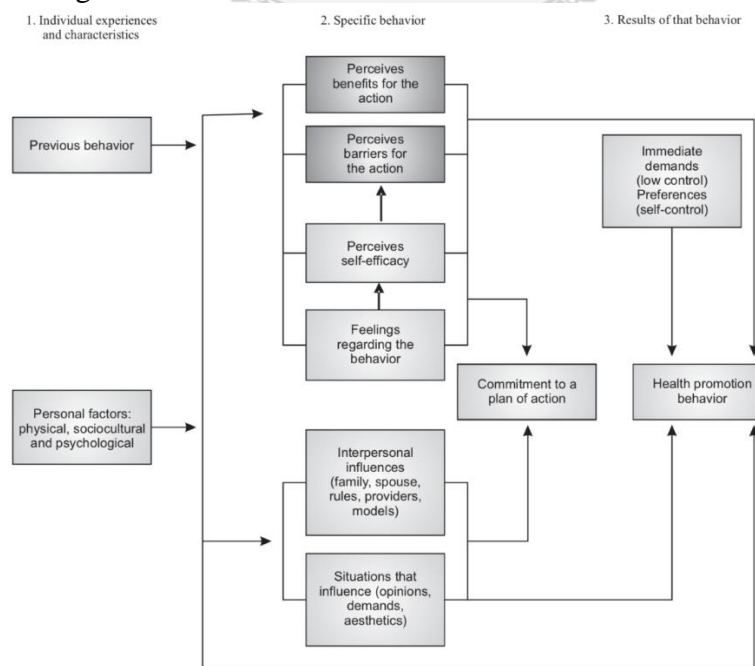
Commitment to a plan of action refers to intension of planning and initiating health promotion action. The underlying cognitive process involving the following two points. 1) Specific time, place, and people who join the activities should be indicated. 2) Strategies and specific actions should be planned. Despite the strategy for health promotion action is planned, immediate competing demands and

preferences are alternative options for health promotion behavior. Competing demands can disturb health promotion event.

Immediate competing demands and preferences are alternative actions for health promotion actions. Immediate competing demands can be identified as unexpected events and responsibilities which immediately present prior to the intended health-promoting behavior which an individual has little or no control over competing demands while competing preferences are identified as preferred alternative activities. An individual's ability to compete with competing preferences depends on self-regulation. For example, with low self-regulation, an individual chooses unhealthy diet instead of healthy diet because of tasty preference. Both immediate competing demands and preferences are expected to directly impact health promotion practice and moderately influence the effects of commitment.

The result of the model is positive outcomes on an individual to perform health -promoting behaviors and improve wellbeing at all stages of life by integrating health-promoting behaviors into a healthy lifestyle.

Figure 3 Diagram of the Health Promotion Model



Source: Guedes et al., 2009

Conceptual framework of this study is derived from the first component of HPM where originates influences on health-promoting behavior involving individual characteristics and experience. This part comprises of prior related behavior and personal factors including biological, sociocultural, and psychological determinants.

2.2. Past Related Researches

This section reviewed past related researches and studies. The section is mainly divided into 5 subsections. The first subsection is the discussion of overall factors affecting health-promoting behaviors. The second subsection refers to studies associate with biological factors. The third subsection involves sociocultural factors that influence health- promoting and health related habits. The fourth subsection discussed psychological factors influence health-promoting and health related behaviors, and the fifth subsection considers the behavioral factors related to health-promoting and health-caring manners, and. The summary tables of factors and analysis methods are organized in tables. Table 1 presents the summary of biological and sociocultural characteristics factors across studies. Table 2 concludes psychological factors across studies. Table 3 summarizes behavioral factors across studies, and Table 4 presents analysis methods used in the studies.

2.2.1 Factors

Number of researches attempts to study on determinants on health promotion behavior. It is global acceptance that social wellbeing and health are influenced by factors not limited to health system but also other factors including socioeconomic characteristics, consumption patterns, demographic characteristics, family supports, social norms, sociopolitical and economic impacts (Kumar & Preetha, 2012). Additionally, Schwarzman et al. (2019) pointed that health promotion generally aims to address socio-ecological factors of health utilizing multiple strategies.

Macfarlane (2005) explained that the factors that affect the successful implementation of disease prevention and health promotion interventions through immunization programmes are:

- National planning, political factors and capacity;
- Availability of data about the target population and intervention impacts;
- Influence of socio-economic factors and special considerations regarding the age of target population;
- Burden of the health problem to society, family and individual;
- Use of intervention in a multifactorial setting;
- Communication strategies through media and school to reach vulnerable and minority groups; and
- Engagement of all levels of the society (from government to individual) in the process.

2.2.2 Biological factors

2.2.2.1 Gender

Östlin, Eckermann, Mishra, Nkowane, and Wallstam (2007) addressed the differences of biological needs, social status, and health risks across genders. Saeed et al. (2016) also distinguished preferred facilities of healthcare services among elder male and female in Ghana. Stock, Wille, and Krämer (2001) claimed that female expressed greater interest in health promotion programs than male from the study of German university students. Moreover, Weaver and Gary (1996)'s study on health care seeking behavior regarding places of medical care treatments of African American elders offered the evidence of significant relationship between health care seeking and gender. However, Nola J Pender and Pender (1980) founded no relationship between genders and intention to utilize health promotion services from nurse practitioners for direct pay in north Illinois. Additionally, no relationship was proved between gender and habit of using hearing protection in the Midwest (McCullagh et al., 2002). In Thailand, Sangprasert and Wiroj (2015) claimed no

relationship between gender and health-promoting behavior in an urban community of metropolitan Bangkok: Pathum Thani province. Chumpeeruang, wanJan, and Duongtatip (2019) supported that elders' health-promoting behavior in Muang Nakhonsawan province was not influenced by gender.

2.2.2.2 Age

Given difference ages, difference physical conditions and awareness can be observed. As a body grows through stages, health condition has changed overtime whether improve or deteriorate. Proper health promotion of each stage of life can help to maintain healthiness of the body. Moreover, health awareness and perceptions may vary across ages which can result in different level of health promotion service consumption. Lusk, Ronis, and Hogan (1997) claimed age as one of the factors with indirect positive relationship to the use of hearing protection from the research on construction workers' use of hearing protection from the Midwestern United States. The result implied that as people get older, they tend to be more concern their health condition which reflects their preventive actions and favors health promotion behaviors. Furthermore, age was proved to affect health-care related behavior in studies (Weaver & Gary, 1996; Saeed et al., 2016). In Thailand, Rerkluenrit et al. (2010) supported age as a statistically significant factors determining health-promoting behaviors among Buddhist monks in Nakhonnayok province. Sangprasert and Wiroj (2015) also founded age to be a significant factor influencing health-promoting behaviors among people who aged more than 15 years old living in urban community of metropolitan Bangkok: Pathum Thani province.

On the other hand, there are studies provided the evidence of no relationship between age and health-promoting behavior. Nola J Pender and Pender (1980) founded no significant of age factor on planning to use health promotion service form nurse practitioners in north Illinois. McCullagh et al. (2002)'s study of factors affecting the use of hearing protection among farmers in the Midwest yielded the same result for insignificance of age factor. In Thailand, Lertsakornsiri and Khampunyo (2017)'s study on factors associating with health-promoting behaviors of

nursing students at Saint Louis College during practice in the health care service further addressed the insignificance of age variable. The insignificance of age factor was in accordance with the result from the study of health-promoting behaviors of professional nurses in faculty of medicine, Vajira hospital, Navamindradhiraj University (Vimonwattana, Sangkapong, & Panriansaen, 2017). In addition, Chumpeeruang et al. (2019) addressed insignificance of relationship between age and health-promoting behavior among senior citizen in Nakhonsawan province.

2.2.2.3 Having chronic disease(s)

Although health-promoting behavior aims to improve one's control over health which not only involve preventive habit but also health improvement, it cannot be ensured that all risk factors are coped with. Regularly consume health promotion services may reflect consistent self-caring. However, people can regularly utilize health promotion services because being aware of their own unhealthy habits, so need to consume health promotion services to not worsen the current health conditions. Sangprasert and Wiroj (2015) proved positive correlation between total score of health-promoting behavior and having chronic disease from the study of an urban community in Pathum Thani province while Rerkluenrit et al. (2010) founded insignificant of having chronic disease variable to health-promoting behaviors among Buddhist monks in Nakhonnayok province.

2.2.3 Sociocultural factors

2.2.3.1 Place of living

Place of living characteristics such as location and types were studied in researches. Rerkluenrit et al. (2010) showed interest in shelter location factor in the study of predictive factors for health-promoting factors among Buddhist monks in Nakhonnayok province. However, the factor was proved to be unrelated to health-promoting behaviors. In the other words, health promoting-behaviors were indifferent whether living in the city or outside the city. Whereas Lertsakornsiri and Khampunyo

(2017) claimed different types of living places for nursing students at Saint Louis College influenced health-promoting behavior in nutrition.

2.2.3.2 Education

It is well comprehended that the quality and years of education are an important determinant of health and health literacy throughout the life-course. Both length and quality of education reinforce the effects of early-years development and influence subsequent social and economic well-being, health and other outcomes of individuals (World Health Organization Regional Office for Europe, 2015). Education can influence decision to health-promoting behaviors. Nola J Pender and Pender (1980)'s study in a northern Illinois country on relationship between psychosocial and behavioral characteristics and intentions to use illness prevention and health promotion services provided by nurse practitioners showed that interest of health promotion services for direct pay was influenced by education beyond high school. Furthermore, Weaver and Gary (1996) supported the significance of years of education factor in relation to health care seeking preference. Saeed et al. (2016)'s study in Ghana also proved education to affect utilization of health care services. In Thailand, Sangprasert and Wiroj (2015) claimed that education was positively correlated with total scores of health-promoting behaviors in urban community of metropolitan Bangkok: Pathum Thani province. Additionally, Lertsakornsiri and Khampunyo (2017) provided an evidence of constructive relationship between years of study in nursing college and health-promoting behaviors in nutrition.

In contrast, a study of factors predicting health-promoting behaviors for Buddhist monks in Nakhonnayok showed no significance relationship of either general education factor or religious education factor and health-promoting habits (Rerkluenrit et al., 2010). Vimonwattana et al. (2017) also founded no relationship between education and health-promoting behaviors of the professional nurses in the faculty of medicine, Vajira hospital, Navamindradhiraj University.

2.2.3.3 Marital status and number in household

Marital status and number in household factor is related to not only family members who depends on an individual but also interpersonal influence of an individual which impacts health-promoting behaviors. Marital status was included in studies. However, Weaver and Gary (1996)'s study of health care seeking behavior among African American elders and Vimonwattana et al. (2017)'s study of professional nurses in faculty of medicine, Vajira hospital, Navamindradhiraj University addressed no significant relationship between marital status and health care habits. Moreover, Nola J Pender and Pender (1980) supported insignificant relationship between number in household and intention to use health promotion and protection services from nurse practitioners.

2.2.3.4 Income and employment status

Generally, the higher the income earns, the higher the purchasing power an individual has. In the other words, the higher the income, the higher the ability of spending on health promotion services. On the other hand, the lower the income leads to the lower healthcare budget which reduce priority health promotion and illness prevention (Bock, Diehm, & Schneider, 2012) which turns out as delay or negligence of health promotion service consumption. It is not only the direct cost of health promotion service to be concerned but also the indirect costs such as transportation cost, opportunity cost of wages and compensations, etc. With financial difficulties, limitations and barriers can clearly disrupt health promotion commitment. In addition to income factor, employment status is one of factors that ensure stream of incomes. Saeed et al. (2016) founded income and employment status influenced health care services utilization preference across places. The positive relationship between income and health promotion in nutrition was proved from the study of Saint Louis College students in Thailand (Lertsakornsiri & Khampunyo, 2017).

In contrast, researches on various groups in Thailand explored insignificance of income factor toward health-promoting behaviors (Vimonwattana et al., 2017;

Chumpeeruang et al., 2019). Moreover, there are researches proved insignificant of employment status factor on health care habits (Weaver & Gary, 1996). Sangprasert and Wiroj (2015) founded income and employment status to be insignificant factors for overall health-promoting aspects.

2.2.3.5 Health-care coverage

Health-care coverage is one of the tools to reduce barriers to health care and health promotion services, especially financial barriers. Generally, direct cost can be covered by the health-care coverage, either partial or a whole, so the out-of-pocket expenditure is lower than without health-care coverage which in turn costs an individual less to consume health promotion services. The status of being under health insurance can affect the decision to opt for healthcare services (Saeed et al., 2016; Nola J Pender & Pender, 1980). For Thailand, the establishment of universal coverage in 2002 enabled the whole Thai population of 66.3 million persons (Sumriddetchkajorn et al., 2019). Universal health coverage implies universal access for all people to necessary healthcare services without risk of financial hardship from utilize those services (de Andrade et al., 2015). From a study of utilization of healthcare services among older adults in Ghana where The National Health Insurance Scheme (NHIS) is implemented to subdue financial burdens on households founded that people without insurance chose alternative health practices such as the pharmacy and traditional treatments which were more affordable and accessible comparing to private and public health facilities while people who had health insurance preferred public health facilities (Saeed et al., 2016). The implication of outcome is discussed to show the effect of health-coverage on healthcare service cost and healthcare options. In other words, individuals who are under health insurance tends to utilize their claims on health-coverage and mitigate healthcare expenditure. As a result of alleviating financial burden, the downsides from utilizing health promotion service is reduced as well as its opportunity cost. Therefore, health coverage favors the decision to consume health promotion services.

2.2.4 Psychological influences

2.2.4.1 Perceived barrier

Perceived barrier was found to be significant determinant of health promotion across studies. In the study of predictive factors of the use of hearing protection among farmers in the Midwest, barrier factor was founded to be a significant predictor of the use of hearing protection. In the study, the barrier related to downside of wearing hearing protection such as miss of hearing warning sounds from the equipment. Rerkluenrit et al. (2010) also supported that perceived barriers to health promotion practice significantly had negative impact on health-promoting behaviors from the study of health-promoting practice in Buddhist monks in Nakhonnayok province.

2.2.4.2 Positive attitude toward health promotion and perceived benefits

Positive attitude toward health promotion and perceived benefit factor were founded to be a significant determinant across researches. Nola J Pender and Pender (1980) provided an evidence that positive attitude toward health promotion services was a significant factor influencing intention to use health-promoting services providing by nurse practitioners. Moreover, Lertsakornsiri and Khampunyo (2017)'s study on factors associating with health-promoting behaviors of nursing students at Saint Louis College during practice in the health care service claimed positive attitude toward health promotion was a statistically significant factor for overall aspects of health-promoting behaviors with positive relationship. Furthermore, Chumpeeruang et al. (2019)'s findings from a study of factors affecting health-promoting actions of the elderly of Muang Nakhonsawan province showed that positive attitude toward healthy lifestyle directly related to health-promoting behaviors.

Perceived benefit determinant was found to be a significant positive determinant of health-promoting behaviors from the study of health-promoting behaviors in Buddhist monks in Nakhonnayok province (Rerkluenrit et al., 2010). In addition,

Vimonwattana et al. (2017) studied determinants of health promotion behaviors of professional nurses in faculty of medicine, Vajira hospital, Navamindradhiraj University and proved that attitude toward health promotion and perceived benefits were significant positive determinants to the professional nurses' health-promoting behaviors.

Nevertheless, McCullagh et al. (2002) studied factors affecting the use of hearing protection amount farmers in the Midwest and proved insignificant relationship between use of hearing protection and value of use in protecting his or her own hearing.

2.2.4.3 Perceived self-efficacy

Rerkluenrit et al. (2010)'s study of health-promoting behaviors in Buddhist monks in Nakhonnayok province suggested one of the statistically significant predictors was perceived self-efficacy. However, McCullagh et al. (2002)'s study of factors affecting the use of hearing protection amount farmers in the Midwest provided an evidence of insignificant relationship between the use of hearing protection and self-efficacy. In the study, perceived self-efficacy variable involved realization of noise level that requires hearing protection.

2.2.4.4 Situational influence

Many researches founded situational influence as a significant factor. McCullagh et al. (2002)'s study on the use of hearing protection of farmers in the Midwest claimed situational influence factor which related to availability of hearing protection equipment to be a significant determinant. Moreover, Vimonwattana et al. (2017)'s study on determinants of health promotion behaviors of professional nurses in faculty of medicine, Vajira hospital, Navamindradhiraj University suggested that accessibility to resources and information and supportive health policy were significant determinants with positive relationship. Furthermore, health policies and accessibility to resources and information were founded to be influencing factors

among the elderly of Muang Nakhonsawan province. In addition, health knowledge directly related to health-promoting behaviors (Chumpeeruang et al., 2019).

2.2.4.5 Situational influence

McCullagh et al. (2002)'s study of factors affecting the use of hearing protection among farmers in the Midwest categorized interpersonal influence variable into interpersonal norms, modeling, and support. The study founded interpersonal support to be a significant predictor. Interpersonal support variable linked to encouragement and praise from others about he or she wears hearing protection. Interpersonal support was a significant positive determinant to the professional nurses' health-promoting behaviors (Vimonwattana et al., 2017). Additionally, being motivated by people and society was an influencing factor for the elderly's health promotion habits in Muang Nakhonsawan province (Chumpeeruang et al., 2019). Nonetheless, the study in a northern Illinois country on relationship between intentions to use health promotion services provided by nurse practitioners and attentiveness to current health issues followed on mass media resulted in insignificant relationship (Nola J Pender & Pender, 1980).

2.2.4.6 Health awareness

Saeed et al. (2016)'s study in Ghana provided an evidence that self-assessment of health status affected utilization of different health care service facilities. Chumpeeruang et al. (2019)'s findings from the study of factors affecting health-promoting actions of the elderly of Muang Nakhonsawan province supported relationship between health-promoting behaviors and health awareness.

2.2.4.7 Stress

Nola J Pender and Pender (1980) founded low level of life stress to be one of the significant predictors for intention to use health promotion services provided by nurse practitioners. The low life stress was associated with high tendency to utilize

nurse-supplied services. Weaver and Gary (1996)'s finding from the study of African American elders supported that depressive symptom and perceived control over life events influenced selection of health care facilities. However, stress was founded to be an insignificant determinant of overall health-promoting aspects on the study of predictive factors affecting health promotion behaviors in urban community of metropolitan Bangkok: Pathum Thani province (Sangprasert & Wiroj, 2015).

2.2.5 Behavioral influences

2.2.5.1 Smoking

Excessive evidences are provided to support the conclusion of harmful impacts to health toward cigarette smoking with severe increment of blood pressure and heart rate (Primatesta, Falaschetti, Gupta, Marmot, & Poulter, 2001). The negative impacts from smoking habits not only harmful to the smoker but also other people who inhale toxic chemical components releasing with cigarette smoke. Consequently, many studies conducted to identify predictors of smoking and aim to reduce smoking as one of the health risk behaviors (Lynagh, Schofield, & Sanson-Fisher, 1997; Martinelli, 1999). Since health promotion programs attempt to discourage smoking habits, reverse relationship between demand for health promotion services and smoking is undoubtedly anticipated. However, Rerkluenrit et al. (2010) founded no relationship between either smoking or age when start smoking and health-promoting behavior in Buddhist monks in Nakhonnayok province.

2.2.5.2 Alcohol drinking habit

Adverse impacts from alcohol consumption is not limited to the abusive drinkers' health condition but increase risk of harmful accidents to themselves and others. Since health promotion focuses on enhance ability of an individual to have control over oneself. Then, several health promotions programs over past decade attempted to cope with alcohol consumption as a health risk behavior (Lynagh et al., 1997). Effective health promotion was proved to strengthen the ability of an

individual to exert control over the determinants of alcohol-impaired driving (Howat, Sleet, Elder, & Maycock, 2004). The negative relationship was further discussed on meta-analysis across literatures on natural recovery from alcohol abuse demonstrates that people do not seek for alcohol treatment for a variety of reasons including disgrace of alcohol treatment, misunderstood of the treatment, social entertainment, and inconvenience (Marlatt & Witkiewitz, 2002). Hence, abuse of alcohol consumption discourages alcohol treatment which is a part of health promotion. Therefore, the negative relationship is obviously observed between the objectives of health promotion programs and abuse of alcohol consumption. Nonetheless, Rerkluenrit et al. (2010) founded no relationship between either alcohol consumption or age when start consuming alcohol and health-promoting behavior in Buddhist monks in Nakhonnayok province.

2.2.5.3 Drug addiction

Being well known for psychoactive substance, drug addiction is undoubtedly expected reversed relationship with health-promoting behavior. Similar to smoking and alcohol drinking, abuse of drugs results in worsen physical and mental health. From the study of health-promoting behavior in Buddhist monks in Nakhonnayok province, drug addiction and age when start using drugs were proved to be significant predictors of health promoting behaviors. The younger an individual started using drugs, the worse the individual's health condition resulting in low responsibility on health caring (Rerkluenrit et al., 2010).

2.2.5.4 Habits of Health Care

Current and past behaviors are potentially influence future decisions across aspects, including health promotion service consumption. Nola J Pender and Pender (1980) included behavioral determinants that are related to intention to consume health promotion services for direct pay in north Illinois including expressing interest toward health promotion services for direct pay, using existing health education and health counseling services, using of existing prevention and early detection services,

number of physician visits in last 12 months, having personal physician, and number of dental care visits in last 24 months. Nonetheless, among these behavioral factors, only expressing interest in prevention and health promotion service factor was proved to be a predictor of intention to utilize prevention health promotion services provided by nurse practitioners.



Table 1 Summary of past related researches for biological and sociocultural factors

	Nola J Pender & Pender (1980)	Weaver & Gary (1996)	McCullagh et al. (2002)	Rerkluenrit et al. (2010)	Sangprasert & Wiroj (2015)	Saeed et al. (2016)	Lertsakornsiri & Khampunyo (2017)	Vimonwattana et al. (2017)	Chumpeeruang et al. (2019)
Country	the U.S.	the U.S.	the U.S.	Thailand	Thailand	Ghana	Thailand	Thailand	Thailand
Data type	Primary	Primary	Primary	Primary	Primary	Secondary	Primary	Primary	Primary
No. of samples	388 North Illinois citizens	311 of African American elders	139 the Mid-west farmers	341 monks in Nakhonnayok	724 urban community citizens	5,573 elders	184 Saint Louis College students	263 professional nurses	256 elders in Nakhonsawan
Dependent variable	Intention to use health promotion services	Health care seeking	Use of hearing protection	Health-promoting behaviors	Health-promoting behaviors	Healthcare service utilization in male & female	Health-promoting behaviors	Health-promoting behaviors	Health-promoting behaviors
Independent variable									
Biological variables									
Gender		✓				✓			
Age		✓		✓		✓			
Having Chronic Disease(s)					✓				
Sociocultural variables									
Education	✓	✓			✓	✓	✓		
Religion education									
Marital status									
Number in household									
Income									
Employment status						✓			
Health-care coverage	✓					✓			
Shelter characteristic									
Career specialization							✓		
Years of career experience									
BMI index/ Weight/ Waist									
Current Health status									
Organization member									

Note: The shaded box represents independent variable included in each study. The “✓” represents significant variables from each study.

Table 2 Summary of past related researches for psychological factors

	Nola J Pender & Pender (1980)	Weaver & Gary (1996)	McCullagh et al. (2002)	Rerkluenrit et al. (2010)	Sangprasert & Wiroj (2015)	Saeed et al. (2016)	Lertsakornsiri & Khampunyo (2017)	Vimonwattana et al. (2017)	Chumpeeruang et al. (2019)
Independent variable									
Psychological variables									
Perceived barriers			✓	✓					
Positive attitude toward health promotion or protection/ perceived benefits	✓			✓			✓	✓	✓
Perceived self-efficacy				✓					
Situational influences			✓					✓	✓
Interpersonal influences			✓					✓	✓
Health awareness						✓			✓
Stress/ depressive symptom	✓	✓							
Perception of control		✓							

Note: The shaded box represents independent variable included in each study. The “✓” represents significant variables from each study.

Table 3 Summary of past related researches for behavioral factors

	Nola J Pender & Pender (1980)	Weaver & Gary (1996)	McCullagh et al. (2002)	Rerkluenrit et al. (2010)	Sangprasert & Wiroj (2015)	Saeed et al. (2016)	Lertsakornisiri & Khampunyo (2017)	Vimonwattana et al. (2017)	Chumpeeruang et al. (2019)
Independent variable									
Behavioral variables									
Smoking									
Age when starts smoking									
Alcohol consumption									
Age when starts alcohol consumption									
Drug addiction				✓					
Age when starts drug addiction				✓					
Expressing interest in prevention & health promotion services	✓								
Use of existing health education and counseling services									
Visits of physician in last 12 months									
Use of existing prevention and early detection services									
Having regular personal physician									
Visits of Dental care in last 24 months									
Church attendance									

Note: The shaded box represents independent variable included in each study. The “✓” represents significant variables from each study.

Table 4 Summary of past related researches for analysis methodologies

	Nola J Pender & Pender (1980)	Weaver & Gary (1996)	McCullagh et al. (2002)	Rerkluenrit et al. (2010)	Sangprasert & Wiroj (2015)	Saeed et al. (2016)	Lertsakornsiri & Khampunyo (2017)	Vimonwattana et al. (2017)	Chumpeeruang et al. (2019)
Methodology									
Descriptive statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chi-square	✓	✓	✓				✓		✓
Pearson correlation				✓	✓		✓		✓
One-way analyzed of variance/ANOVA		✓			✓				
Spearman correlation				✓	✓				
Eta coefficient				✓					
Discriminant analysis	✓								
Logistic regression			✓			✓			
Stepwise regression					✓				
Multiple regression				✓	✓				
Point of Biserial Correlation					✓				

Note: The “✓” represents methodology used in each study.

Chapter 3 BACKGROUND AND HEALTH SITUATION IN THAILAND

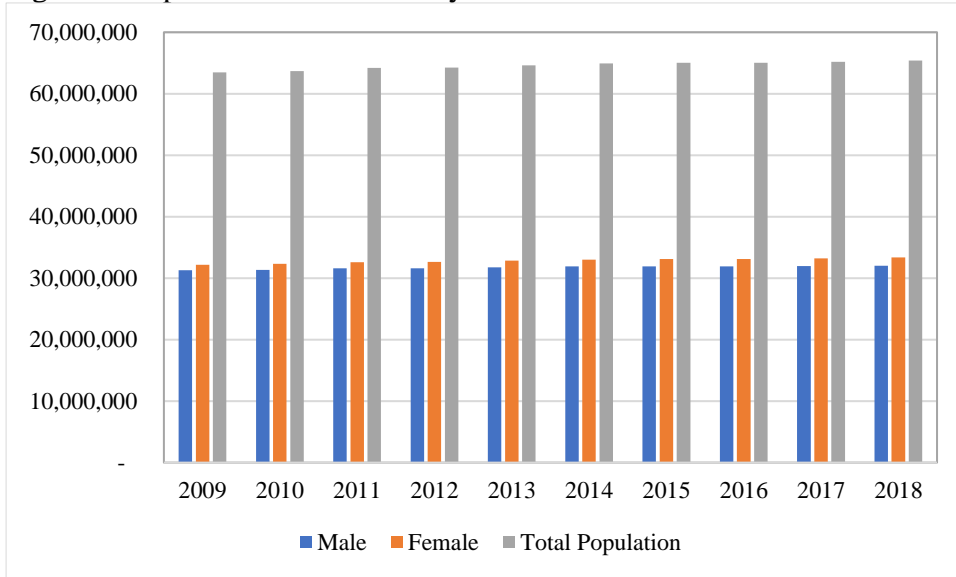
3.1 Geography

Thailand is a country in Southeast Asia which borders Myanmar and Laos to the north, Laos and Cambodia to the east, Myanmar to the west, and Malaysia to the south. In addition, westward is the Andaman Sea and southward borders Gulf of Thailand. For geography, Thailand located in tropical area with 513,115 square kilometers (Tourism Authority of Thailand, 2019).

3.2 Demography

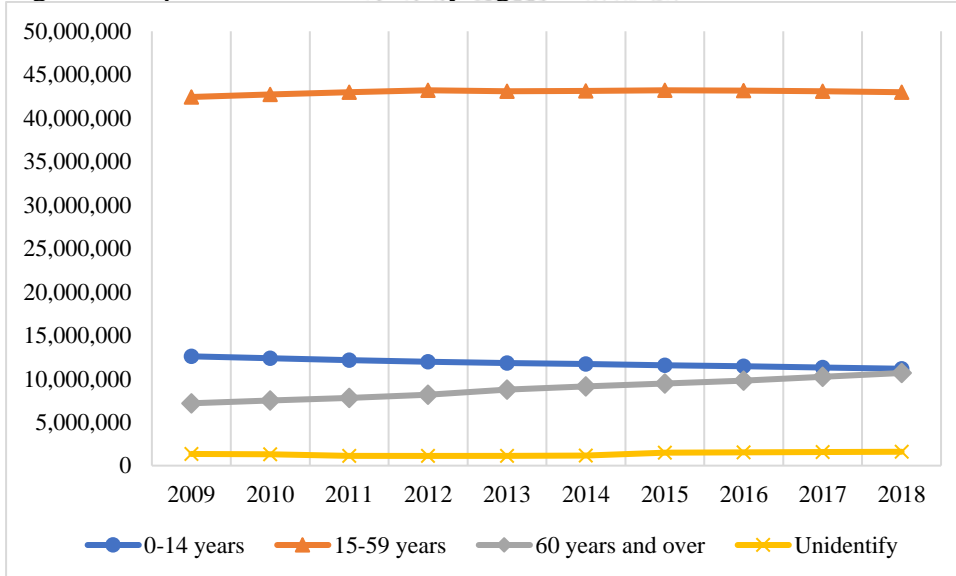
Figure 4 demonstrates Thailand population had increase from 63 million people in 2009 to 66 million people in 2018. Over years, female population has been slightly larger than male population with the proportion of male to female of approximately 0.97. In 2009, majority of population structure is working age (15 – 59 years) followed by child (0 -14 years) and elder (60 years and over) consecutively. However, Figure 5 illustrates that the size of elder population had been increasing, while child population had been decreasing over years. At the end of 2018, the number of senior citizens was vaguely smaller than child citizen and has been increased overtime. Higher life expectancy and lower fertility rate essentially contributed to the figures.

Figure 4 Population of Thailand by Gender from 2009 – 2018



Source: National Statistical Office

Figure 5 Population of Thailand by Age from 2009 – 2018

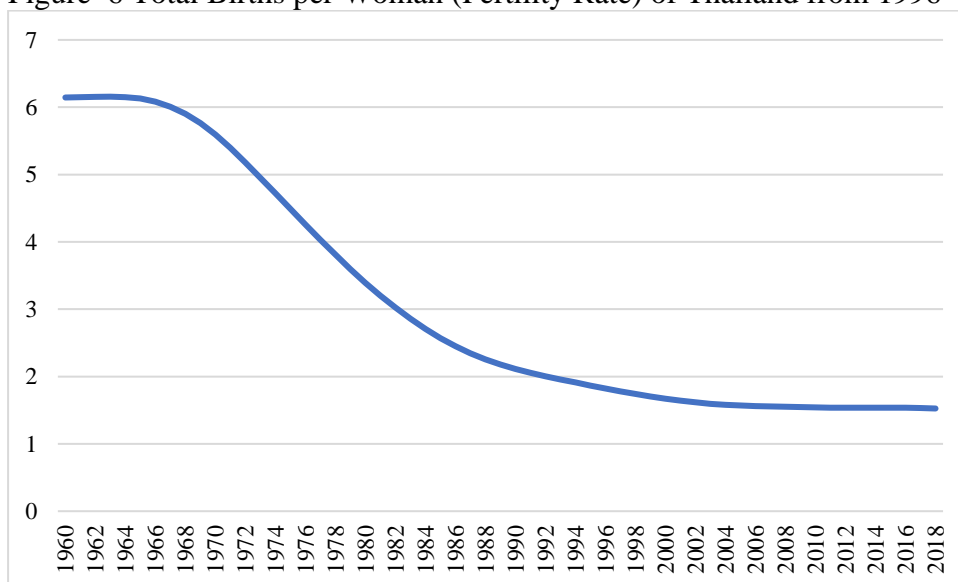


Source: National Statistical Office

It is projected elderly population to keep rising and be accounted for one-third of total Thai population in 2040 and more than 50 percent will age more than 70 years (Thai Health Promotion Foundation, 2019). Fertility rate had continuously decreased. The number of births fall from more than a million to approximately 760,000 a year.

Figure 6 shows Fertility rate of each woman reduce from 6 to 1.6 births for a which is lower than replacement level of fertility at 2 births to substitute for parents.

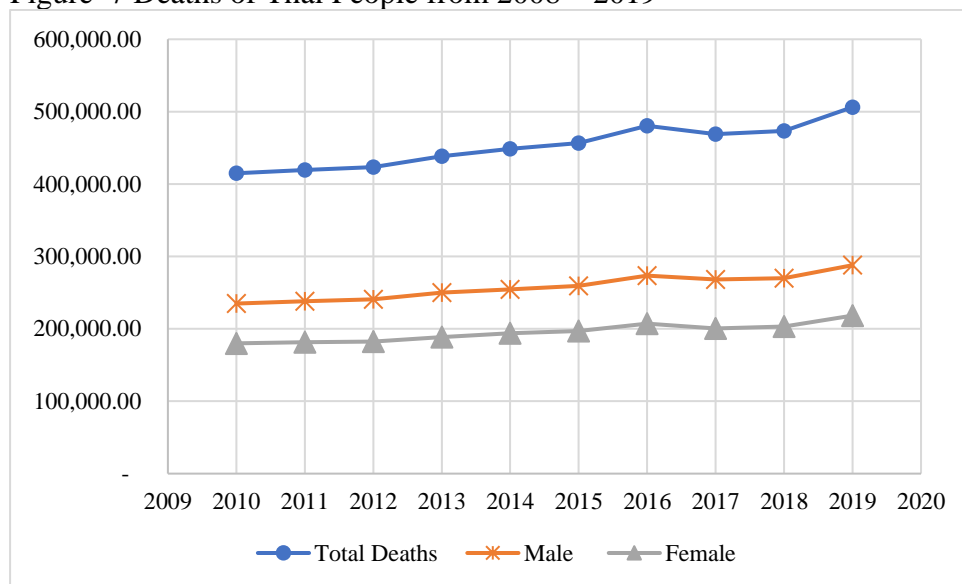
Figure 6 Total Births per Woman (Fertility Rate) of Thailand from 1960 – 2018



Source: The World Bank

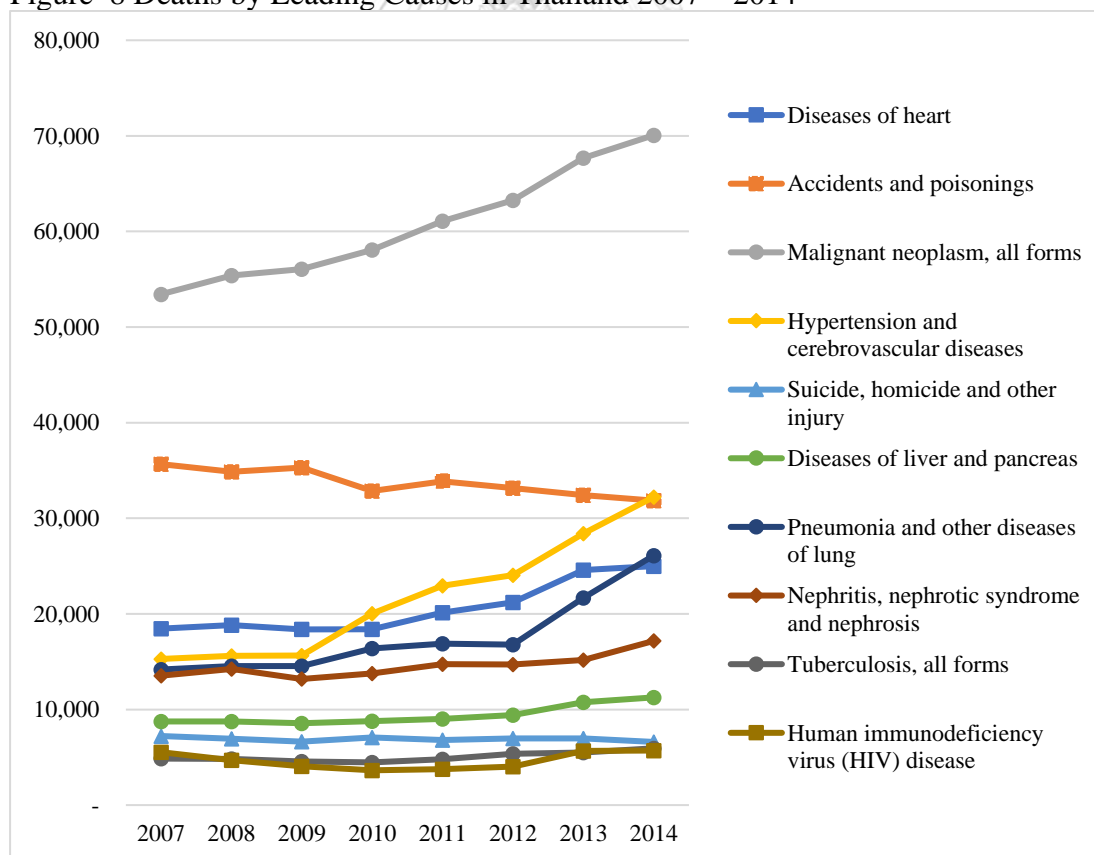
Lethal incident statistics illustrate increasing number of deaths from 2010 to 2019. In Figure 7, each year, male deaths were greater than female deaths, and the trend is observed to remain the same. Figure 8 illustrates leading causes of deaths in Thailand categorized per NSO are diseases of heart, accidents and poisonings, malignant neoplasm, hypertension and cerebrovascular diseases, suicide, homicide and other injury, diseases of liver and pancreas, pneumonia and other diseases of lung, nephritis, nephrotic syndrome and nephrosis, tuberculosis (all forms), human immunodeficiency virus (HIV) disease. These causes accounted 45 percent of total deaths in 2007 and greater than 50 percent in 2014.

Figure 7 Deaths of Thai People from 2008 – 2019



Source: National Statistical Office

Figure 8 Deaths by Leading Causes in Thailand 2007 – 2014



Source: National Statistical Office

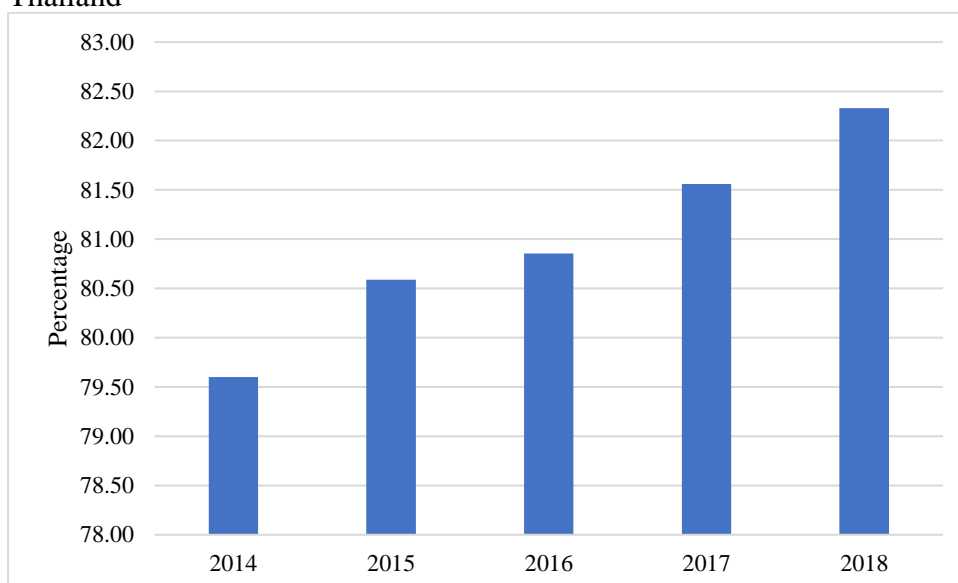
3.3 Education

Over decades, Thai government has been investing resources to manage, expand, and improve compulsory education. From 2000 to 2014, government investment in compulsory education increased more than twice. Each year, the budget for education accounted for 21 percent of total budget or 4.1 percent of GDP. In 2009, 15-year Free Education Program – FEP has implemented and been active until nowadays (Office of Basic Education Commission, The Faculty of Economics, Thammasat University, & UNICEF Thailand, 2017).

Office of the Basic Education Commission or OBEC implements policies stating that basic years of education covering 15 years from kindergarten to secondary education or high school. The duration of each stage of schooling are three years for kindergarten, 6 years for primary education, and another 6 years for secondary education. Policy IV in OBEC's policy 2020 focuses on ensuring equal opportunities and access to qualified and standardized education and reducing education gap across income level and regions. The expenses and resources for compulsory education are subsidized by the government to every child free of charge.

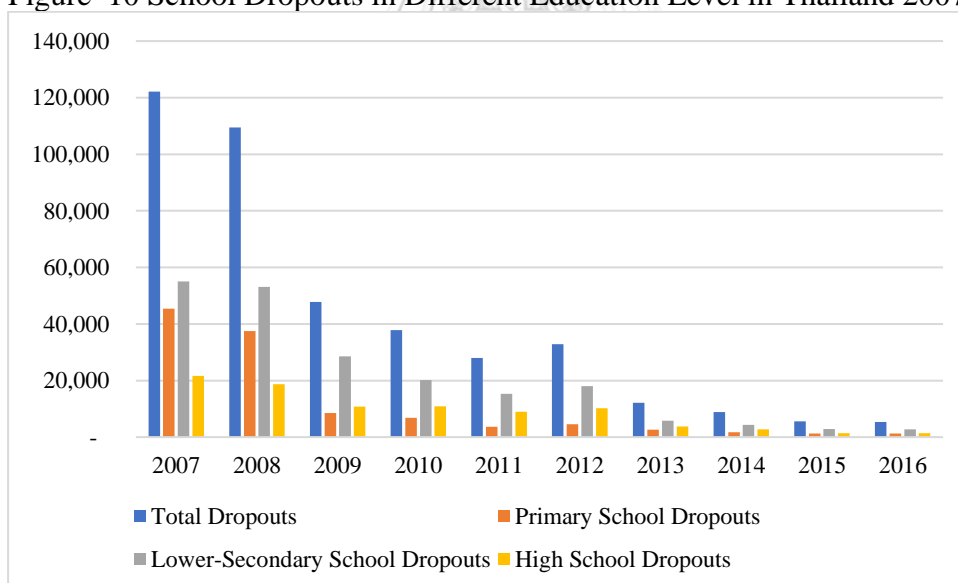
Figure 9 shows the overall school enrollment percentage has increased from 79.60 percent in 2014 to 82.33 percent in 2018. Figure 9 depicts the overall number of school dropouts in levels of education have been decreased since 2007 in formal education. It is worth to mention that among formal education services, students can alternatively opt for vocational and technical education which are considered as upper-secondary level.

Figure 9 Percentage of School Enrollment (Population Age 3 - 21 Years Old) in Thailand



Source: National Statistical Office

Figure 10 School Dropouts in Different Education Level in Thailand 2007 - 2016



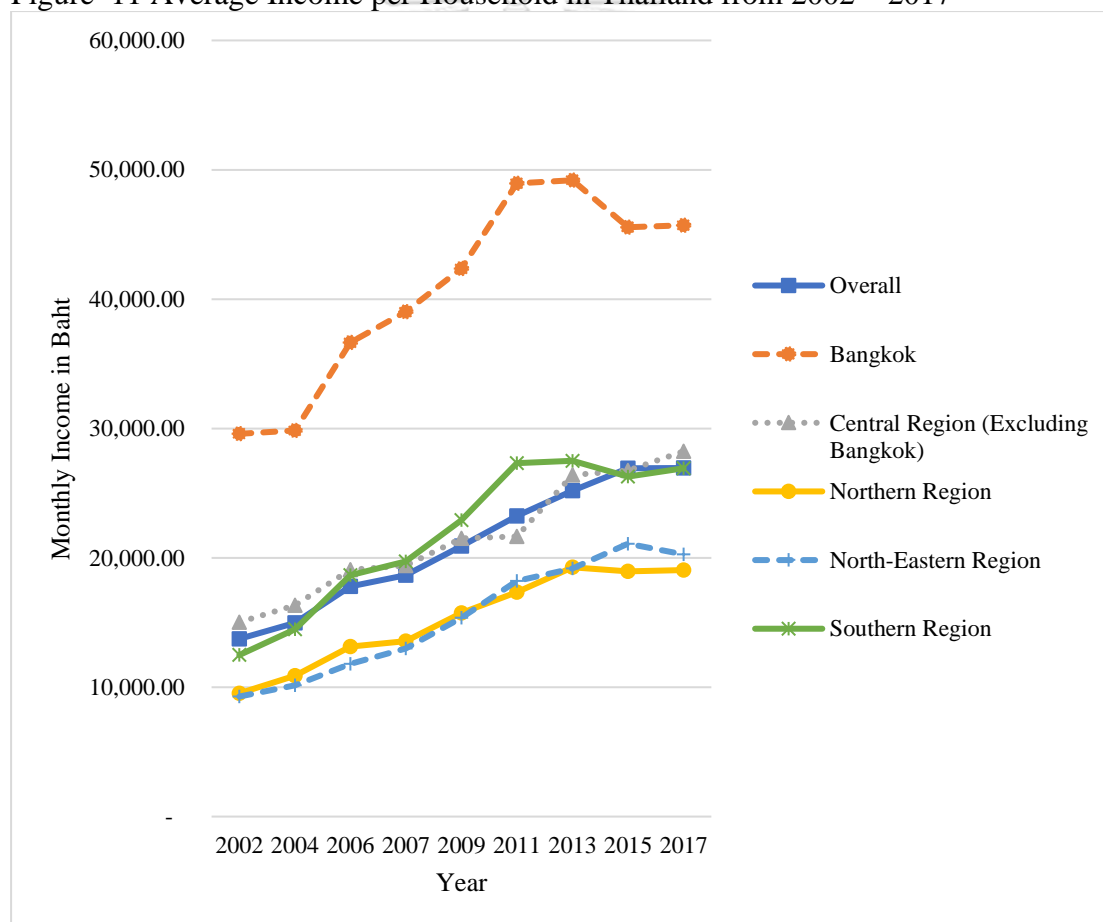
Source: National Statistical Office

3.4 Household income

Overall average income per household in Thailand almost double from 13,736 baht per household in 2002 to 26,946.43 baht per household in 2017. In Figure 11,

Central region and Southern region's average income are higher than Northern region and North-Eastern region in Thailand over a decade. In 2017, average income per household in Central region is the highest, while the lowest average income per household earned in North-Eastern region. Average income per household in Bangkok is the highest in Thailand. In 2002 and 2004, provinces with the lowest average income per household were in North-Eastern region which were Yasothon and Surin. Nevertheless, during 2006 to 2017, the provinces with the lowest average income per household were in Northern region including Mae Hong Son and Chiang Rai.

Figure 11 Average Income per Household in Thailand from 2002 – 2017



Source: National Statistical Office

3.5 Health

Currently Ministry of Public Health has divided health districted in Thailand into 13 districts. The first 12 districts cover 4 to 8 provinces with 4 to 6 million people in each district. The report claims that given size of health districted can benefit from economies of scale. The 13th district is solely Bangkok which indicates special characteristics of policies and management across ministries. Each health district is a group of nearby provinces which share similar characteristics such as geography and climate. In each health district, there are government organizations directly response to local health issues in each area. Those organizations are National Health Commission Office and National Health Security Office emphasizing integration mechanisms in local area (Ministry of Public Health, 2019).

Five general health indicators compose of life expectancy, health adjusted life expectancy, maternal mortality rate, infant mortality rate, and under-five mortality rate. Life expectancy at birth had increased overtime from 70.4 years for male and 77.5 years for female in 2010 to 72.6 years for male and 79.3 years for female in 2020. The same increasing trend applied for health adjusted life expectancy with the smaller number of years. In 2014, the adjusted life expectancy for male is 68.5 years and 74.2 years for female. While life expectancy signals the longer healthy life, maternal mortality rate has been increasing from 18.1 to 100,000 births in 2012 to 26.6 to 100,000 births across all regions of Thailand. Infant mortality rate and under-five mortality rate are quite stable at 6-7 to 1,000 babies and 8-9 to 1,000 children (Ministry of Public Health, 2019).

Table 5 lists first five leading sickness for Thais mostly are non-communicable diseases. Comparing 2012 to 2016, the primary hypertension or high blood pressure had been in the first rank with increment of the cases from 993,671 to 1.2 million. The second rank had changed from anemia in 2012 to diabetes in 2016, while the third rank was vice versa with a greater number of patients for both diseases in 2016. Renal failure or kidney failure patients increase from less than five hundred

thousand to more than seven hundred thousand within 3 years. Hence, it was ranked the fourth. Pneumonia became the fifth rank in 2016 with half a million of cases.

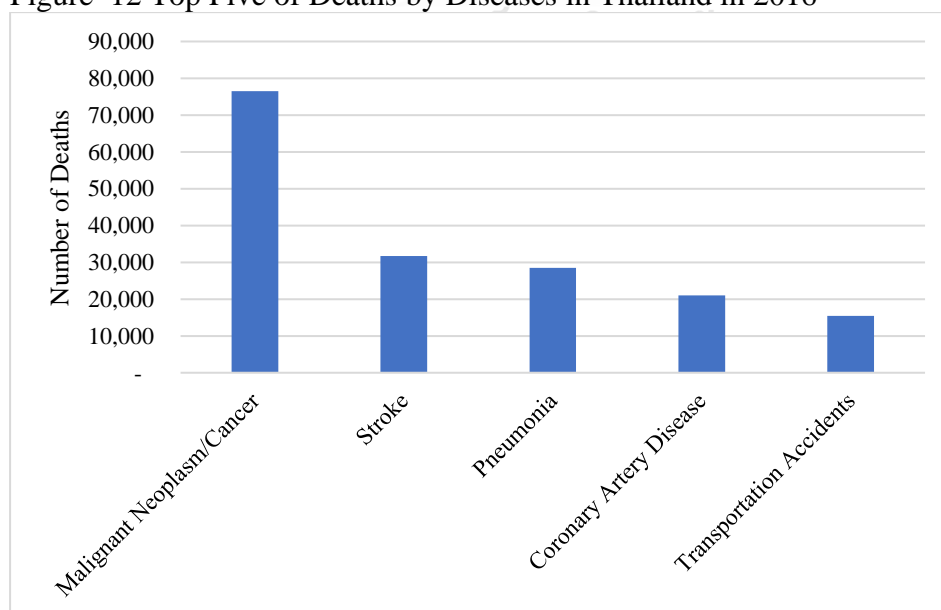
Table 5 Comparing Top Five of Diseases in Thailand in 2012 and 2016

Rank	Diseases	2012	Diseases	2016
1	Primary Hypertension/High Blood Pressure	993,671	Primary Hypertension/High Blood Pressure	1,295,968
2	Anemia	727,762	Diabetes	840,489
3	Diabetes	674,826	Anemia	775,171
4	Renal Failure/Kidney Failure	477,797	Renal Failure/Kidney Failure	710,477
5	Complications of Pregnancy	324,770	Pneumonia	514,823

Source: Ministry of Public Health

Five leading diseases that caused highest number of deaths comparing 2012 and 2016 were cancer, stroke, pneumonia, coronary artery disease, and transportation accidents. Overall, the number of deaths had increased. It is observed that cancer as the first rank caused more than twice as many as the second rank in 2016.

Figure 12 Top Five of Deaths by Diseases in Thailand in 2016

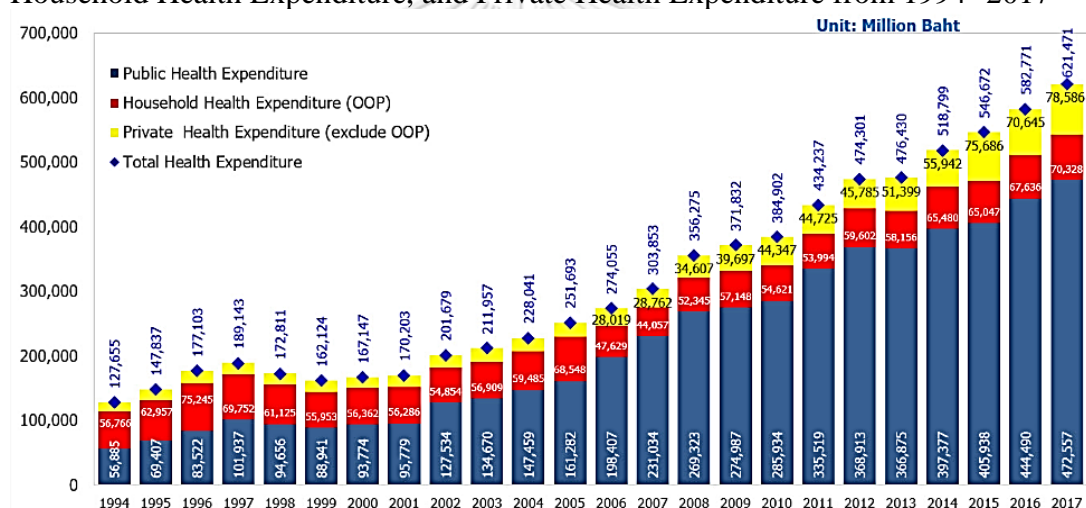


Source: Ministry of Public Health

3.6 Health expenditure

Total health expenditure has been increasing since 2002 as well as the public health expenditure. It is worth to point that National Health Security Office has established in 2002. Figure 13 shows that public health expenditure had increased from 127,534 million bath in 2002 to 472,557 million baht in 2017 which is more than triple over 15 years. Household health expenditure tended to be stable over periods of time, while public health expenditure has increased more than twice from 2006 to 2015.

Figure 13 Total Health Expenditure (million baht): Public Health Expenditure, Household Health Expenditure, and Private Health Expenditure from 1994 -2017



Source: National Health Security Office

3.7 Health coverage

National Health Security Office with the vision of “Everyone who lives in Thailand covered by Universal Health Coverage (UHC) and access to health care with confidence when needed” has implemented Universal Health Coverage in Thailand. Table 6 shows the population under health security schemes have been increasing from 2015 to 2019. Approximately 70 percent of total population are under Universal Coverage Scheme (UCS) under NHSO. The number of people under Social Security Scheme (SSS) has increased over the period. It accounts for 18.77 percent of total

population. Most of the population under UCS age 0 to 19 years. For working age (25 to 49 years), majority are under SSS. Population under Civil Servant Medical Benefit Scheme (CSMBS) cover wide range of age, especially over 40 years. Ninety-nine percent of the population are under UHC, while another 1 percent who are not comprised are prisoners, monks, dependent elders, people with disabilities, and minorities.

Table 6 Number of Thai population in all Health security scheme in Fiscal Year 2015-2019

Number of Thai Population in all Health security scheme in Fiscal Year 2015-2019	2015	2016	2017	2018	2019
Universal Coverage Scheme (UCS)	48,336,321	48,330,473	48,109,957	47,802,669	47,522,681
Social Security Scheme (SSS)	11,266,495	11,630,205	11,857,751	12,237,637	12,584,458
Civil Servant Medical Benefit Scheme (CSMBS)	4,836,208	4,742,823	4,939,627	5,053,330	5,149,480
Local Administrative Officers (LAOs)	611,982	615,157	607,577	625,316	625,823
Stateless People (STP)	400,333	384,592	381,881	377,713	521,835
Private School Teachers (PVT)	78,387	73,683	88,647	90,598	86,965
Disability Person in Social Security Schemes (DIS)	-	-	28,205	18,533	16,667
Qualified non-registered UCS	50,148	34,584	33,100	39,351	55,922
Total UHC Population	65,579,874	65,811,517	66,046,745	66,245,228	66,563,831
Total Population	65,956,318	66,278,204	66,537,112	66,778,323	67,048,312
Percentage of UHC Population to Total Population	99.43%	99.30%	99.26%	99.20%	99.28%

Source: National Health Security Office

Up to this point, health and death statistics demonstrate the significant number of Thai people who suffer from NCDs each year. Even NCDs are preventable with healthy habits, the number of NCD cases tends to increase over time. Among various ways to practice health-promoting behaviors and avert NCDs, regularly consumption of health promotion service such as health check-up, health consultation (for instance smoking, drinking, balance diet), vitamin supplements consumption, etc. can reduce risk of NCDs. These actions not only allow a person to check-up the current health status, but also let the individual to cope with health problems on time which results in reduction of illness and improve overall welfare of the society.

Demographic and socio-economic background shown in previously mentioned statistics depict variety of characteristics among Thai population. From the aspect of health and wellbeing, only few percentages of health care expenditure are spent for health promotion. Therefore, identifying factors affecting health promotion service consumption in Thailand considering these characteristics can offer the solid proofs to be concerned when creating effective regulations and fruitful policy implementation.



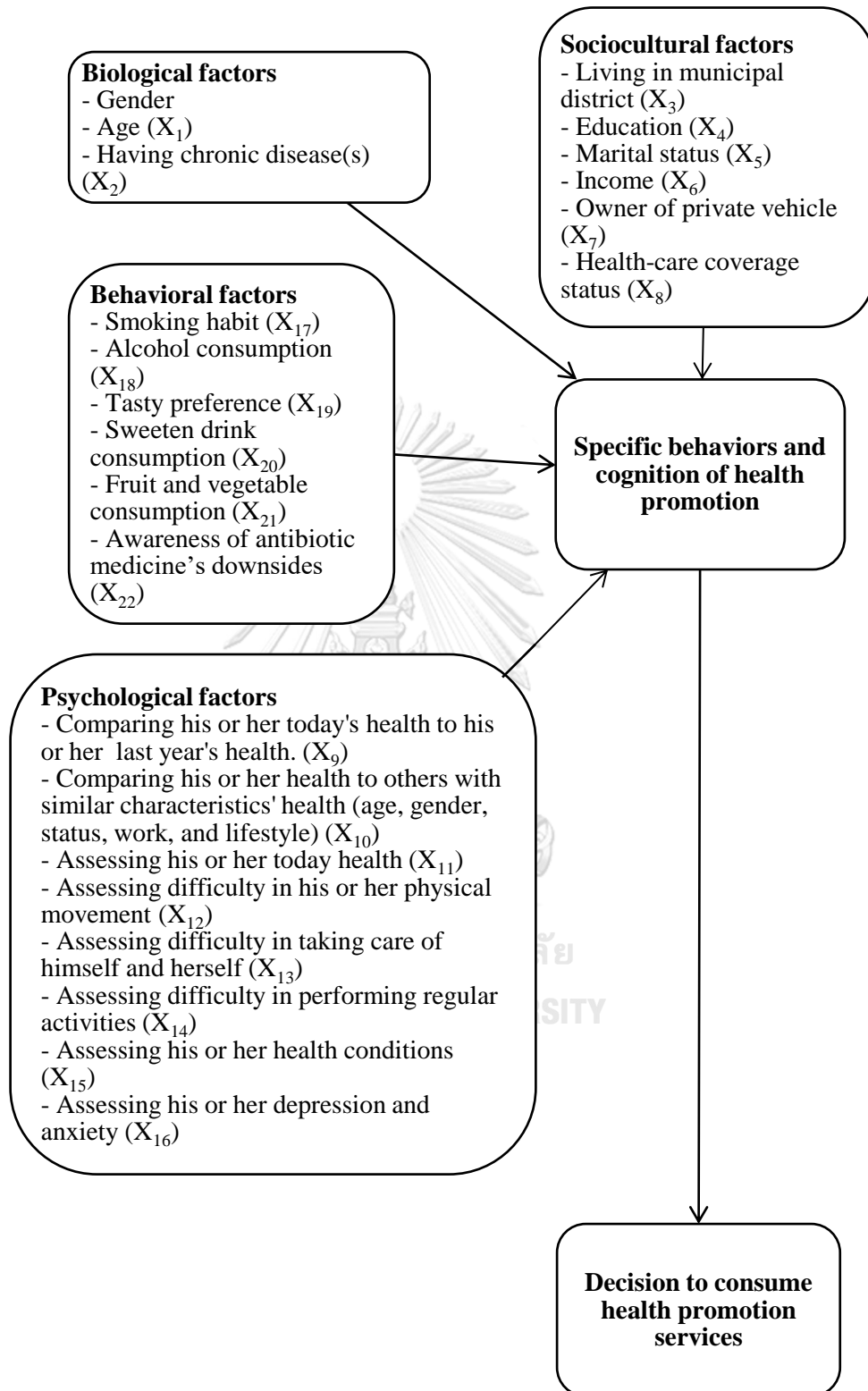
Chapter 4 METHODOLOGY

In this chapter, the methodology of the research is explained in various aspects including conceptual framework, sample, and model.

4.1 Conceptual Framework

In this study, a number of selected factors related to individual characteristics and experience components from HPM (Pender et al., 2011) are examined their relationship with health promotion service consumption applying quantitative approach and binary logistics regression. The linkage of biological and sociocultural factors, behavioral factors, and psychological factors to health promotion behavior is explained by Pender's health promotion model. The factors of interest in this study are showed in Figure 14.

Figure 14 Conceptual Framework of the study



4.2 Data Collection

4.2.1 Sampling procedure

The study applies national-level, secondary data collected by NSO (National Statistical Office) under Ministry of Digital Economy and Society in 2015. The sample survey method was stratified two – stage sampling using province as stratum. 77 provinces were identified as 77 strata. In addition, each stratum was divided into municipal areas and non-municipal areas. All members from 55,920 sample households were interviewed with a questionnaire. Total of 148,430 samples were collected given 113,882 samples aged more than 15 years old. All the interviews are conducted during March and April 2015.

There are 31,457 samples collected from Northern region, 39,980 samples from Northeastern region, 25,655 samples from Southern region, and 51,338 samples from Central. The number of samples from each region shows in Table 7.

Due to limitation of data available and collection procedure of some interested factors such as fruit and vegetable consumption, knowledge about antibiotic medicine, and self-assessment, the samples which are employed to the model aged more than 15 years old.

Table 7 The number of samples from each region

Regions/province	Total samples	Samples aged more than 15 years old
Northern region	31,457	25,058
Northeastern region	39,980	30,471
Southern region	25,655	19,085
Central region	51,338	39,268
Total samples	148,430	113,882

Health promotion service choices on the questionnaire for people who aged more than 15 years old include annual medical check-up, diabetes screening test, hypertension screening, cervical cancer screening test, consultations about changing unhealthy behaviors (such as balance diet, smoking cessation, stop alcohol drinking), vaccination, dental preventive care, intaking supplements, family planning services, antenatal care, puerperium care, and others.

4.2.2 Tools

The survey instrument employed is an interviewer administered questionnaire which consists of 10 sections including general characteristic section, health care coverage section, illness and medical care section, health need section, exercise section, smoking and drinking section, health and mental section, food consumption section, knowledge about antibiotic medicine section, and household characteristic section where health and mental section, food consumption section, knowledge about antibiotic medicine section are collected from samples who aged more than 15 years old.

4.3 Methodology

The study can be divided into 2 main sections integrating descriptive statistics to depict characteristics of collected data, and inferential statistic employing logit model in order to determine factors affecting health promotion service consumption in Thailand. It is worth to note that logit models are utilized more often than the probit models in health economic literatures (Supakankunti, Adhikari, & Khan, 2015).

4.3.1 Descriptive Analysis

To study and summarize health promotion service consumption behavior in Thailand at an aggregate level, this study applies descriptive statistics such as central tendency, variability, range, and percentage along with different techniques of data visualization including tables and charts.

4.3.2 Variables

Biological factors, sociocultural factors, psychological factors, and behavioral factors are included in the model to determine the significant factors affecting health promotion service consumption in Thailand. Decision to consume health promotion services is defined as the dependent variable in the model. The independent variables are the factors which are expected to influence health promotion service consumption. Some factors are from review of previous researches relating to health-related habits and health promoting behaviors involving gender, age, having chronic disease(s), education, marital status, income, health-care coverage status, smoking, alcohol consumption, and area of living. The other factors of interest that are added to the model in this study are, ownership of a private vehicle, taste preference, sweeten drink consumption, fruit and vegetable consumption, awareness of antibiotic and medicine's downsides. For psychological factors, scores on several self-assessments are used as proxies of an individual's believe across aspects of his or her health. It is worth to note that male and female models are analyzed separately due to biological differences and available services.

$$y = f(x_i) \quad \text{where } i = 1-22$$

Given

y represents decision to consume health promotion services (HPS)

Biological factors

x_1 represents age (AGE)

x_2 represents having chronic disease(s) (CHD)

Sociocultural factors

x_3 represents living in municipal district (AREA)

x_4 represents education (EDU)

x_5 represents marital status (MRS)

x_6 represents income (INC)

x_7 represents ownership of a private vehicle (VEH)

x_8 represents health-care coverage status (HCC)

Psychological factors

x_9 represents score from comparing his or her today's health to his or her last year's health (SEY)

x_{10} represents score from comparing his or her health to others with similar characteristics' health such as age, gender, status, work, and lifestyle (SES)

x_{11} represents score from assessing his or her today health (SEC)

x_{12} represents score from assessing difficulty in his or her physical movement (SEM)

x_{13} represents score from assessing difficulty in taking care of himself or herself (SET)

x_{14} represents score from assessing difficulty in performing regular activities (SEA)

x_{15} represents score from assessing his or her health conditions (SEI)

x_{16} represents score from assessing his or her depression and anxiety (SED)

Behavioral factors

x_{17} represents smoking (SMK)

x_{18} represents alcohol consumption (ALC)

x_{19} represents tasty preference (TSP)

x_{20} represents sweeten drink consumption (SWD)

x_{21} represents fruit & vegetable consumption (FVC)

x_{22} represents awareness of antibiotic medicine's downsides (AMD)

The details of components in the model are explained as follows.

1. Decision to consume health promotion service

The dependent variable (HPP) is coded as 1 when an individual had consumed any health promotion services during the last 12 months and coded as 0 if otherwise. The types of health promotion services cover annual medical check-up, diabetes screening test, hypertension screening, cervical cancer screening test, consultations about changing unhealthy behaviors (such as balance diet, smoking cessation, stop alcohol drinking), vaccination, dental preventive care, intaking supplements, family planning services, antenatal care, and puerperium care.

2. Biological factors

Due to gender differences, especially biological structure, available health promotion services are different for male and female. The examples from the collected data are cervical cancer screening test, antenatal care, and puerperium care which can be utilized only by female. Therefore, the study treated male and female in separate models.

As an individual becomes older over years, body's condition deteriorates. Therefore, the attention is required to deal with potential health problems. Furthermore, the experience gain over years should offer insights to elder citizens on how to take care of their own health. However, "old habits die hard" reflects that it is difficult to change an individual's behaviors as time passed. Hence, some health promoting behaviors are easier to be cultivated in younger generation.

Status of having any chronic diseases signaled the need of medical care. Hence, it potentially leads to other aspect of health care and health promoting behaviors to prevent the worsen of health condition.

3. Sociocultural factors

Living in municipal district is expected to have more facilities to ease health promotion service consumption than living outside municipal area. The example of facilities are hospitals, clinics, local health centers, and mode of transportation.

Education can shape a person's perspective toward living and lifestyle. In addition, opted choices or decision made for any actions are count. Thus, the higher level of education, the higher chance that an individual obtains more information in various aspects. Perception and analysis which affect decision regarding to short-term and long-term goals are guided. To be more specific, education is served as a building block for an individual's attitude toward health promotion which had been proved across studies.

In general, marriage can lead to family planning which extend the scope of health promotion services to include family planning, antenatal care, and puerperium care, so marital status is expected to impact the likelihood to consume health promotion services.

Income is a factor that directly influence ability to purchase any goods and services. Then, the higher the income, the higher the purchasing power is projected. Similar to any other normal goods and services, the increment of income is expected to associate with higher consumption of health promoting service. In other words, income elasticity of health promotion services is expected to be non-negative. To further extend, an individual with higher income not only be able to pay for explicit price of health promotion services but also hidden costs that may postpone the consumption of health promotion services due to financial priority such as shortage of cash on hand, transportation cost, and opportunity cost of wage.

Ownership of a private vehicle is included as a proxy of wealth of an individual. Furthermore, a private vehicle allows convenience visit to the health promotion service providers by eliminating the difficulty searching for alternatives modes of transportation. It implies the removal of one of the barriers when an individual decides to utilize health promotion services.

Health-care coverage shares health promotion services cost with an individual who are under the coverage. It helps an individual to alleviate financial burden from spending related to health either fully or partially depending on programs and regulations. Consequently, out-of-pocket expenditure of utilizing health promotion services which is perceived by insurance-covered consumers is lower than the service provider's initially charged price.

4. Psychological factors

Psychological factors used to investigate attitude toward his or her own health. Scores from various self-assessments are employed as proxies of health-related psychological factors in this study. For the first 3 self-assessments including comparison of his or her health across time, comparison of his or her health with other people's health, and assessment of his or her today health, 1 is for the worse condition, and 5 is for the healthiest status. Overall, these self-assessments are used as proxies of self-esteem and perceived health status. The rest of self-assessments are proxies of perceived health problems, 1 is for no health problem, and 5 is for the most severe health issues. The assessments involve movement difficulty, self-caring difficulty, performing daily activities, health conditions, and depression and anxiety.

- Score from comparing his or her today's health to his or her last year's health is used to be a proxy for self-esteem or how an individual thinks about his or her health across time.
- Score from comparing his or her health to others with similar characteristics' health (such as age, gender, status, work, and lifestyle) is used to be a proxy for self-esteem or how an individual thinks about his or her health comparing with others.
- Score from assessing his or her today health is used to be a proxy for perceived health status at present or how good is an individual's health from his or her perspective.

- Score from assessing difficulty in his or her physical movement is used to be a proxy of an individual's perceived health status in the aspect of mobility.
- Score from assessing difficulty in taking care of himself or herself is used to be a proxy of an individual's perceived health status in the aspect of self-caring.
- Score from assessing difficulty in performing regular activities is used to be a proxy of an individual's perceived health status in the aspect of physical activities.
- Score from assessing his or her health conditions is used to be a proxy of an individual's perceived health status in the aspect of illness.
- Score from assessing his or her depression and anxiety is used to be a proxy of an individual's perceived health status in the aspect of self-esteem.

5. Behavioral factors

Smoking adversely relates to health promotion habits. It is mentioned to be one of the causes of NCDs. Harmful chemicals are directly taken into the body through respiratory system. Despite the undesirable impacts on health, smoking is an intentionally habit, at least in the beginning. Moreover, cigarettes contain an addictive substance named nicotine which worsens attempts when a smoker wants to quit. In case a smoker intends to quit, smoking cessation program is available to be joined which is considered as one of health promotion services.

Alcohol consumption drawbacks do not limit to over intake and physical reactions, but reckless behaviors under alcohol effects which put a person's health at risk and oppose to health-promoting habits by losing control over one's health conditions. Consequences of being a hard drinker lead to physical and mental problems. NCD is one of them. To put an end to alcoholic drink, an individual may seek for a type of health promotion service called treatments of alcoholism to overcome alcohol addiction.

The tastier the food, the higher tendency that an individual overtake a certain kind of seasoning and spices for example salt, fish sauce, sugar, vinegar, and chili powder. Over ingestion of them potentially lead to imbalance and unhealthy diet causing body's malfunction. On one side, an individual who have no conscious regarding to full-flavored food to health status may not seek for health promotion services. On the other hand, an individual who had not concerned for intense flavor preference may develop symptoms and seek for health promotion services to tackle with problems before developing into NCDs.

Sweeten drink is sugar enrichment. Frequent consumption of sweeten drink leads to risk factors which highly possible to develop to health problems such as overweight, high blood glucose, and unhealthy diet. These characteristics are root causes of NCDs. However, there are health promotion services to help an individual to change their habits such as behavioral change consulting. On the other hand, an individual who is cautious about their health can utilize screening test whether his or her level of sugar consumption has led to health problems.

Fruit and vegetable consumption favor health promotion behaviors. Fruit and vegetable are enriched natural resources for vitamins, minerals, and fiber to maintain proper body's functions. Having fruit and vegetable in proper proportion on daily basis can reflect health-concerned habits. Furthermore, to ensure or enhance amount of vitamins and mineral intake, an individual may seek for consultation and dispensing of supplements from health promotion service providers.

Awareness of antibiotic medicine's negative impacts is one of the indicators to measure an individual's health-literacy. Accordingly, an individual who is aware of antibiotic medicine's downsides more or less signals health concerns. Knowledge about antibiotic disadvantages can discourage an individual to take antibiotic medicine. Thus, to avoid frequent intake of antibiotic medicine, an individual feasibly lean toward health risk avoidance habits and expected to be interested in health promotion services.

4.3.3 Logit Model

To study the determinants of decision to consume health promotion services, logistic regression is applied to conduct a binary-choice model or a logit model. The dependent variable in the model is qualitative and dichotomous which is coded as 0 or 1. Precisely, the dependent variable is coded as 1 when an individual has consumed health promotion services within the last 12 months and coded as 0 if otherwise. The study treated male and female in separate models. Due to biological differences, choices of utilized health promotion services on the collected data were different. Cervical cancer screening test was a for-instance.

Difference from simple or multiple regression analysis in which the relationship between dependent and independent variables can be directly written in a form of linear equation, the logistic regression presents the relationship between the probability of the dependent variable equal to 1, or the chance of occurrences for interested events. The explanatory variables in a form of nonlinear equation are shown in equation (4.1).

$$P(y = 1|X_1, X_2, \dots, X_p) = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p}} \quad (4.1)$$

For ease of exposition, equation (4.1) can be rewritten as follows.

$$P = \frac{e^Z}{1 + e^Z} \quad (4.2)$$

From equation (4.2), P is the probability, ranging from 0 to 1, while Z ranges from $-\infty$ to $+\infty$. As $Z \rightarrow -\infty$, $P \rightarrow 0$, and as $Z \rightarrow +\infty$, $P \rightarrow 1$. The next step is to transform equation (4.2) to logit model which relies on the concept of odds. Odds is calculated using the probability of the event of interest which will occur, then it is divided by the probability the event of interest will not occur, given the same set of independent values. The odds in a favor of $y = 1$ can be written as follows.

$$\begin{aligned} \text{Odds} &= \frac{P(y=1|X_1, X_2, \dots, X_p)}{P(y=0|X_1, X_2, \dots, X_p)} = \frac{P(y=1|X_1, X_2, \dots, X_p)}{1 - P(y=1|X_1, X_2, \dots, X_p)} \\ &= e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p} \end{aligned} \quad (4.3)$$

By taking natural logarithm on both sides of equation (4.3), the logit model can be obtained and written as shown in equation (4.4).

$$\ln(\text{odds}) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p \quad (4.4)$$

Therefore, the logit model for health promotion consumption is written as:

$$\begin{aligned} Z = \ln\left(\frac{P_i}{1-P_i}\right) &= \beta_0 + \beta_1 AGE_i + \beta_2 CHD_i + \beta_3 AREA_i + \beta_4 EDU_i + \\ &\beta_5 MRS_i + \beta_6 INC_i + \beta_7 VEH_i + \beta_8 HCC_i + \beta_9 SEY_i + \beta_{10} SES_i + \\ &\beta_{11} SEC_i + \beta_{12} SEM_i + \beta_{13} SET_i + \beta_{14} SEA_i + \beta_{15} SEI_i + \beta_{16} SED_i + \\ &\beta_{17} SMK_i + \beta_{18} ALC_i + \beta_{19} TSP_i + \beta_{20} SWD_i + \beta_{21} FVC_i + \beta_{22} AMD_i + \\ &\epsilon_i \end{aligned} \quad (4.5)$$

Where P is the probability that an individual who consumed health promotion service during last 12 months. AGE represents age, CHD represents the status of having chronic disease(s), AREA represents living in municipal district, EDU represents education, MRS represents marital status, INC represents income, VEH represents the ownership of a private vehicle, HCC represents health-care coverage status, SEY represents the score from comparing his or her today's health to his or her last year's health, SES represents the score from comparing his or her health to others with similar characteristics' health (age, gender, status, work, and lifestyle), SEC represents the score from evaluating his or her today health, SEM represents the score from evaluating difficulty in his or her physical movement, SET represents the score from evaluating difficulty in taking care of himself or herself, SEA represents the score from evaluating difficulty in performing regular activities, SEI represents the score from evaluating his or her health conditions, and SED represents the score from evaluating his or her depression and anxiety, SMK represents smoking, ALC

represents alcohol consumption, TSP represents tasty preference, SWD represents sweetened drink consumption, FVC represents fruit and vegetable consumption, AMD represents awareness of antibiotic medicine's downsides. i denotes the observation 1, 2, 3, ..., n in sample. ε is an error term. Table 8 summarizes the measurement of independent variables. Their expected signs and explanations are described in Table 9.

Table 8 Independent Variables Measurement

Variable name	Variable definition	Variable descriptions
Biological factors		
AGE	Age	Years of living
CHD	Having chronic disease(s)	1 = Having chronic disease(s), 0 = Otherwise
Sociocultural factors		
AREA	Living in municipal district	1 = Living in municipal district, 0 = Otherwise
EDU	Education	1 = Completing high school or equivalent degree, 0 = Otherwise
MRS	Marital status	1 = Married, 0 = Otherwise
INC	Income	Monthly income in THB
VEH	Ownership of a private vehicle	1 = Own at least 1 road vehicle (including private car, pick-up truck, and motorcycle), 0 = Otherwise
HCC	Health-care coverage status	1 = Under health-care coverage status, 0 = Otherwise
Psychological factors		
SEY	Comparing his or her today's health to his or her last year's health.	1 = much worse, 2 = worse, 3 = same, 4 = better, 5 = much better
SES	Comparing his or her health to others with similar characteristics' health (age, gender, status, work, and lifestyle)	1 = much worse, 2 = worse, 3 = same, 4 = better, 5 = much better
SEC	Assessing his or her today health	1 = very unhealthy, 2 = unhealthy, 3 = fair, 4 = healthy, 5 = very healthy
SEM	Assessing difficulty in his or her physical movement	1 = no problem, 2 = few problems, 3 = some problems, 4 = lots of problems, 5 = cannot move/walk

SET	Assessing difficulty in taking care of himself or herself	1 = no problem, 2 = few problems, 3 = some problems, 4 = lots of problems, 5 = cannot practice self-caring
SEA	Assessing difficulty in performing regular activities	1 = no problem, 2 = few problems, 3 = some problems, 4 = lots of problems, 5 = cannot perform regular activities
SEI	Assessing his or her health conditions	1 = no symptom, 2 = mild symptom(s), 3 = moderate symptom(s), 4 = severe symptom(s), 5 = very severe symptom(s)
SED	Assessing his or her depression and anxiety	1 = not at all, 2 = minor problem, 3 = moderate problem, 4 = significant problem, 5 = major problem
Behavioral factors		
SMK	Smoking	1 = Smoking at least a day per week, 0 = Otherwise
ALC	Alcohol consumption	1 = Being considered as a heavy drinker during past 12 months, 0 = Otherwise
TSP	Tasty preference	1 = Adding extra-seasoning, 0 = Otherwise
SWD	Sweetened drink consumption	1 = Consuming at least a bottle/box/can/glass of sweetened drink per day, 0 = Otherwise
FVC	Fruit and vegetable consumption	1 = Consuming at least a ladle of fruit and vegetable per day, 0 = Otherwise
AMD	Awareness of antibiotic medicine's downsides	1 = Being aware of antibiotic medicine's downsides, 0 = Otherwise

Table 9 Independent variables expected sign or relationship with health promotion service consumption

Variable definition	Expected signs	Variable descriptions
Biological factors		
Age	+/-	Age is expected to have either positive or negative relationship with health promotion service consumption. As time passes, an individual experiences different stages of body function and learn how to tackle health problems or improve control over health condition. Thus, the older person tends to be aware of health promotion service benefits which lead to decision to consume health promotion services. Nonetheless, it is also possible that the older person insists on his or her unhealthy habits,

		so he or she does not seek for health promotion services to improve control over health conditions.
Having chronic disease(s)	+	Positive relationship is expected. Having chronic disease(s) signaled the essential of medical care, so it potentially leads to other aspect of health care and health promoting to prevent the worsen of health condition.
Sociocultural factors		
Living in municipal district	+	Positive relationship is expected. There are facilities in municipal area to ease health promotion service consumption.
Education	+	Positive relationship is expected. Education can improve the person's health-literacy. The stronger health literacy, the higher tendency that the person perceives health promotion services and opts for them.
Marital status	+	Positive relationship is expected. Marriage can extend the scope of health promotion services to include family planning, antenatal care, and puerperium care.
Income	+/0	Income is expected to have either positive or no relationship with health promotion service consumption. Income is expected to have positive relationship with health promotion practices by giving an individual purchasing power to consume health promotions services.
		However, some type of health care coverage programs allows an individual to utilize health promotion services with partial or no explicit cost, so income is suspected to have no relationship with health promotion service consumption.
Ownership of a private vehicle	+	Positive relationship is expected. It is a proxy of wealth and encourages health promotion service usages by removing one of the transportation barriers.
Health-care coverage status	+/0	Health-care coverage is expected to have either positive or no relationship with health

promotion service consumption.

Health promotion service's cost to an individual who is under health-care coverage status either partially or fully covered by the program. With lower perceived price of health promotion services, an individual is motivated to consume more health promotion services.

However, it can be expected to have no relationship with health promotion service consumption since majority of Thai people are under health-care coverage.

Psychological factors		
Assessing his or her today's health to his or her last year's health.	+	Positive relationship is expected. The higher of healthy score, the better healthy practices had been committed which probably included health promotion service consumption.
Comparing his or her health to others with similar characteristics' health (age, gender, status, work, and lifestyle)	+	Positive relationship is expected. The higher of healthy score, the better healthy practices had been committed which probably included health promotion service consumption.
Assessing his or her today health	+	Positive relationship is expected. The higher of healthy score, the better healthy practices had been committed which probably included health promotion service consumption.
Assessing difficulty in his or her physical movement	-	Negative relationship is expected. The worse physical movement, the longer health caring had been neglected as well as health promoting behaviors.
Assessing difficulty in taking care of himself or herself	-	Negative relationship is expected. The worsen self-caring, the lowered interest in health promotion service consumption.
Assessing difficulty in performing regular activities	-	Negative relationship is expected. The worse ability to perform regular activities, the longer health caring had been neglected as well as health promoting behaviors.
Assessing his or her health conditions	+	Positive relationship is expected. The more severe the illness, the more medical attention is required, so it potentially leads to other aspect of health care and health promoting to

		prevent the worsen of health condition.
Assessing his or her depression and anxiety	-	Negative relationship is expected. The more depressed the person, the higher chance that health caring had been neglected as well as health promoting behaviors.
Behavioral factors		
Smoking	-/+	Negative relationship is expected since smoking is harmful to health which provides opposite results to health promotion services. It shows negligence of health caring. Nonetheless, it can be positive if an individual is seeking for smoking cessation service.
Alcohol consumption	-/+	Negative relationship is expected since habit of alcohol abuse worsen health which implies negligence of health caring. Nonetheless, it can be positive if an individual is seeking for stop drinking consultation.
Tasty preference	-/+	Negative relationship is expected since adding too much seasoning implying careless health behavior. Nonetheless, positive relationship can be expected in case an individual realizes his or her unhealthy diet and demands for health promotion service to tackle with possible health problems.
Sweetened drink consumption	-/+	Negative relationship is expected because excess of sugar consumption infers overlook of health care issues. Nonetheless, an unhealthy individual who suffers from unhealthy habits may seek for health promotion service to cope with signaling health problems.
Fruit and vegetable consumption	+	Positive relationship is expected. Daily consumption of fruit & vegetable infers awareness of its advantages on health. Therefore, interest of their benefits on health

	increases tendency of health promotion service consumption.
Awareness of antibiotic medicine's downsides +	Positive relationship is expected. Acknowledge downsides of antibiotic reveals a proxy of health literacy and interest toward health care.

Since fundamental characteristics of Thai citizens can greatly vary from one region to another, the dataset is classified into 4 groups by regions including Northern region, Northeastern region, Southern region, and Central region. This study applies equation (4.5) to 5 different estimation scenarios, one for each region, and the whole country combined. Hence, there are 5 models for male and 5 models for female.

Unlike linear regression analysis which estimates coefficients by Ordinary Least Squares (OLS), the logit model estimates coefficients by maximum likelihood. Z statistic is employed to test statistical significance of each coefficient in the model. For joint hypothesis of all coefficients, likelihood ratio (LR) statistic is applied with the null hypothesis of all coefficients equal to zero. LR statistic follows χ^2 distribution with degree of freedom equal to number of explanatory variables. McFadden R^2 , which ranges from 0 to 1, measures goodness of fit for the model. It can be calculated as equation (4.6):

$$McFadden R^2 = 1 - \frac{\ln(LLF_{ur})}{\ln(LLF_r)} \quad (4.6)$$

Where LLF_{ur} is the unrestricted log likelihood function where all regressors are included in the model and LLF_r is the restricted log likelihood function where only the intercept is included in the model (Gujarati, 2004).

The results from the logit model can be interpreted by odds ratio and marginal effects.

Odds Ratio: The odd ratio measures the effect on the odds of a one-unit increase in only one of the independent variables. In the other words, odd ratio is the odds that $y = 1$ given one-unit increase in an independent variable ($odds_1$) divided by

the odds that $y = 1$ given no change in the value of the independent variable ($odds_0$). Hence, a relationship between odds ratio and regression coefficient (β_i) for each independent variable can be shown as:

$$\text{Odds Ratio} = \frac{odds_1}{odds_0} = e^{\beta_k} \quad (4.7)$$

Marginal Effect: From equation (4.5), the signs in front of coefficients solely determine the direction of relationship between independent and dependent variables. Positive sign implies an increase in the independent variable will lead to higher probability. In contrast, a negative sign suggests an increase in the independent variable will reduce the probability. In order to observe the magnitude, marginal effect is applied. For explanatory and continuous variables, coefficients indicate the effects of a one-unit change in the variable on the probability of an occurrence of events under the dependent variable. For explanatory and qualitative variables, marginal effect is measured difference in the probability of the interested events' occurrence given different categories under the independent variable.

However, the coefficients from equation (4.5) cannot be directly interpreted as the marginal effects. For the logit model, the marginal effect can be observed from taking derivative of the function. The mathematical expression can be written as:

$$\frac{\partial P_i}{\partial X_k} = \frac{e^Z \beta_k}{(1+e^Z)^2} \quad (4.8)$$

Alternatively, it can be rewritten as:

$$\frac{\partial P_i}{\partial X_k} = \beta_k P_i (1 - P_i) \quad (4.9)$$

From equation (4.8) and (4.9), the marginal effects are observed to vary and do not only depend on the values of coefficient, β_k , but is also influenced by other independent variables through the probability, P_i . The estimation method is to assume

the values of other variables to be equal to mean of samples. This would yield the value of marginal effects at the average. This study applies the marginal effects to interpret the results from the logit models.

In addition to the logit models, Backward stepwise selection by Wald statistic is exploited to select explanatory variables in the model. The procedure is to run the regression with all explanatory variables in the models first. Then, a variable whose p-value exceeds 0.1, given 10% significance level, and is the highest is excluded from the model. The model with the remaining regressors is then estimated again. The procedure repeats until all regressors are statistically significant at 10% significance level.

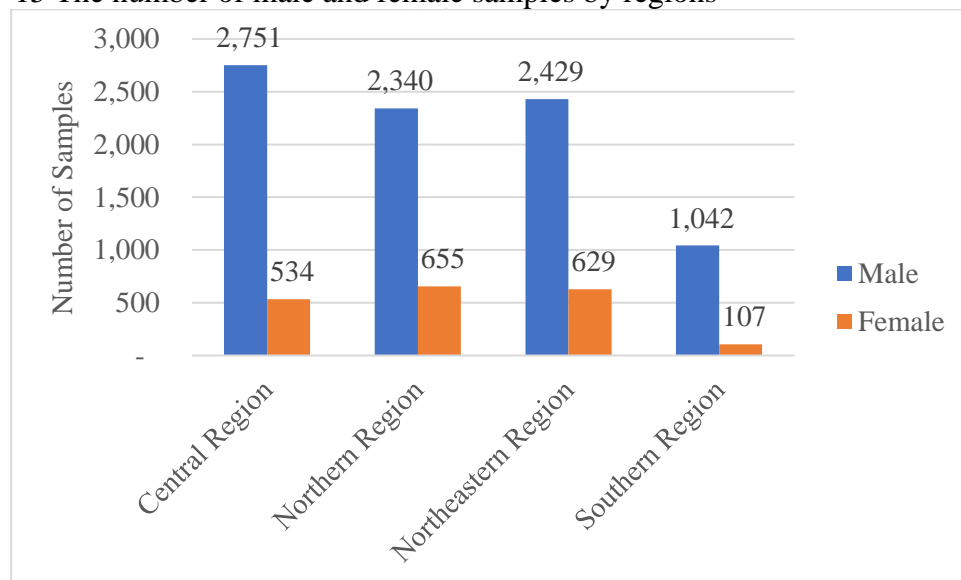


Chapter 5 RESULTS

5.1 Descriptive statistics

After exclusion of missing data and outliers, the analysis utilized total 10,487 respondents which consists of 8,562 men and 1,925 women across regions in Thailand. Given 8,562 male and 1,925 female samples in this study, 95 percent confidence interval is applied (Kanjanaawasee, 2004).

Figure 15 The number of male and female samples by regions



The average age of male respondents are 48.04 years old and 45.58 years old for female. Minimum age of both genders from the sample is 16 years old while the maximum age is 84 years old. The standard deviation is 12.93 years old for male and 12.68 years old for female.

Average monthly income for men and women equals to 9,862.93 baht and 8,342.66 baht respectively with the minimum of none and the maximum of 30,000 baht. The standard deviation is 6,979.04 baht for male and 6,429.32 baht for female.

17.13 percent of male samples and 22.23 percent of female samples suffer from chronic diseases. 55.08 percent of male samples and 59.95 percent of female samples live in municipal area. 27.96 percent of male samples and 30.18 percent of female samples graduate high school or equivalent degree. 75.48 percent of male

samples and 50.86 percent of female samples are married. 92.10 percent of male and 89.82 percent of female own at least a private road vehicle. 98.97 percent of male samples and 99.58 percent of female samples are under health-care coverage.

Average self-assessment scores for male and female are illustrated in Table 11. Each self-assessment scale ranges from 1 to 5 points. No. 1 to No. 3 indicate healthier features as a score increases while No.4 to No. 8 represent worse conditions for a unit of increment. In general, the average scores of male and female are close to each other. Even though both groups believe to have fair health status, women average assessment on health condition and depression score are worse than men by approximately 0.05.

For behavioral factors, 53.15 percent of male samples and 8.57 percent smoke at least a day per week. 84.92 percent of male samples and 70.86 percent are considered as heavy drinkers during past 12 months. 63.65 percent of male samples and 60.57 percent of female samples add extra-seasoning in their food. 5.90 percent of male samples and 4.99 percent of female samples consume at least a bottle/box/can/glass of sweetened drink per day. 94.58 percent of male samples and 95.53 percent of female samples consume at least a ladle of fruit and vegetable per day. 64.54 percent of male samples and 67.22 female samples are aware of antibiotic medicine's downsides.

Table 10 Average self-assessment scores for male and female across aspects

No.	Self-assessment	Male	Female
1.	Comparing your today's health to your last year's health.	2.96	2.98
2.	Comparing your health to other people with similar characteristics' health	3.11	3.12
3.	Evaluating your today health	3.56	3.58
4.	Evaluating difficulty in your physical movement	1.12	1.13
5.	Evaluating difficulty in taking care of yourself	1.05	1.04
6.	Evaluating difficulty in performing regular activities	1.06	1.06
7.	Evaluating your health conditions	1.16	1.21
8.	Evaluating your depression and anxiety	1.15	1.21

12.64 percent of male respondents and 22.29 percent of female respondents consume health promotion service at least a time during past 12 months.

Health promotion services utilized by the samples for their last 2 visits are showed in Table 11 and Table 12.

Table 11 Male's health promotion service consumption by types of health promotion services

Health Promotion Service Consumption	Frequency	Percentage
Annual Medical Check-Up	465	35.02%
Diabetes Screening Test/Hypertension Screening	434	32.68%
Vaccination	311	23.42%
Dental Preventive Care	73	5.50%
Intaking Supplements	30	2.26%
Others	11	0.83%
Consultations About Changing Unhealthy Behaviors	3	0.23%
Family Planning Services	1	0.08%
Total	1,328	100%

Table 12 Female's health promotion service consumption by types of health promotion services

Health Promotion Service Consumption	Frequency	Percentage
Diabetes Screening Test/Hypertension Screening	158	28.47%
Vaccination	146	26.31%
Annual Medical Check-Up	132	23.78%
Cervical Cancer Screening Test	59	10.63%
Dental Preventive Care	25	4.50%
Intaking Supplements	12	2.16%
Family Planning Services	7	1.26%
Others	7	1.26%
Puerperium Care	5	0.90%
Antenatal Care	3	0.54%
Consultations About Changing Unhealthy Behaviors	1	0.18%
Total	555	100%

Among male respondents who utilized health promotion services during last 12 months, the average age is 50.79 years old with the minimum age of 17 years old and the maximum age of 84 years old. 30.59 percent of them suffered from chronic

disease(s). 52.77 percent live in municipal area. 34.75 percent graduate high school or equivalent level. 79.57 percent are married. The average monthly income is 10,267.89 baht with the minimum monthly income of none and the maximum monthly income of 30,000 baht. 94.09 percent own at least one road vehicle. 99.54 percent are under health-care coverage. For behavioral factors, 45.10 percent smoke at least a day per week. 77.63 percent are considered as a heavy drinker during past 12 months. 53.23 percent add extra-seasoning in their food. 4.90 percent consume at least a bottle/box/can/glass of sweetened drink per day. 95.38 percent consume at least a ladle of fruit and vegetable per day. 66.08 percent are aware of antibiotic medicine's downsides.

Table 13 compares the average score of self-assessment scores across aspects for male who utilized health promotion services during past 12 months and who did not. Overall, the average scores between two groups are close to each other. The average score of today health and health comparison of today and last year are higher for men who did not utilize health promotion services. However, men who utilized health promotion services had the higher average score in believing to be healthier than others with similar characteristics. For most of the health problem assessments, men who utilized health promotion services have higher scores on health problems.

Table 13 Comparison of average self-assessment scores for male with health promotion service consumption during past 12 months and without health promotion service consumption during past 12 months

No.	Self-assessment	Health promotion service consumption	No health promotion service consumption
1.	Comparing your today's health to your last year's health.	2.91	2.97
2.	Comparing your health to other people with similar characteristics' health	3.15	3.10
3.	Evaluating your today health	3.53	3.56
4.	Evaluating difficulty in your physical movement	1.16	1.11
5.	Evaluating difficulty in taking care of yourself	1.04	1.05
6.	Evaluating difficulty in performing regular activities	1.09	1.06

7.	Evaluating your health conditions	1.21	1.16
8.	Evaluating your depression and anxiety	1.15	1.14

Among female who utilized health promotion services during last 12 months, the average age is 48.50 years old with the minimum age of 16 years old and the maximum age of 83 years old. 28.67 percent of them suffer from chronic disease(s). 52.68 percent live in municipal area. 24.24 percent graduate high school or equivalent level. 53.15 percent are married. The average monthly income is 7,900.28 baht with the minimum monthly income of none and the maximum monthly income of 30,000 baht. 93.01 percent own at least one road vehicle. 99.53 percent are under health-care coverage. For behavioral factors, 5.83 percent smoke at least a day per week. 65.50 percent are considered as heavy drinkers during past 12 months. 51.05 percent of samples add extra-seasoning in their food. 4.20 percent consume at least a bottle/box/can/glass of sweetened drink per day. 95.34 percent consume at least a ladle of fruit and vegetable per day. 66.43 percent are aware of antibiotic medicine's downsides.

Table 14 compares the average score of self-assessment scores across aspects for female who utilized health promotion services during past 12 months and who did not. In general, the average scores between two groups are close to each other.

Similar to male, the average score of today health and health comparison of today and last year are higher for women who did not utilize health promotion services. Nonetheless, women who utilized health promotion services have the higher average score in believing to be healthier than others with similar characteristics. For most of the health problem assessment, women who utilized health promotion services had higher scores on health problems.

Table 14 Comparison of average self-assessment scores for female with health promotion service consumption during past 12 months and without health promotion service consumption during past 12 months

No.	Self-assessment	Health promotion service consumption	No health promotion service consumption
1.	Comparing your today's health to your last year's health.	2.94	2.99
2.	Comparing your health to other people with similar characteristics' health	3.15	3.11
3.	Evaluating your today health	3.55	3.59
4.	Evaluating difficulty in your physical movement	1.18	1.12
5.	Evaluating difficulty in taking care of yourself	1.03	1.04
6.	Evaluating difficulty in performing regular activities	1.09	1.06
7.	Evaluating your health conditions	1.30	1.19
8.	Evaluating your depression and anxiety	1.25	1.20

Although most of the percentages across characteristics of male and female who consumed health promotion services during past 12 months are close to each other, it is worth to note that the percentage of high school or equivalent degree graduation of female is lowered than male graduation by 10.51 percent. The number of married females is lowered than the number of married males by 26.42 percent. In addition, the remarkably higher percentage of unhealthy habits including smoking and alcohol consumption can be observed in male than in female by 39.27 percent and 12.13 percent, respectively.

5.2 Model analysis

The logit models of Thailand, Central region, Northern region, Northeastern region, and Southern region were run for male and female. There are 10 models in total including male in Thailand model, male in Central region model, male in Northern region model, male in Northeastern region, male in Southern region model, female in Thailand model, female in Central region model, female in Northern region, female in Northeastern region and female in Southern region.

From likelihood ratio (LR) chi-square test, the null hypothesis can be rejected at 1 percent significance level for all models. The results are showed on Table 15. It indicates that the variables include in the model have significance impacts on the health promotion service consumption. In the other words, the variables are significant determinants of the health promotion service consumption.

Table 15 Likelihood ratio (LR) chi-square test and p-value of each model

		Thailand	Central Region	Northern Region	Northeastern Region	Southern Region
Male	LR chi ²	307.36	114.97	104.17	100.44	33.60
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
Female	LR chi ²	96.66	39.00	29.48	56.87	13.39
	p-value	0.0000	0.0000	0.0000	0.0000	0.0039

McFadden R² or Pseudo R² values for goodness of fit of each model are illustrated in Table 16.

Table 16 McFadden R² or Pseudo R² value for goodness of fit of each model

	Thailand	Central Region	Northern Region	Northeastern Region	Southern Region
Male	0.0473	0.0714	0.0521	0.0525	0.0377
Female	0.0473	0.0808	0.0399	0.0820	0.1277

Additionally, Hosmer-Lemeshow goodness of fit test shows that the models fit the data. All p-values exceed 0.05. Table 17 presents p-value from Hosmer-Lemeshow goodness of fit test of each model.

Table 17 P-values from Hosmer-Lemeshow goodness of fit test of each model

Gender	Thailand	Central Region	Northern Region	Northeastern Region	Southern Region
Male	0.1690	0.3425	0.1240	0.3105	0.9316
Female	0.1261	0.3301	0.0953	0.1545	0.6432

5.2.1 Model analysis of male's factors affecting health promotion service consumption in Thailand

The marginal effects at average values of statistically significant variables for Thai male from backward stepwise logistic regression are presented in Table 18. Among factors, age, education, and having chronic disease(s) are statistically significant at 1 percent significance level. The probability of health promotion service consumption for Thai male who suffers from chronic disease(s) is 9.12 percent higher than who does not suffer from chronic disease(s). The probability of health promotion service consumption for Thai male who completes high school or equivalent degrees is 6.42 percent greater than who does not complete the degree. In addition, a year older of Thai men, the chance of utilizing health promotion service rises by 0.12 percent. At 5 percent significance level, the probability of health promotion service utilization for Thai male who lives in municipal district is 1.65 percent lower than who does not live in municipal district.

According to psychological factors, men who score themselves a point better health than others with the similar characteristics has an increment of tendency to use health promotion services by 2.09 percent at 1 percent significance level. Both assessment scores on problem of physical movement and problem of taking care of himself are statistically significant at 5 percent significance level. With a unit increment of worse physical movement appraisal, the probability that a person seeks for health promotion service increased by 1.91 percent. However, a unit increase of unpleasant self-caring point reduces probability of health promotion service consumption by 3.55 percent.

The statistically significant behavioral factors at 1 percent significance level included smoking, alcohol consumption, and tasty preference. The probability of health promotion service consumption for Thai male who adds extra-seasoning in his food is 3.95 percent lower than who does not add extra-seasoning in his food. Moreover, the probability of health promotion service consumption for Thai male who is considered as a heavy drinker during last 12 months is 3.90 percent less than who is not considered as a heavy drinker during past 12 months. In addition, smoking

at least a day per week, the probability of using health promotion services decreases by 1.95 percent.

5.2.2 Model analysis of female's factors affecting health promotion service consumption in Thailand

The marginal effects at average values of statistically significant variables for Thai female from backward stepwise logistic regression are presented in Table 18. The biological and sociocultural factors of health promotion service consumption for women at 1 percent significance level are age, living area, and ownership of a road vehicle. Having a road vehicle, the probability of health promotion service utilization increases by 9.95 percent. Additionally, a year older of Thai women, the chance of utilizing health promotion service rises by 0.33 percent. In contrast, the probability of health promotion service utilization for Thai female who lives in municipal district is 5.53 percent lower than who does not live in municipal district.

It is interesting to point that some psychological variables contribute to the probability of health promotion service utilization. With a point increases on difficulties regarding to taking care of herself, the probability of having health promotion service during past 12 months drops by 20.18 percent at 1 percent significance level. On the other hand, a unit increase for severity of health conditions stimulates the increment of the probability by 5.70 percent. Moreover, at 5 percent significance level, realizing hardship on performing regular activities positively influence prospect of health promotion service consumption. An extra point evaluated raises the probability by 9.63 percent.

The unhealthy behaviors factors result in a negative relationship with likelihood to consume health promotion services. At 1 percent significance level, smoking at least a day per week, the tendency of health promotion consumption reduces by 8.90 percent. Furthermore, the probability of health promotion service consumption for Thai female who adds extra-seasoning in her food is 6.26 percent lower than who does not add extra-seasoning in her food.

In common, age has positive influence while living in municipal area shows negative effect on the probability of health promotion service consumption for both genders. Likewise, unhealthy behavioral practices contribute negative impacts on the probability to opt for health promotion services. Besides, all groups' probabilities of consuming health promotion services are lessened by a score increase in difficulties of self-caring assessment. Nevertheless, there are number of statistically insignificant factors for both male and female. They are marital status, income, health-care coverage status, sweetened drink consumption, fruit and vegetable intake, awareness of antibiotic medicine's drawback, self-assessment on today's health, and self-assessment of depression and anxiety.

Table 18 Marginal effect at average values of statistically significant independent variables for Thailand models

Variable	Male		Female	
	Coefficient	Marginal effect	Coefficient	Marginal effect
Constant	-2.3320	-	-2.0054	-
AGE	0.0119***	0.0012	0.0197***	0.0033
CHD	0.7447***	0.0912		
AREA	-0.1618**	-0.0165	-0.3281***	-0.0553
EDU	0.5720***	0.0642		
VEH			0.7180***	0.0996
SEY	-0.1125*	-0.0114		
SES	0.2064***	0.0209		
SEM	0.1887**	0.0191		
SET	-0.3498**	-0.0355	-1.2207***	-0.2018
SEA			0.5825**	0.0963
SEI			0.3448***	0.057
SMK	-0.1916***	-0.0195	-0.6325***	-0.089
ALC	-0.3506***	-0.039	-0.2254*	-0.0383
TSP	-0.3740***	-0.0395	-0.3705***	-0.0626

Note: Single asterisk (*) represents 10 percent significance level. Double asterisks (**) represent 5 percent significance level, and triple asterisks (***) represent 1 percent significance level.

5.2.3 Model analysis of male's factors affecting health promotion service consumption by regions

The marginal effects at average values of statistically significant variables for Thai male by region from backward stepwise logistic regression are presented in Table 19. In Central region, having chronic disease(s) and education contributed positive impact on the probability of health promotion service consumption at 1 percent significance level. The probability of consuming health promotion services for who suffers from chronic disease(s) is 8.20 percent higher than who does not suffer from chronic disease(s), and the probability of using health promotion services for who graduates high school or equivalent degrees is 5.86 percent higher than who does not graduate the degrees. In addition, age is statistically significant at 5 percent with 0.09 percent increment of the probability of health promotion service consumption. The statistically behavioral determinants include preference to add seasoning in food and alcohol consumption. Adding extra-seasoning, the chance of health promotion service utilization decreases by 3.46 percent at 1 percent significance level. At 5 percent significance level, the probability of health promotion service consumption for men who is considered as a heavy drinker during past 12 months is 3.08 percent lower than who is not considered as a heavy drinker during past 12 months. For psychological factors, believing to have better health than others with similar characteristics by 1 point of self-assessment increases the probability of health promotion service consumption by 1.97 percent at 1 percent significance level.

In Northern region, men who suffer from chronic disease(s) is associated with the higher probability of using health promotion service by 12.31 percent comparing to men who do not suffer from chronic disease(s) at 1 percent significance level. At the same significance level, income also positively affected the probability of health promotion service consumption by 0.000333 percent. At 5 percent significance level, completing high school or equivalent degree increases the probability of health

promotion service utilization by 5.42 percent, and having better self-assessment score of comparison of health against others with similar characteristics increases the likelihood of health promotion service consumption by 2.63 percent. In contrast, at 1 percent significance level, men who live in municipal district are associated with lower probability of health promotion service consumption by 4.69 percent comparing to men who do not live in municipal district. In addition, smoking at least a day per week, the probability of health promotion service consumption reduces by 4.55 percent, and self-scoring to have better health comparing today to last year dropped the change of utilizing health promotion services by 4.04 percent.

In Northeastern region, the biological and sociocultural factors positively influencing the likelihood to utilize health promotion services at 1 percent significance level are the status of having chronic disease(s), education, and age by 8.42 percent, 6.47 percent, and 0.30 percent, respectively. Statistically significant behavioral factors including preference of addition extra-seasoning, fruit and vegetable consumption, and alcohol consumption adversely influence the possibility of health promotion service consumption. At 1 percent significance level, given the habit of adding extra-seasoning, the probability of health promotion service utilization reduces by 4.21 percent. At 5 percent significance level, the probability of health promotion service consumption for men who consume fruit and vegetable at least a ladle per day is 9.65 percent lower than who do not consume fruit and vegetable at least a ladle per day while the probability of health promotion service utilization for men who are considered as heavy drinkers during last 12 months is 4.42 percent lower than who are not considered as a heavy drinker during last 12 months. In contrast, regularly consuming sweeten drink is associated with increment of the probability of health promotion service utilization by 7.54 percent. Self-assessment score on the difficulty with physical movement positively influenced the probability of health promotion service consumption by 3.40 percent, but an additional score on awareness of self-caring problem decreased the likelihood of using health promotion services by 5.95 percent at 5 percent significance level.

In Southern region, at 5 percent significance level, the probability of health promotion service consumption in men with chronic disease(s) is 7.21 percent higher than who do not suffer from chronic disease. Graduating high school or equivalent degree, the probability of health promotion service utilization increases by 5.74 percent comparing to who do not graduate high school or equivalent degree. It is interesting to point men who are considered as a heavy drinker during past 12 months are associated with lower chance of utilizing health promotion services by 11.37 percent at 1 percent significance level. Furthermore, preference of adding extra-seasoning reduced the probability of health promotion service consumption by 5.43 percent at 5 percent significance level.

Hence, in most regions, having chronic disease(s) and education were statistically significant biologic and sociocultural factors with positive effect on the probability of health promotion service consumption while behavioral determinants involving alcohol consumption and preference of adding extra-seasoning negatively influenced the chance of health promotion service consumption. Additionally, age and the score on health comparison with others had positive effect on the likelihood of health promotion service utilization in 2 out of 4 regions.

Table 19 Marginal effect at average values of statistically significant independent variables for male models in regions

Variables	Central Region		Northern Region		Northeastern Region		Southern Region	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Constant	-3.7078	-	-1.6479	-	-2.1541	-	-1.1414	-
AGE	0.0141**	0.0009			0.0277***	0.0030		
CHD	0.9348***	0.0820	0.8600***	0.1231	0.6620***	0.0842	0.5114**	0.0721
AREA			-0.3874***	-0.0469				
EDU	0.7835***	0.0586	0.4141**	0.0542	0.5429***	0.0647	0.4363**	0.0574
INC			0.0000276***	0.00000333				
SEY			-0.3346***	-0.0404				
SES	0.2982***	0.0197	0.2178**	0.0263				
SEM					0.3196**	0.0340		
SET					-0.5590**	-0.0595		
SMK	-0.2462*	-0.0163	-0.3809***	-0.0455				
ALC	-0.4108**	-0.0308			-0.3729**	-0.0442	-0.7575***	-0.1137
TSP	-0.4688***	-0.0346			-0.3866***	-0.0421	-0.4376**	-0.0543
SWD					0.5807	0.0754**		
FVC					-0.7118**	-0.0965		

Note: Single asterisk (*) represents 10 percent significance level. Double asterisks (**) represent 5 percent significance level, and triple asterisks (***) represent 1 percent significance level.

5.2.4 Model analysis of female's factors affecting health promotion service consumption by regions

The marginal effects of statistically significant variables for Thai female by region from backward stepwise logistic regression are presented in Table 20. In Central region, age positively contributed to the probability of health promotion service consumption 0.41 percent at 1 percent significance level. Smoking a day per week, the possibility of health promotion service consumption reduces by 9.88 percent at 5 percent significance level. Statistically significant psychological factors are self-assessment of health conditions and difficulty of self-caring. Women who score themselves a point more on severity of health condition is associated with the higher probability to consume health promotion services by 9.33 percent at 1 percent significance level. On the other hand, women who score themselves a point more on problem of self-caring have lower tendency to consume health promotion service by 22.76 percent at 5 percent significance level.

In Northern region, the probability of health promotion service consumption for women who live in municipal district is 8.66 percent lower than the possibility of health promotion service consumption for who do not live in municipal district at 5 percent significance level. Smoking habit negatively impacted the feasibility of health promotion service utilization. The probability of health promotion service consumption for women who smoke at least a day per week is 14.05 percent lower than women who do not smoke at least a day per week at 5 percent significance level. Psychological factors which are statistically significant at 5 percent were self-assessment on problems to perform regular activities and health conditions. A point increases on both self-assessments enhance the likelihood to utilize health promotion services by 20.48 percent and 8.34 percent, respectively.

In Northeastern region, age positively contributes the probability of health promotion service consumption by 0.51 percent at 1 percent significance level. At 5 percent significance level, owning a road vehicle, women's probability of utilizing health promotion services improves by 12.86 percent. Moreover, married women are

associated with higher likelihood to consume health promotion services by 7.54 percent comparing to who are not married. The probability of health promotion service consumption for women who add extra-seasoning in their food is 16.11 percent lower than who do not add extra-seasoning in their food at 1 percent significance level. Statistically significant self-assessment factor at 5 percent significance is today's healthy score. An additional score given on today's health self-assessment increases the probability the likelihood to consume health promotion services by 5.79 percent.

In Southern region, the statistically significant factor at 5 percent significance level is age. An additional year increases the probability of health promotion service consumption by 0.84 percent.

Among 4 regions, most of them share age factor with small-positive marginal effect on the probability of health promotion service consumption. In addition, Central region and Northern regions share some statistically significant factors. Smoking habit reduces the probability of health promotion service consumption in both regions. Furthermore, they reflect alike psychological statistically significant factor. The probability of health promotion service consumption increases when an additional score on severe health condition is given.

Statistically significant factors are varied among regions for both genders. Nonetheless, they have several determinants in common. Age is positively influenced the possibility of health promotion service consumption in Central region and Northeastern region. Living in municipal area negatively impacts the likelihood of health promotion service consumption in Northern region. In Northern region and Central region, smoking adversely influences the feasibility of health promotion service consumption. In Northeastern region, preference of addition extra-seasoning in food reduces the prospect of health promotion service consumption in both genders. In contrast, statistically insignificant factors across regions are health-care coverage status and awareness of antibiotic medicine's drawback.

Table 20 Marginal effect at average values of statistically significant independent variables for female models in regions

Variables	Central Region		Northern Region		Northeastern Region		Southern Region	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Constant	-2.6049	-	-1.1097	-	-3.8932	-	-3.4433	-
AGE	0.0330***	0.0041			0.0304***	0.0051	0.0555**	0.0084
AREA			-0.4656**	-0.0866				
EDU							-0.9571*	-0.1443
MRS					0.4529**	0.0754		
VEH	0.6449	0.0693*			0.9749**	0.1286		
SEY					-0.3750*	-0.0633		
SEC					0.3435**	0.0579		
SET	-1.8303**	-0.2276	-1.1321*	-0.2070				
SEA			1.1196**	0.2048				
SEI	0.7505***	0.0933	0.4561**	0.0834				
SED					0.3479*	0.0587		
SMK	-1.0503**	-0.0988	-0.9627**	-0.1405				
ALC			-0.3375*	-0.0635				
TSP					-0.9555***	-0.1611		
SWD							1.4831*	0.3008

Note: Single asterisk (*) represents 10 percent significance level. Double asterisks (**) represent 5 percent significance level, and triple asterisks (***) represent 1 percent significance level.

Chapter 6 DISCUSSION

6.1 Male and female in Thailand

Based on the analysis, major conclusions were drawn as follows: first, male and female had different determinants influencing health promotion service consumption which conclude differently from the study of health promoting behavior of elderly in Muang Nakornsawan province (Chumpeeruang et al., 2019). Nonetheless, both genders shared some statistically significant and insignificant factors. Second, at 1 percent significance level, men's probability of utilizing health promotion services was positively influenced by status of having chronic diseases, education, better score of self-assessment on health comparing with others, and age. These results offered solid evidences on impact from personal factors under HPM. The outcomes resembled findings from the study of health promoting behaviors in the Urban Community of Metropolitan Bangkok (Sangprasert & Wiroj, 2015) suggesting positive correlation of health promoting score and age, education, and status of having chronic disease(s). For behavioral factors, preference of adding extra-seasoning, alcohol consumption, and smoking negatively impacted the probability of health promotion service consumption. Overall, bad health habits led to less likelihood to consume health promotion services which further increased the risk of developing chronic diseases. The findings were in accordance with "prior related behavior" from HPM stating that habits in the past affect the probability of engagement in health-promoting behaviors (Nola J. Pender, Murdaugh, & Parsons, 2011). Likewise, drug addiction was founded to adversely impact health-promoting behavior among Buddhist Monks in Nakhonnayok province (Rerkluenrit et al., 2010). Third, at 1 percent significance level, women's prospect to have health promotion services rose when she owned a road vehicle, had worsened self-assessment on severe health condition, and grew older. On the other hand, the probability plunged for an additional score on problem of self-caring. The other negative determinants on the chance of using health promotion services were smoking, preference of adding-extra seasoning, and living in municipal district. In general, unhealthy routines reduced the probability of utilizing health promotion services. Moreover, realizing the lack of self-

caring decreased the probability to use the health promotion services as well. Meanwhile, more severe perceived health conditions enhanced the feasibility of health promotion service consumption.

6.2 Public sector

Given the positive relationship between completing high school or equivalent degree and probability of utilize health promotion services, government's promotion of high school education or equivalent degree can directly enhance the likelihood of health promotion service consumption in Thai male. The completion of high school or equivalent degrees increases the probability of health promotion service consumption by 6.42 percent. The results further suggest that Thai men tended to use health promotion services when they have already suffered from chronic disease(s). The probability of health promotion service utilization for men who have suffered from chronic disease(s) is 9.12 percent higher than men who have not suffered from chronic disease(s). Although they have already suffered chronic illness(es), health promotion services can prevent future threats. Then, the earlier they realize their chronic conditions, the earlier they are more likely to opt for health promotion services which ease the severity of diseases. Then, government advocate of health screenings for chronic diseases can timely increase to probability of health promotion service consumption. Having men realize to have better health condition comparing with others via assessments and group activities can enhance beneficial effects on health promotion service consumption. For an additional score, the probability of health promotion service consumption increases by 2.09 percent. Hence, providing public health assessment questionnaire or local interview can assist them realized their health status and led to the consumption of health promotion services. For behavioral change services such as alcoholism treatment, the finding pointed that unhealthy habits worsen the probability of health promotion service consumption. The chance of health promotion service utilization is lower for men who add extra-seasoning in their food by 3.95 percent, who are considered as a heavy drinker during past 12 months by 3.90 percent, and who smoke at least a day per week by 1.95

percent comparing to who do not. This possibly results from disgrace of treatment, lack of information, and resistance to change. As a result, an individual with unhealthy habit(s) seems less likely to seek for health improvement, so assistance from externals should be required. Apart from an individual, family and community are essential players in behavioral changes for sustainably healthy habits (Health Education Division, 2013). Hence, to improve the chance of having health promotion treatment, starting with surrounded people and environment may be more effective than straightly altered an individual lifestyle.

The findings offer that supporting women to have road vehicle and creating awareness of current health problems yields the positive relationship with the probability to consume health promotion services, especially in Northeastern region. Owning a road vehicle, the probability of health promotion service consumption increases by 9.96 percent. Apart from functioning as a transportation mode, it is worth to note that the variable of road vehicle ownership was added to the model as a proxy of wealth. Then, wealth does affect the probability of health promotion service consumption in Thai women. Given as a proxy of wealth, government promotion of savings and investments feasibly enhance the probability of health promotion service consumption in female. Furthermore, having Thai female to realize their health problems increase the chance of utilizing health promotion services, so supporting them to involving in the activities to create health condition awareness such as quick interview can led to increase in the health promotion service consumption. An additional score of self-assessment on illness increases the probability of health promotion service consumption by 5.70 percent. Similar to Thai male, unhealthy habits such as smoking aggravated the probability of health promotion service utilization. The probability of health promotion service consumption is 8.90 percent lower for women who smoke at least a day per week. In addition, women who have the habit of adding extra-seasoning in their food are associated with lower chance of health promotion service consumption by 6.26 percent. It signaled low likelihood of voluntary behavioral changes. Therefore, motivation from surrounded people, environment, and public health efforts are necessary.

6.3 Private sector

Given the result that men with chronic disease(s) are associated with higher tendency of health promotion service consumption comparing to who do not by 9.12 percent, men who graduate high school or equivalent degrees are associated with the higher probability of health promotion service consumption by 6.42 percent comparing to who do not, and men's probability of health promotion service consumption increases by 0.12 percent as they grow a year older, health promotion service providers are suggested to target male with chronic diseases, high school diploma or equivalent degree, and at elder age to improve the feasibility of success sales. In addition, believing to have better health comparing with others by a score on self-assessment increases the probability of health promotion service consumption by 2.09 percent, so health promotion service providers may consider offer quick self-assessments for potential customers for market research to further design marketing plan for target customers.

For potential Thai female customers, women with private road vehicle are associated with the higher probability of health promotion service consumption by 9.96 percent comparing to who do not own a private road vehicle. Moreover, given a year older, women's prospect of health promotion service consumption increases by 0.33 percent. Furthermore, a score on self-assessment of illness severity increases the probability of health promotion service consumption by 5.70 percent.

In short, for health promotion service providers, the results suggest that targeting male with chronic diseases, high school diploma or equivalent degree, belief to have better health comparing with others, and at elder age can improve the feasibility to offer their health promotion services while the characteristics of having private vehicle, realization of health issues, and at elder age can be convinced with higher prospect of sales in female customers.

The service providers can offer health assessments for potential customers to increase health awareness and interest in health promotion service consumption. However, unhealthy habit treatment programs signaled to have less possibility of success transaction when are directly offered to an individual with unhealthy routine. Being considered as a heavy drinker, the probability of health promotion service utilization decreases by 3.90 percent in male. Smoking at least a day per week, the probability of health promotion service consumption reduces by 1.95 percent in male and 8.90 percent in female. Habit of adding extra-seasoning is associated with lower chance of health promotion service consumption by 3.95 percent in male and 6.26 percent in female. Therefore, service providers should bring the potential customers' families or close persons to attention when offering the treatments. Their support is essential to alleviate the relatively low likelihood of health promotion service consumption comparing to individuals with no unhealthy habits. Additionally, the outcome suggests both ladies and gentlemen in municipal areas are less likely to opt for health promotion services. The probability of health promotion service consumption for men who live in municipal district is 1.65 percent lower than men who do not live in municipal area. The probability of health promotion service consumption for women who live in municipal district is 5.53 percent lower than women who do not live in municipal area. In the other words, potential customers who do not live in municipal areas are associated with higher consumption possibility.

6.4 Limitation

Although the findings from the current study reinforce the use of HPM concept in determining the factor affecting health promotion service consumption for men and women in Thailand, it is crucial to note that the study did not include all the variables as well as relationships advised by HPM. Given the limited data, future studies are suggested to include additional independent variables. The underlying ideas of results should be further analyzed. For example, what made people who live in municipal area less likely to utilize health promotion services, especially in Northern region. In addition, for elder people and individuals with chronic diseases, it

is highly possible that they consume health promotion services due to necessity or medical advice from doctors rather than their willingness to utilize health promotion services. Therefore, future studies may distinguish if the demand for health promotion service consumption is derived from self-interest or necessity. The more in depth understanding of consumers, the more effective for market segmentation and policy intervention to boost health promotion service consumption in Thailand.



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