Impact of Socio - economic Characteristics and Health Risk Behaviors on Labor Force Age Health Outcome in Kanchanaburi Demographic Surveillance System, Thailand

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Introduction

In all societies, it is well-established that the lower socio-economic characteristics person has substantially shorter life expectancy and more illnesses than the higher one. For example, there are differences in persistence of mortality rates between socio-economic characteristics, which results from their type of occupation, living and lifestyle (Dinkel, 1985). This included a wide range of factors, such as income, employment and working conditions, housing, education, nutrition, stress and violence. These factors are now considered as the social determinants of health (Huei, T.T. and T. M. Liu, 2005; World Health Organization, 2003). This phenomenon has been observed since the nineteenth century when Chadwick (1965) investigated the health of the working class in Victorian England and found that there are differences in life expectancy and health outcome among people with different social classes such as level of education and source of income, different types of occupations which were mostly related to social class. Moreover, it was found among people who live in neighborhoods which were characterized by different levels of community wealth and infrastructure (Washington State Department of Health, 2002).

For instance, the report of the Heart and Stroke Foundation (2003) in the United States has shown that the relationship between socioeconomic factors and health outcome that the people who are lower in the hierarchy experienced three times the risk of death from heart disease, stroke, cancer, gastrointestinal disease, accident and suicide

when compared to those at the top rank of the hierarchy. These results show that some determinants of health outcome could not be explained by difference in medical care. That, not only genetics or traditional risk behavior, but also social determinants of health, such as socio-economic characteristics have a significant impact on the illness of individuals (Christenson and Johnson, 1995; Moore and Hayward, 1990). For this reason, there were many investigations in the past to assess and determine the impact of social class on health outcome while testing theories of the disparities. For example, in the early state of theories, most of them focused on differences in the risks of overcrowding, poor housing conditions, poor sanitation, and malnutrition on individual health status (McKeown and Brown, 1955; Omran, 1971).

This phenomenon has occurred in societies which used to be faced with famine and particularly in developing countries. The rising of temperatures and humidity have facilitated the spread of many vector borne infectious diseases including malaria, dengue and encephalitis. As a result, the increasing prevalence of mortality rates caused by infectious diseases is largely due to decreased economic productivity, increased medical costs, and taxes, which can be obstacles to health care systems in some developing countries (Mosk and Johansson, 1986). Although health conditions have been improved over time, such as public health efforts to improve sanitation, better working conditions, and promotion of mass immunization, these efforts still have not eliminated the socioeconomic position differentials in health outcome (Vancouver Island Health Authority, 2006). By contrast, these industrial countries also face challenges from air pollution which has a substantial impact among people with asthma, chronic bronchitis, allergies, and heart conditions (Huei, T.T. and T. M. Liu, 2005).

In Thailand, the mortality rate was high in the past due to an unimproved health care system. This situation had increased the risk of Thai dying especially from epidemic and infectious diseases e.g. plague, malaria, cholera, smallpox, scarlet fever, influenza, polio, pneumonia and syphilis. In recent decades, Thailand has greatly improved their health care system with the development of good medical services, which has resulted in the reduction in mortality rates. There is evidence that the overall causes of death among Thai evidently inclined to non-communicable diseases and

accidents, except for HIV/AIDS, a communicable disease, (Department of Mental Health, 2005). Communicable diseases which used to be significant health problems have declined. Rather vulnerable behavior has led to a large number of non-communicable diseases nowadays, especially unhealthy habitual consumption of tobacco, alcohol, etc. Some studies reveal that behavioral differences of socio-economic groups are factors which also affect health.

For Thailand, social change in Thailand is due mainly to urbanization and industrialization including an increase in the number of elderly, while the number of labor force age groups seem to be declining when compared to the past (Department of Mental Health, 2005). This has led to the change of living conditions, lifestyle, socioeconomic status, and consumption behavior, not only at an individual level, but also for household and community as well. It has been found that all of these factors have, as a social context, a strong connection to socio-economic factors which directly contribute to the effect on health outcome of the population as a whole (Vapattanawong et al., 2007). As a result, it is important to examine the impact of socio-economic characteristics on labor force age health outcome as to whether *"the differences in socio-economic characteristics will have any impact on health outcome or not?"* by using Kanchanaburi Demographic Surveillance System (KDSS) as a case study area. This study has several social contexts that are equivalent to most Thai socio-economic characteristics, such as Thailand being the location of many types of industry - influences of capitalism, an important producer of plantation crops, and one of the major tourist destinations - which is able to produce an occupation class and differences in types of occupations ranked by type of work.

For KDSS, these various factors reflect the diversity in socio-economic characteristics, economic and ecological conditions. Moreover, it has found that non-communicable diseases were the highest reported causes of death in this area. This morbidity and mortality pattern is similar to Thailand's morbidity and mortality situation (Institute for Population and Social Research, 2001). That is to say, the benefit of this examination, in fact, is not only to complement the traditional prevention programs that emphasize reduction or elimination of risk factors among individuals, but

also to support local community administrative units to provide plans and proper strategies to promote health activities. Furthermore, empirical results can help to understand the social determinants of health in Thai's context more fully. Research objective and methodology section will be described below.

Research Objective

This research aims to examine the impact of socio-economic characteristics of labor force age on health outcome. Socio-economic characteristics here are measured by level of education, type of occupation, and residential areas. Likewise, additional behavior such as alcohol consumption and smoking habits, including demographic factors, such as gender and age group also are brought into account as independent variables.

Theoretical Background of Social Class and Social Determinants of Health

According to WHO (2003), social determinants of health are the social and economic conditions that influence the health of individuals and communities. Social determinants of health include environmental conditions where individuals live and their work places, etc. The term "social determinants of health" grew out of the search by researchers to identify the specific exposures by which members of different socioeconomic positions or classes come to experience varying degrees of health and illness (Raphael, 2004). Similarly, it was well documented that individuals in various socioeconomic classes will have differing experiences in health outcome. These factors led to illness and remain to be identified (Smith and Kington, 1997). Importantly, these determinants have a direct impact on an individual's health situation. Furthermore, they are one of the best predictors when focusing on an individual's health status, because most of them are related to standard of living and individual lifestyle, etc. (Raphael, 2004). For instance, when concentrating on an individual's health, it is well known that large disparities between socio-economic characteristics and economic status between

groups within a given population can produce a great affect on health outcome. One example is that Wilkinson and Marmot have found the larger the social gap, the worse the health outcome of the overall civil population (Wilkinson and Marmot, 1998).

Many scholars and organizations had defined the meaning of socio-economic characteristics and social determinants of health outcome. However, the main details about an indicator are involved mostly with social determinants and economic conditions which are strongly related to socio-economic characteristics, such as social gradient e.g. level of education, type of occupation and residential areas. Moreover, the most worldwide indicators used are the social determinants of health, which were constructed by WHO and the Public Health Agency of Canada, mentioned earlier. For example, the WHO (2003) has produced a booklet and campaign to promote awareness and action on the social determinants of health. The ten key determinants are constructed to assess health outcome such as 1) the social gradient, 2) stress, 3) early life, 4) social exclusion, 5) stress at work, 6) unemployment and job security, 7) social support, 8) addiction, 9) food, and 10) transport. Likewise, the Canadian Nurses Association (2005) affirmed that the social determinants of health consist of twelve indicators namely, 1) income and social status which are able to reflect socio-economic characteristics, 2) social support networks, 3) education level and literacy, 4) employment and working conditions, 5) social environments, 6) physical environment, 7) personal health practices and coping skills, 8) healthy child development, 9) biological and genetic endowment 10) health services 11) gender, and 12) culture. For this investigation, the social class and social determinants of health will be applied from the WHO's findings. However, due to the limitation of information in which to analyze all categories as defined by WHO, this study employs only some categories, such as socio-economic characteristics and social determinants of health as the predictor for labor force age health outcome. They are in the social gradient domain which is measured by type of occupation, level of education, and residential area.

For socio-economic characteristics and health outcome, many debates have ensued about this event. One example is that there are some variations of health outcome between the top rank and the bottom rank population. The community health

standards can represent a continuous social gradient that reflects both the advantage and the disadvantage of individual health status. The disadvantage in this instance may stand for having few family assets, poor education, being in a dead-end or insecure job, improper living environment, such as living in a poor housing environment (WHO, 2003). Likewise, the work place conditions, such as type of occupation may contribute to chronic stress. For example, there are a number of labor force age population who contact stress diseases at the work place. So that, working conditions with some levels of working class-lowest level such as laborer and low wage earner will increase the risk of contracting some chronic diseases. As a result, this kind of chronic stress is not that of the busy executive, but the stress of lower level jobs or lowest level of social class in the work place. Some studies found that, when people have little control over their work or few opportunities to use their skills, the risks of illness will be increased (Moore and Hayward, 1990; Stern, 1983). That is to say, jobs with high demand but fewest rewards will carry special risk of worse health conditions. Besides those who have jobs, those who are unemployed are also important. Unemployment can put health at risk, especially in regions where unemployment is widespread. Job insecurity is a chronic stress which increases the situation of a bad health outcome. Thus, when attempting to examine and predict an individual health outcome, an important indicator that should be included in the equation is individual habitual behavior. Hence, in this analysis individual addiction habits, such as alcohol and tobacco have been brought into account (Behrman, Sickles and Taubman, 1990). As much literature affirms, these habits are harmful to individual health. For example, alcohol dependence, drug use and smoking cigarettes are all closely associated with social class and economic disadvantage and social disruption. Numbers of research show that people who live under poorer economic and social conditions are more likely to consume alcohol and be addicted to cigarettes, when compared to those who are in a higher social class, such as the rich or those are living in more comfortable conditions (Ravenholt, 1984). In turn, the factors that lead to alcohol dependence intensifies with poor living standards and bad housing environments, low income-under low ranking of work, single parenthood, unemployment, etc. Moreover, the homeless and misplaced populations are all associated with a high rate of smoking which is a major cause of bad health. That is to say, to examine the above research question, it is important to observe some of these

behaviors whether are there any effects on health outcome. Information below will discuss the source of data and research methodology.

Data and Method

This research employs a cross-sectional analysis under a concept of a symmetrical event, in which the cause and consequences have occurred under the same situation. For example, the analysis believes that socio-economic characteristics and health outcome of the labor force age group will occur at the same time. The data are from the first round of the Kanchanaburi Demographic Surveillance System (KDSS) which was conducted by the Institute for Population and Social Research, Mahidol University, Thailand in 2000. The main information of the survey covers both information about population dynamics, such as demographic change, social and economic data file, and individual health information. And this is the advantage of this data set when employed for this investigation. Moreover, the study area is large and covered about 100 villages and urban communities. Importantly, the design of this KDSS is from a census perspective. As a result, it is able to observe each individual health outcome then aggregate it as the whole community. The unit of analysis is individual.

Likewise, the unit of observation is a household. Health outcome is the dependent variable, and measured from an individual self report, under the basis of a mutually exclusive event, all categories here are not dependent on each other, and divided into three categories, namely: 1) healthy 2) have some illness, and 3) have some chronic disease. The independent variables are classified into three domains, namely: 1) socio-economic characteristics and social gradient which are measured by level of education, type of occupation, and residential area, 2) addictive behavior is measured by cigarette smoking, and alcohol consumption, and 3) demographic factor, such as gender which refers to gender role, and age group that will be treated as independent variables as well. Based on the maximum likelihood principle, the majority of independent variables and controlled variables are constructed as dummy variables, excluding the level of education which has been classified under ordinal

scale. For this examination descriptive statistics also apply when describing individual characteristics, which are related to the empirical phenomena from surveys, the distribution and central tendency of data set. Besides, the inferential statistics were also used when examining the impact of socio-economic characteristics of labor force age on health outcome. Importantly, to make sure that this investigation is precise, colinearity and multicolinearity among independent variables are tested. Then the Multinomial Logistic Regression Analysis under STATA package is applied when exploring the impact of socio-economic characteristics on health outcome probability.

General characteristics of population

Table 1 and Table 2 show that the total number of population in this study is 22,876. When considering the health outcome, it was found that more than half of the population in KDSS reported that his or her health outcome is healthy while there were about 14 percent who reported that they have some illness, and about 23 percent reported that they have some chronic disease as shown in table 1. Thus, it is important to note that the number of people who have some chronic disease is more than those who have some illness.

Table 1: Number and percentage of population by health outcome

Variables	Number	Percentage
Health outcome		
- Healthy	14,388	62.9
- Have some illness	3,186	13.9
- Have some chronic diseases	5,302	23.2
Total	**22,876**	**100.0**

Looking at the information of individual characteristics, as shown in table 2, when considering gender, it was found that 45 percent of them are males while about 55 percent are females. The higher proportion of population are persons aged between

25-34 years old and 35-44 years old. For occupation, it is found that 42 percent of them work in the agricultural sector while 34 percent work outside the agricultural sector. Moreover, around 24 percent do not have job. For education, it is found that most of the people in this analysis have finished primary education level. Likewise, when focusing on residential area, about 25 percent of them live in an upland area, 22 percent live in an urban area, 20 percent live in a mixed area, 17 percent live in a rice area, and 16 percent live in a cash crop area respectively. Considering addictive behavior, about 67 percent of them do not smoke cigarettes. Similarly, around 58 percent do not drink alcohol.

Table 2: Number and percentage of population by social class and controlled variables

Variables	Number	Percentage
Gender		
- Male	10,267	44.9
- Female	12,609	55.1
Total	**22,876**	**100.0**
Age		
- Age 15-24	4,134	18.1
- Age 25-34	6,018	26.3
- Age 35-44	6,030	26.4
- Age 45-54	4,173	18.2
- Age 55-64	2,521	11.0
Total	**22,876**	**100.0**
Level of education		
- No education	3,881	16.9
- Primary education	13,766	60.2
- Secondary education	3,254	14.2
- College and above	1,975	8.6
Total	**22,876**	**100.0**

Table 2: (Continued)

Variables	Number	Percentage
Occupation		
- No job	5,511	24.1
- Agriculture	9,629	42.1
- Non agriculture	7,736	33.8
Total	**22,876**	**100.0**
Residential area		
- Urban area	5,123	22.4
- Rice area	3,770	16.5
- Cash crop area	3,636	15.9
- Upland area	5,632	24.6
- Mixed	4,715	20.6
Total	**22,876**	**100.0**
Smoking		
- Smoke	7,646	33.4
- Not smoke	15,230	66.6
Total	**22,876**	**100.0**
Alcohol drinking		
- Drink	9,733	42.5
- Not drink	13,143	57.5
Total	**22,876**	**100.0**

To explore health outcome under differential of socio-economic status, it is necessary to examine some cross tabulation method. From table 3, the results found that females have the higher proportion for both chronic disease and illness than males, about 10 percent. When looking at age group, the distribution of data in this variable is based on the law of nature, that in the younger age group, the percentage of healthy is high. Conversely, in the older age group, the percentage of healthy is lower.

Moreover, when focusing on addictive behavior, about 60 percent of people who use tobacco are healthy, while 40 percent of them have some chronic disease or some illness. This proportion shows a 10 % lower proportions in people who do not use

tobacco that is about 70 percent are healthy. For alcohol consumption, it has found a similar proportion of people who drink alcohol seem to have a higher percentage of some chronic disease and some illness when compared to those who do not drink.

Table 3: Cross-tabulation percentage of health outcome by socio-economic characteristics and some independent variables

Variables	Healthy	Illness	Diseases	Total
Gender				
- Male	72.4	9.7	17.9	100.0
- Female	55.2	17.3	27.5	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**
Age				
- Age 15-24	82.2	6.1	11.8	100.0
- Age 25-34	71.3	10.4	18.3	100.0
- Age 35-44	61.3	14.5	24.2	100.0
- Age 45-54	49.3	19.9	30.9	100.0
- Age 55-64	37.6	24.2	38.3	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**
Level of education				
- No education	58.3	20.3	21.4	100.0
- Primary education	59.5	15.3	25.3	100.0
- Secondary education	77.6	5.7	16.7	100.0
- College and above	71.6	5.6	22.8	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**
Occupation				
- No job	61.9	14.1	24.0	100.0
- Agriculture	60.5	16.6	23.0	100.0
- Non agriculture	66.6	10.5	22.9	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**
Residential area				
- Urban area	64.4	10.4	25.2	100.0
- Rice area	57.7	19.6	22.7	100.0
- Cash crop area	61.4	13.2	25.4	100.0
- Upland area	65.8	15.3	18.9	100.0
- Others	63.1	12.2	24.7	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**

Table 3: (Continued)

Variables	Healthy	Illness	Diseases	Total
Smoking				
- Smoke	59.9	14.2	25.9	100.0
- Not smoke	68.9	13.4	17.7	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**
Alcohol drinking				
- Drink	60.5	14.0	25.5	100.0
- Not drink	66.1	13.8	20.1	100.0
Total	**62.9**	**13.9**	**23.2**	**100.0**

Information about mean and standard deviation that will be used for this analysis is shown in table 4.

Table 4: The mean and standard deviation of variables

Variables	Mean	S.D.
Gender		
- Male	0.45	0.50
- Female	0.55	0.50
Age		
- Age 15-24	0.18	18.1
- Age 25-34	0.26	26.3
- Age 35-44	0.26	26.4
- Age 45-54	0.18	18.2
- Age 55-64	0.11	11.0
Level of education		
- No education	0.15	33.4
- Primary education	0.60	66.6
- Secondary education	0.14	42.5
- College and above	0.09	57.5
Occupation		
- No job	0.24	24.1
- Agriculture	0.42	42.1
- Non agriculture	0.34	33.8

Table 4: (Continued)

Variables	Mean	S.D.
Residential area		
- Urban area	0.22	22.4
- Rice area	0.16	16.5
- Cash crop area	0.16	15.9
- Upland area	0.25	24.6
- Mix area	0.21	20.6
Smoking		
- Smoke	0.33	0.47
- Not smoke	0.67	0.47
Alcohol drinking		
- Drink	0.43	0.49
- Not drink	0.57	0.49

Impact of Socio-economic Characteristics on Health Outcome

To estimate the probabilities that would occur on health outcome by using socio-economic characteristics and social determinants of health as independent variables, this study constructed 2 statistical models for analysis with different purposes as follows:

Model 1: *To estimate probabilities that would occur on health outcome by taking the socio-economic characteristics and social gradient indicator as independent control variables for demographic factors.*

Model 2: *To estimate probabilities that would occur on health outcome by taking the socio-economic characteristics and social gradient and addiction as independent control variables for demographic factors.*

Results from table 5 indicate that the male when compared to the female had a more significantly negative effect with the probability of some chronic disease and some illness when compared with the healthy category. This explains that those males

were more likely to have a healthy outcome than the females. Considering age group, it was found that when comparing the younger people with the older people, the younger ones would be stronger and have a lower probability of some chronic disease and/or some illness than the older people. This result corresponds with the Gompertz's law of mortality, which investigated the mortality of the British, Swedish, and French among ages between 20 and 60 years old, and discovered that while the age of the people would be increased in arithmetic progression, the probability of human death would be increased in geometric progression pervasively (Gompertz, 1825). In this situation, it can be summarized that when the age of people increased, the chance of them dying or having some chronic disease would be increased as well.

Table 5: Multinomial logistic regression coefficient of socio-economic factors, consumptive behavior, living environment, and control variables on probability of health outcome

Variables	Model 1			Model 2		
	Illness VS Healthy	Diseases VS Healthy	Illness VS Diseases	Illness VS Healthy	Diseases VS Healthy	Illness VS Diseases
Gender						
- Male	-0.883***	-0.762***	-0.121*	-0.933***	-0.575***	-0.358***
- Female#						
Age						
- Age 15-24#						
- Age 25-34	0.550***	0.577***	-0.028	0.530***	0.616***	-0.086
- Age 35-44	1.008***	1.046***	-0.037	0.983***	1.096***	-0.113
- Age 45-54	1.519***	1.520***	-0.002	1.493***	1.568***	-0.074
- Age 55-64	2.000***	2.026***	-0.027	1.913***	2.064***	-0.078
Level of education						
- No education#						
- Primary	-0.118*	0.273***	-0.391***	-0.126*	0.236***	-0.362***
- Secondary	-0.719***	0.100	-0.819***	-0.725***	0.035	-0.759***
- College and above	-0.940***	0.163*	-1.103***	-0.942***	0.089	-1.029***
Occupation						
- Agriculture#						
- No job	-0.063	0.133*	-0.196**	-0.058	0.127*	-0.186**
- Non agriculture	-0.132*	0.050	-0.182*	-0.130*	0.044	-0.175*

Table 5: (Continued)

Variables	Model 1			Model 2		
	Illness VS Healthy	Diseases VS Healthy	Illness VS Diseases	Illness VS Healthy	Diseases VS Healthy	Illness VS Diseases
Residential area						
- Urban area	0.016	0.014	0.002	0.018	0.004	0.014
- Rice area		0.029	0.506***	0.526***	0.029	0.497***
- Cash crop area	0.535***	0.140*	-0.043	0.090	0.148*	-0.059
- Upland area	0.097	-0.196***	0.384***	0.186**	-0.139*	0.325***
- Mix area#	0.188*					
Smoking						
- Smoke				-0.019	0.309***	-0.290***
- Not smoke#						
Alcohol drinking						
- Drink				-0.153**	0.090*	-0.243***
- Not drink#						
Constant	-2.013***	-1.871***	-0.142	-2.027***	-1.826***	-0.201
Pseudo R2	0.0765			0.0784		
N	22,876			22,876		
LR Chi2 (28)	3167.30			3245.09		
Log Likelihood	-19120.16			-19081.26		

*** p<0.001, **p<0.01, *p<0.05 # Reference group

When focused on socio-economic factors, the results from model 1 and model 2 gave the same results that the level of education had a more significantly negative effect with the probabilities to have some illness. This means that people who attained higher education would be more likely to have healthy outcomes than those who have lower levels of education. This result affirmed that the poorer social conditions including worse economic circumstances, and disadvantage in education, will have effect on health outcome throughout the life (Wilkinson and Marmot, 1998). Moreover, when the level of education has increased, the chance of illness will be decreased.

By contrast, it has found that the chance to have some chronic disease will slightly increase. This might be the effect of stress from work conditions. The turning point between level of education and healthy outcome is primary school; people who finished primary school would be more likely to have healthy outcomes when compared to those who did not attain any educational level. Importantly, after primary school, the probabilities to have healthy outcome is increased as shown in figure 1. Similarly, when looking at the impact of occupation on health outcome, see figure 2, individuals who had no jobs and those working in a non-agricultural sector had more chance to have some chronic diseases when compared with those who are working in an agricultural sector. The results were confirmed by the finding of the World Health Organization, which found empirical evidence from a number of countries that unemployment contributes to health risk, and the risk is higher in regions where unemployment is widespread, even after allowing for other factors, unemployed people and their families would suffer a substantially increased risk of premature death. The health effects of unemployment are linked to both its psychological consequences and the financial problems it brings– especially debt (World Health Organization, 2003). Thus, socio-economic characteristics and social gradient in KDSS context seem to have impact on health outcome. Conventionally, probability is presented in Figure 1 and Figure 2.

Figure 1

Simulated probabilities of level of education on health outcome

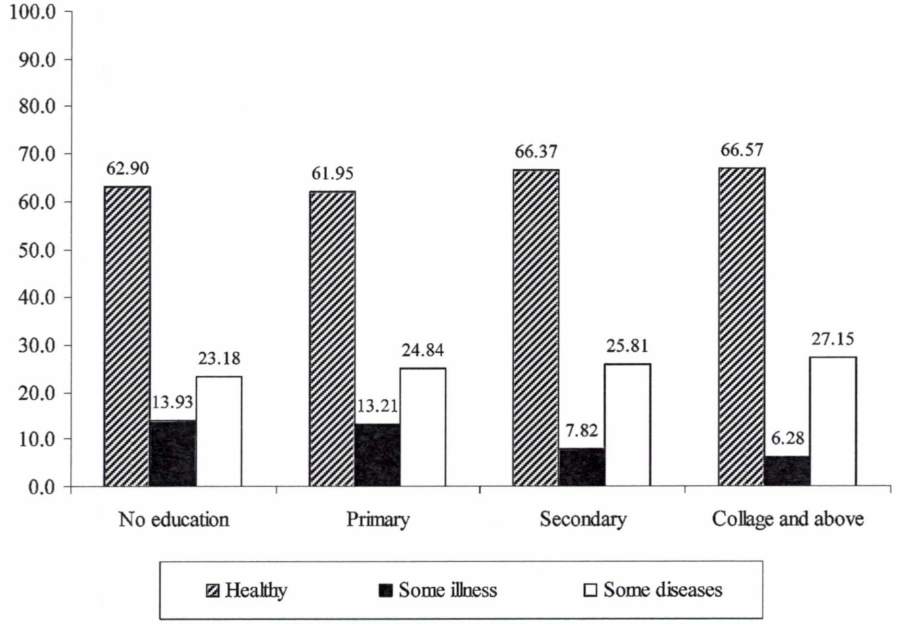
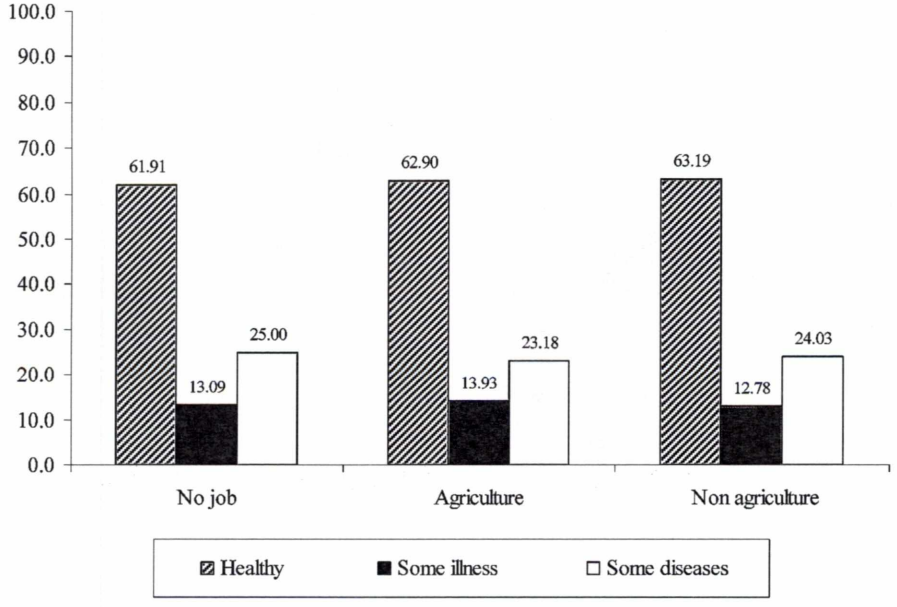


Figure 2

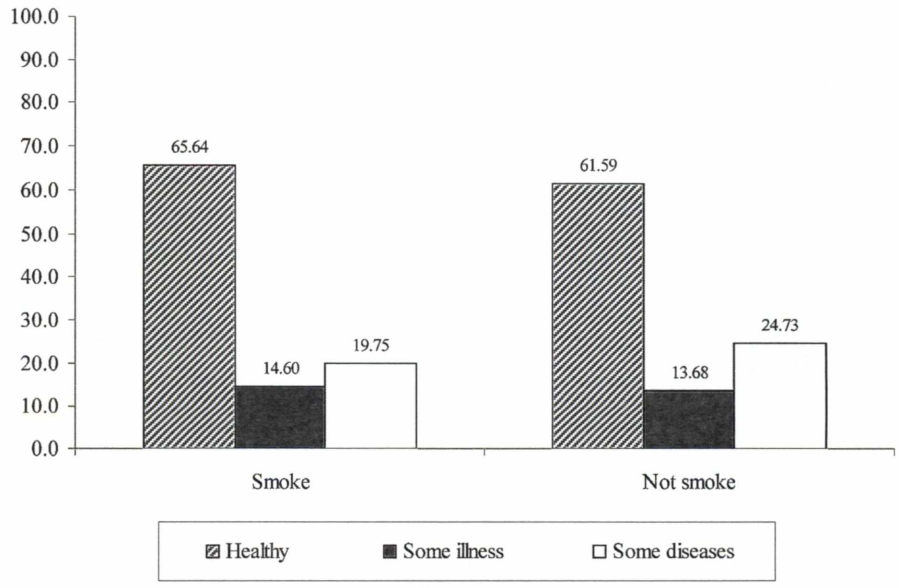
Simulated probabilities of occupation on health outcome



From model 2 as shown in table 5, this model adds the addictive behavior and living environment factors into a statistical model. The results found that the effect of variable in model 1 remain in the same direction. Interestingly, the newly added variables, the addiction indictor, show that both smoking behavior and alcohol consumption have significantly greater effects on having some chronic diseases. This can be explained that people who smoke cigarettes are more likely to have some chronic diseases than to have a healthy outcome or to have some illness when compared to those who do not smoke. For more detail, this variable was simulated as shown in figure 3. And it has found that; when everything being equal, about 5% of people who smoke cigarettes has a higher chance to have some chronic diseases than those who do not smoke cigarettes. Furthermore, the chance to have a healthy outcome would be lower, which is about 5 percent as well.

Figure 3

Simulated probabilities of smoking behavior on health outcome



When focused on alcohol drinking behavior, table 5 and figure 4 show that it has the same direction as with smoking behavior. However, the effect is quite smaller when compared to smoking behavior. The influences of this factor create some differentials among each health outcome, about 1-2 percent, even if it is a tiny number in statistics, but when thinking about human beings' lifespan, these numbers may contribute to a long term effect on the whole period of a lifespan. From the above results, it can be summarized that both smoking and alcohol consumption are able to cause a high burden of disease and increase the number of injuries. For example evidence from Europe has found that tobacco is the single largest cause of avoidable death, accounting for over half a million deaths each year and over a million deaths in Europe as a whole (The Fred Hollows Foundation, 2004). Besides, alcohol is one of the key health determinants which need to be tackled. It is not only health consequences in a narrow sense which raise concern, but also the social dimension which has to be considered, such as violence, crime, family problems, social exclusion, and problems at the workplace and drunk driving. Furthermore, when looking at the impact of residential area, results from table 5 show that the overall effects of this variable do not have any effect on health outcome. However, when considering in detail, it has found that there are some significant effects between people who live in a rice area and a mixed area. For example, figure 5 shows that people who live in a rice area have more chance to have some illness than those who live in other areas. Interestingly, people who live in an upland area, have the highest chance to have healthy outcome, and have a lower chance to have some chronic diseases when compared to those who live in other areas.

Figure 4

Simulated probabilities of alcohol drinking behavior on health outcome

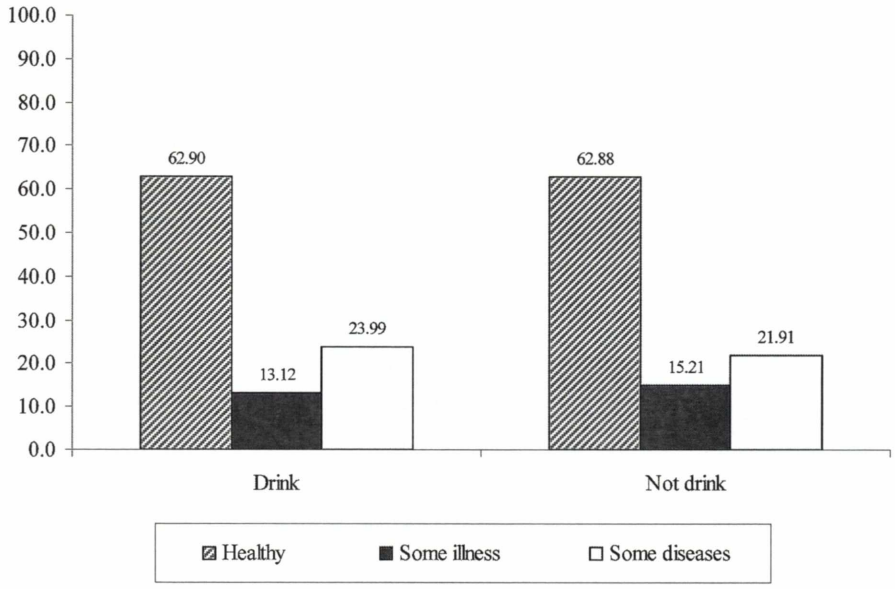
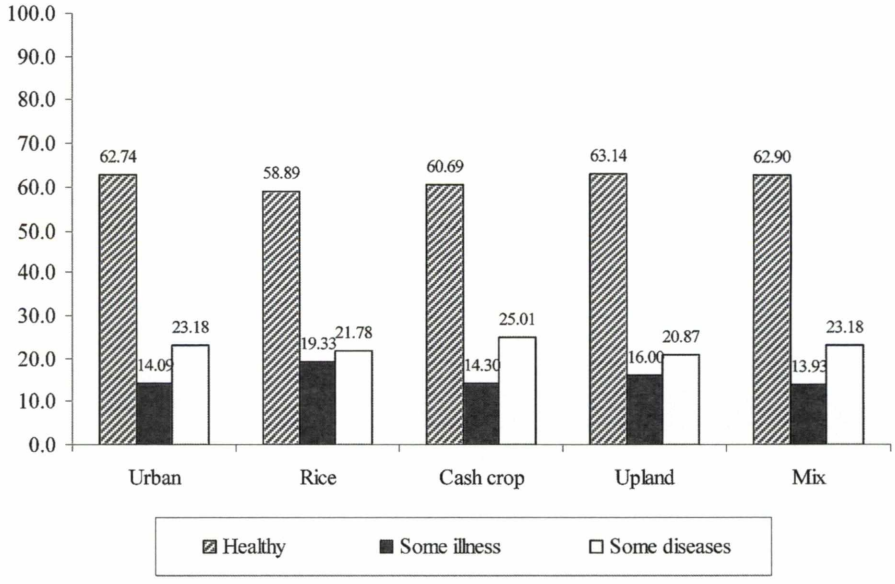


Figure 5

Simulated probabilities of living areas on health outcome



Conclusion

From the above results, it can be summarized that all of social class factors, the most important factor which affects health outcome, after socio-economic characteristics, is addictive behavior, which is smoking and alcohol drinking. Regarding this result, demographic factors such as gender and age group, which are control variables, have indicated that both of them have strong significant effect on health outcome. For example, males are more likely to have healthy outcome when compared to females. By the same token, the younger age group is more likely to have healthy outcome when compared to the older one. However, the main reasons that these variables were not simulated are due to the fact that all of them are physical or biological factors. That is gender can not be changed and cannot be selected. For age, it will be changed when time increases. Importantly, this follows the Rational Choice Theory which is the background theory of maximization utilization method. The benefit of this method would provide the best choice for policy planning. Thus, the recommendation of this study will be provided under three aspects, the first aspect a "Prevention campaign". This campaign should be focused on the younger population. They are the healthy folks in this situation. The important risk factor that should be prevented is addictive behavior, such as drug use, tobacco smoking, and alcohol consumption. For this reason, the best way to protect the adolescent from some chronic disease or some illness is the prevention campaign.

The second aspect is a "Promotion campaign" among the adult age group, which is between 35 and 44 years old. This age group has a high risk of some chronic disease and some illness from working conditions. Thus, it is important to take care of the workplace conditions in order to help this social determinant of health. For those who are unemployed, it is important to provide jobs for them via job training programs because it is another risk factor that contributes to worse health outcome. The implementation to promoting health for this population is that there should be some welfare such as free diagnoses service, etc. These programs will help to reduce the chronic stress when people do not have jobs. And, the last aspect is a "Rehabilitation campaign" which should be provided among the older age group which is around 45

until 64 years old because they have the highest risk of having some chronic disease and some illness. Moreover, among these older persons, some of them may already have some chronic diseases and some illnesses. Thus, to recover and to treat this age group there should be some health giving activities that can be provided, with enough budgets for treatment, to gain a healthy outcome. The benefit of the campaign is not only to improve health for the civil population, but also to decrease the budget of health care service in the near future. Finally, it is important to note that the improvement in the educational policy for those people who have less education and for those who are unemployed should also be immediately implemented.

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