

CHAPTER 1

Introduction

1.1 Rationale and Background

The vision of the ministry of public health of Thailand is to be the core agency in developing the health system with quality, efficiency and equality; with participation of the people, communities and all sectors for good health of all Thai people in order to achieve a good and sustainable society following the King's Sufficiency Economy philosophy.

Health and health care related problems are intricate issues involving various factors. Similarly, the ways of how much problems can be coped are also diverse in nature. A systematic approach to problem analysis and solution is deemed necessary for guiding a policy direction and role of the people in the society.

In Thailand where morbidity and mortality are primarily related to chronic rather than infectious diseases, health behaviors are particularly important. The cardiovascular disease is mainly cause of death and the second is cancers (WHO, 2014) which the risk factor for higher the mortality rate were alcohol use, smoking, low fruit and vegetable intake, indoor smoke from household use of solid fuels, urban air pollution, overweight and obesity, physical inactivity, contaminated injections in health care settings, and unsafe sex. (Lopez et al, 2006).

The foundation for much economics research on health behaviors is Michael Grossman's model of health capital (Grossman, 1972). Basic aspects of the model are that people receive an endowment of health capital at birth, which depreciates with age but can be raised through investments; death occurs when the health stock falls below a minimum level. Health has both consumption and investment aspects, as it enters the utility function directly and determines the amount of healthy time available for market

and nonmarket activities. People produce health by combining market goods and services with time, consistent with Becker's model of household production (Becker, 1976). For example, an individual might produce health by buying a treadmill and running shoes and spending time running on the treadmill. Individuals allocate time and money to maximize the present discounted value of lifetime utility. Indirectly, length of life is a choice in the original model which contains no uncertainty. Specifically, the timing of death results from conscious decisions regarding health investments made with full knowledge of their implications for longevity. Assuming that health has only investment aspects (i.e. it does not enter the utility function directly and is only valuable for producing healthy days), optimal health capital is characterized by an equality of the supply of health capital (i.e. the opportunity cost of health capital) and the demand for health capital (i.e. the marginal monetary return on health investments).

Application of the health capital model for health behaviors such as sleep and exercise is straightforward (Kenkel, 2000): people invest in such behaviors until, at the margin, the return on investments in health equals the opportunity cost of health capital. However, the model also applies to unhealthy behaviors, which can be interpreted as negative investments in health. When the individual has solved the constrained maximization problem, the optimal participation in unhealthy behaviors will be characterized by an equality of the marginal costs of the unhealthy behavior (both the monetary cost of purchasing market goods like cigarettes and alcohol and the nonmonetary cost of reduced health and shorter lifespan) and the marginal benefits (such as the instantaneous pleasure derived from consumption).

Such health behaviors are the subject of this thesis and can be broadly construed as any action, or deliberate inaction, by an individual that affects his or her own health or the health of others. This thesis focuses on the specific behaviors – like tobacco consumption, alcohol consumption, and physical activity that have strong direct effects on own health.

1.2 Statement of the Problem and Significance of the Study

1.2.1 Alcohol and tobacco consumption in Thailand

As a representative of health-risk behavior, alcohol and tobacco consumption imposes a marked burden on society in several aspects including health care costs, costs of productivity loss, costs of property damage, costs of criminal justice and law enforcement. Furthermore, it has been found that this impact does not only affect individual drinkers or smokers but also non-drinkers or smokers who live in the same society. For example, the estimated expenditure from economics burden of tobacco is about 52,189 million baht in 2014. (National tobacco risk factors annual report, 2014)

Alcohol and tobacco are among the top causes of preventable deaths. Moreover, these substances often are used together. The studies have found that people who smoke are much more likely to drink, and people who drink are much more likely to smoke. Dependence on alcohol and tobacco also is correlated. (U.S. Department of Health and Human Services, 2007)

1.2.1.1 Alcohol consumption in Thailand

Alcohol is the first leading risk factor for chronic disease and death, including many types of cancer, respiratory disease and heart disease. It is the major cause of cancer, accounting for about 20–30% of cancer cases in Australia (AIHW & AACR, 2012). Thus, alcohol control policies in low-medium income countries include Thailand should aim to reduce consumption in drinkers and prevent initiation of drinking. For example, Thailand implement high alcohol taxation, restricted alcoholic beverages sale times, that more effective measures at the societal level to control alcohol consumption and alcohol-related harms.

National Statistical Office survey in 2014, the results showed that there were about 54.8 million populations aged 15 years and over, with these, about 17.7 million people (20.8%) are alcohol user. Men used alcohol in higher rate than women (53.0% and 12.9% respectively). Considering by age, it was clearly seen that 25-59

years old people has used alcohol higher rate than others (38.2% respectively) in Table 1.1

Table 1.1 Number of aged 15 years and over has alcohol consumption in Thailand

Group	Population (>15 years old) Unit: 1,000	Alcohol consumption	% of population (>15 years old)	Average aging of population who began alcohol consumption
Total	54,831.2	17,705.1	32.3	20.8
<u>Age</u>				
15-24	9,636.8	2,428.3	25.2	16.7
25-59	35,214.1	13,439.8	38.2	20.9
>60	9,980.4	1,837.0	18.4	23.3
<u>Sex</u>				
Male	26,524.1	14,047.3	53.0	19.4
Female	28,307.2	3,657.8	12.9	25.0

Source: The National Statistical Office, 2014, p.4

1.2.1.2 Tobacco consumption in Thailand

Tobacco is the second leading risk factor for chronic disease and death, including many types of cancer, respiratory disease and heart disease. It is the major cause of cancer, accounting for about 20–30% of cancer cases in Australia (AIHW & AACR, 2012).

As same as alcohol consumption control policies, the tobacco consumption control policies try to reduce consumption in smokers and prevent initiation of smoking. For example, high rate tobacco taxation, controlling of tobacco

advertising, increasing the non-smoking area for non-smoker (Ban on smoking is comprehensive in public places and workplaces. The places with total ban include all public transports, outdoor exercising, learning park or centre, occupation train centre, cinemas, stores, public park, zoo, botanical park , bank institution, oil or gas station, passenger terminal of all kinds including airport, boat pier and air-conditioned restaurants / internet shop etc), supporting quite-smoke program for smokers, alliance and public relation in tobacco control, and law enforcement by hot line center. These successful policies has shown decreasing trend of smoker in Thailand from 32 % in 1991 to 20% in 2013 of population over 15 years (figure 1.1).

National Statistical Office survey in 2014, the results showed that there were about 54.8 million population aged 15 years and over, with these, about 11.4 million people (20.7%) smoked cigarette. Men smoked cigarette higher rate than women (40.5% and 2.2% respectively). Considering by area and region, it was clearly seen that people who lived in non-municipal area smoked cigarette higher rate than those in municipal area (23.0% and 18.0 respectively) in Table 1.2 (IHPP, 2014).

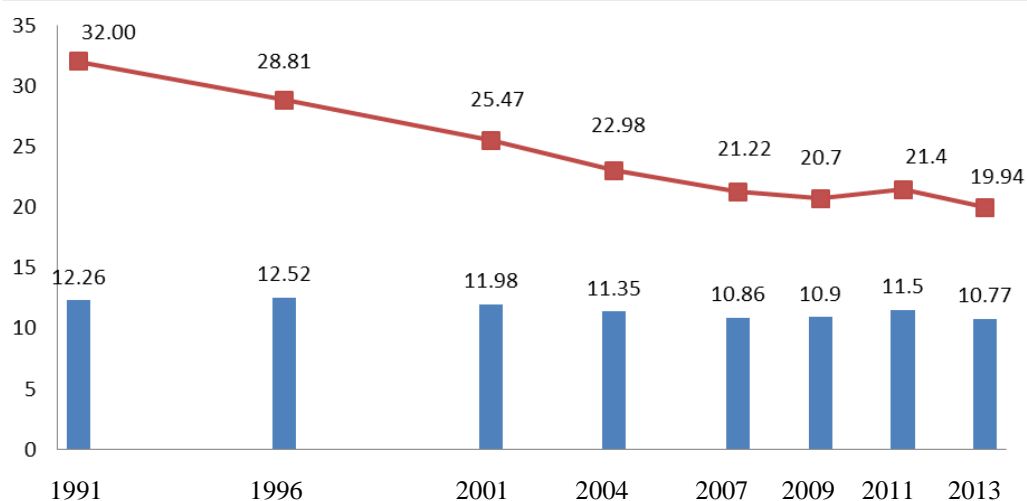


Figure 1.1 Smoking rate in Thailand 1991-2013

Source: IHPP Thailand, 2014. p.8

Table 1.2 Number of aged 15 years and over has tobacco consumption in Thailand

Group	Population (>15 years old) Unit: 1,000	Tobacco			% of population (>15 years old)
		Total	Daily smoke	Ex smoker	
Total	54,831.2	11,363.4	10,002.5	1,360.9	20.7
<u>Age</u>					
15-24	9,636.8	1,413.7	1,107.6	306.1	14.7
25-59	35,214.1	8,290.2	7,368.3	921.9	23.5
>60	9,980.4	1,659.5	1,526.6	132.9	16.6
<u>Sex</u>					
Male	26,524.1	10,746.8	9,490.0	1,256.8	40.5
Female	28,307.2	616.6	512.5	104.1	2.2
<u>Area</u>					
Municipal area	24,882.1	4,483.3	3,883.4	599.9	18.0
Non-municipal area	29,949.2	6,880.1	6,119.1	761.0	23.0

Source: The National Statistical Office, 2014, p.1

1.2.2 Thailand population behavior physical exercising and mental health

In the other side, the health behavior such as physical activity which previous recommendations are to improve health recommends an effective frequency, duration, and intensity of physical activity for fitness in men and women; that is 20-60 minutes of continuous, moderate to high-intensity exercise performed three or more times a week (U.S. Department of Health and Human Service, 1996). This recommendation may lead to a low participation of many people, particularly elderly people, who think that it is not suitable for them to do that kind of exercise.

Since 2010, Thai Health Promotion Foundation has declared to promote physical activity among Thai population by granting several projects on public campaign at national level and implementation program at the local level in every regions of country. Most of the projects are mainly focused on toward increase in the perception, attitude, and practice, on physical activity in all Thai population. (Katewongsa et al, 2014)

The 2011 survey (The National Statistical Office, 2011) results showed that about 15.1 million people (26.1%) played sport or exercised. Men played sport or exercised slightly higher rate than women (27.4% and 25.0 respectively).

In comparing (in table 1.3) with the past surveys (2004 and 2007), it was found that proportion of population playing sport or physical exercising in 2011 decreased about 3%, especially in the Southern region, it extremely decreased, of about 7.5%, which might be because of the big flood in 54 provinces in the survey period.

Table 1.3 Population aged 11 years and over playing sports or physical exercising
by sex, area and region : 2004, 2007 and 2011

Sex, Area, and Region	Percentage of population playing sports or physical exercising over 11 years old		
	2004	2007	2011
Total	29.1	29.6	26.1
Male	32.8	32.7	27.4
Female	25.4	26.7	25.0
Area			
Municipal area	33.4	33.5	30.4
Non-municipal area	26.9	27.9	23.9
Region			
Bangkok	33.5	33.4	31.5
Central	24.3	24.3	22.0
Northern	29.9	28.3	28.8
Northeastern	28.5	29.7	24.5
Southern	33.5	37.4	29.9

Source: The National Statistical Office, 2011, p.2

In addition, from the situation above, alcohol consumption and cigarettes consumption are frequently related to behavioral problems, which lead to several negative consequences. The thesis aim to apply a bivariate modeling, a multivariate modeling, switching regression and copula approach which them analyze the effect of health-risk behavior and health behavior. The results will be support the policy makers who improve the efficiency of health behavior campaigns and health risk behavior reducing campaigns.

1.3 Objectives

The objectives of this study are as follows:

- a) To apply econometric models are suitable for health behavior data
 - to estimate model parameters that describe the joint distribution of dependent variable between the healthy and health-risk behavior from survey data;
 - to answer questions regarding health behavior and health-risk behavior determining factors in widely definition (consume or not consume) and narrow definition in ordinal scale(not-consume, less, moderate, hazards);
 - to provides valuable background for policy designs to improve the efficiency of health behavior campaigns and health risk behavior reducing campaigns.

- b) To apply econometric models are suitable for solve the self selection bias problem when compare with the conventional method.

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1.4 Main Contributions of the Research

The contributions of econometric models in this thesis are

a) This thesis provides the appropriate methodology to analyze the healthy and unhealthy behavior from survey data as follows:

- Pair Copula Constructions are used to approximate the multivariate joint distribution of multivariate binary probit models that are answer questions regarding health behavior and health-risk behavior determining factors in widely definition;

- Bivariate Ordinal Copula is used to fitting bivariate ordinal regression with residual dependence characterized that are answer questions regarding health behavior and health-risk behavior determining factors in narrow definition as ordinal scale (not-consume, less, moderate, hazards).

b) This thesis finding will proposes an approach to specifying and estimating regression models with endogenous switching, based on copula function. This models can solve the self selection bias problem when compare with the conventional method.

c) This thesis provides valuable background for policy recommendations and health promotion and prevention policy designs to improve the efficiency of health behavior campaigns and health risk behavior reducing campaigns. The factors determining of behaviors and outcomes can also provide direct information for health policies. In addition, This the knowledge on characteristics of those who have had healthy and unhealthy behavior can help the policy makers focus the targeting and narrow down the sector of the Thai citizen with the lifestyle problems.

1.5 Overviews of the Thesis

As discussed in the beginning of this chapter, this thesis proposes three econometric models for analyses health and health-risk behaviors. The contributions of this thesis, it is reviews existing empirical methodologies in Chapter2. The literature reviews on Copula model, Pair Copula Constructions, and switching regression model.

After the reviews of existing methodologies, the applications are elaborated. Therefore, Chapter 3 presents the application to analyses health behavior and health-risk behavior determining factors, such as alcohol consumption, tobacco consumption and physical activity, in widely definition that are introduced the idea of viewing the binary choice (individual who has chosen and not chosen) models as derivation from binomial distribution in contrast with derivation from latent continuous variable to model the multivariate joint distribution using discrete copula. Chapter 4 presents the application to analyses health behavior and health-risk behavior determining factors in narrow definition that are introduced a Copula-based Bivariate Order Probit to model the dependence between two ordinal outcome responses.

In addition, Chapter 5 presents the application to reinvestigate the effect of alcohol consumption on hypertension from observation data by used copula-based endogenous switching regression for ordinal outcomes as the more appropriate model for treatment effect estimation. Finally, Chapter 6 provided concluding remarks of this thesis.

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