

ผลของพฤติกรรมส่งเสริมสุขภาพที่มีต่อภาวะสุขภาพของผู้สูงอายุในเวียดนามใต้



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THE EFFECT OF HEALTH PROMOTING BEHAVIOR
ON HEALTH STATUS OF ELDERLY PEOPLE
IN SOUTHERN VIETNAM

Miss Mai Nguyen Nhat Chi



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for the Degree of Master of Arts Program in Demography
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มาย เห่งวียน นัท จี : ผลของพฤติกรรมส่งเสริมสุขภาพที่มีต่อภาวะสุขภาพของผู้สูงอายุในเวียดนามใต้ (THE EFFECT OF HEALTH PROMOTING BEHAVIOR ON HEALTH STATUS OF ELDERLY PEOPLE IN SOUTHERN VIETNAM) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. วิพรรณ ประจวบเหมาะ, 73 หน้า.

ผลกระทบของพฤติกรรมส่งเสริมสุขภาพต่อภาวะสุขภาพของผู้สูงอายุในเวียดนามใต้

ประเทศเวียดนามจัดเป็นประเทศลำดับต้นของอาเซียนที่สัดส่วนของผู้สูงอายุเพิ่มขึ้นอย่างรวดเร็วมาก ซึ่งประเด็นท้าทายประเด็นที่สำคัญประการหนึ่งจากการเพิ่มขึ้นอย่างรวดเร็วของประชากรสูงอายุนี้ คือ การเปลี่ยนแปลงแบบแผนของการเจ็บป่วยจากโรคติดต่อเป็นโรคไม่ติดต่อ แบบแผนการเจ็บป่วยที่เปลี่ยนไปนี้มีแนวโน้มที่จะนำไปสู่การเพิ่มขึ้นของภาระโรคจากโรคเรื้อรังในเวียดนาม ก่อให้เกิดภาระทางเศรษฐกิจที่หนักหน่วงทั้งต่อผู้สูงอายุ ครอบครัว และภาครัฐ เพื่อรับมือกับโรคที่ไม่ติดต่อหรือโรคเรื้อรังนี้ การส่งเสริมสุขภาพกลายเป็นมาตรการที่สำคัญ

แม้ว่าประเด็นทางด้านสุขภาพ และพฤติกรรมสุขภาพของผู้สูงอายุจะเป็นประเด็นที่สำคัญที่ส่งผลต่อความอยู่ดีมีสุขและการพัฒนาอย่างยั่งยืนของประเทศ แต่พบว่ามีการศึกษาในประเด็นดังกล่าวค่อนข้างน้อย และส่วนใหญ่ยังจำกัดการศึกษาอยู่ที่เวียดนามเหนือ ดังนั้นการศึกษาค้นคว้าวิจัยมีวัตถุประสงค์เพื่อศึกษาภาวะสุขภาพของผู้สูงอายุที่เวียดนามใต้ และศึกษาความสัมพันธ์ระหว่างพฤติกรรมส่งเสริมสุขภาพกับสภาวะสุขภาพของผู้สูงอายุ

การศึกษาค้นคว้าครั้งนี้ใช้ข้อมูลจากการสำรวจ “the Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants” ซึ่งเก็บรวบรวมข้อมูลโดย the Institute of Hygiene and Public Health ร่วมกับ องค์การอนามัยโลก (WHO) ในปี พ.ศ.2553 โดยสภาวะสุขภาพประเมินโดยใช้ค่าดัชนีมวลกาย (Body Mass Index: BMI)

ผลการศึกษาโดยการวิเคราะห์แบบหลายตัวแปร พบว่าหลังจากการควบคุมด้วยตัวแปรภูมิหลังอื่นๆ พฤติกรรมสุขภาพ โดยเฉพาะการรับประทานอาหาร พฤติกรรมการบริโภคแอลกอฮอล์ และการเดินต่อวัน มีอิทธิพลต่อภาวะสุขภาพของผู้สูงอายุอย่างมีนัยสำคัญทางสถิติ นอกจากนี้ยังพบความแตกต่างของสภาวะสุขภาพของผู้สูงอายุระหว่างผู้สูงอายุที่อาศัยอยู่ในเมืองและชนบทอีกด้วย

คำสำคัญ: ผู้สูงอายุ พฤติกรรมส่งเสริมสุขภาพ การรับประทานอาหาร สภาวะสุขภาพ ดัชนีมวลกาย

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KEYWORDS: BMI / OLDER PEOPLE / HEALTH STATUS / HEALTH PROMOTING BEHAVIORS / NUTRITION INTAKE

MAI NGUYEN NHAT CHI: THE EFFECT OF HEALTH PROMOTING BEHAVIOR ON HEALTH STATUS OF ELDERLY PEOPLE IN SOUTHERN VIETNAM. ADVISOR: ASSOC. PROF. VIPAN PRACHUABMOH, Ph.D., 73 pp.

Vietnam is one of the forefront countries in ASEAN in term of rapid population aging. One of the major challenges of rapid population aging is the shifting in the morbidity patterns from communicable diseases to non-communicable diseases. Therefore, the shifting in morbidity and mortality patterns among older persons is likely to increase the burden of chronic diseases in Vietnam, which may result in a heavy economic burden on older persons, their family, and the government. In order to combat with non-communicable diseases, the health promoting behavior has been introduced as an important measure.

Although the health status and health behavior of the elderly are one of the major challenges for their well-being and the sustainable development of the country, there are very few studies focusing on this issue. In addition, most of the study concentrated on Northern Vietnam. So far, there are very few studies about the health status of the elderly in Southern Vietnam. Therefore, this study attempted to explore the situation of health status of the elderly in Southern Vietnam as well as the relationship between health promoting behavior and health status of the elderly.

This study utilizes the secondary data from “the Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants” conducted by the Institute of Hygiene and Public Health in cooperation with WHO in 2010. The health status is assessed by Body Mass Index.

The results from multivariate analysis reveal when controlling for all background variables of the older persons, the health behavior, especially nutritional intake and alcohol consumption, and walking per day has statistically significant on the health status of older persons. The result also reveals the difference in health status among older persons in urban and rural areas.

Field of Study: Demography

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Student's Signature

Advisor's Signature

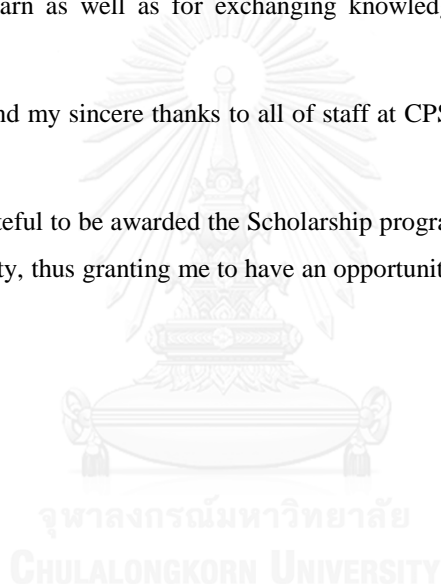
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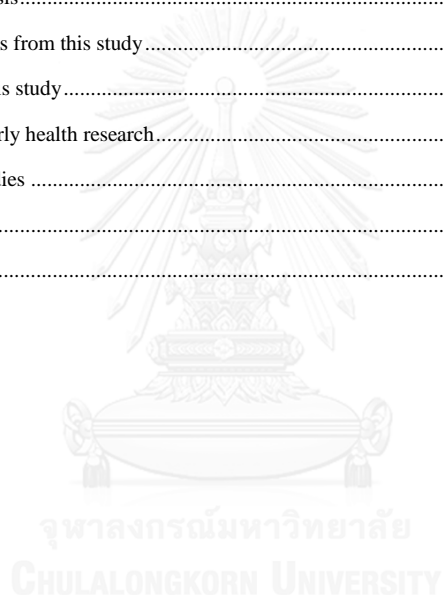
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ABBREVIATION

| | |
|--------|--|
| BMI | Body Mass Index |
| CDC | Centers for Disease Control and Prevention |
| DESA | Department of Economic and Social Affairs |
| DHHS | Department of Health and Human Services |
| GOPFP | General Office for Population Family Planning |
| GSO | General Statistics Office |
| IOTF | International Obesity Task Force |
| MNA | Mini Nutrition Assessment |
| MOH | Ministry of Health |
| NCDs | Non-Communicable Diseases |
| NHANES | National Health and Nutrition Examination Survey |
| SES | Socio-economic Status |
| TFR | Total Fertility Rate |
| UN | United Nations |
| UNICEF | United Nations Children's Fund |
| UNFPA | United Nations Fund for Population Activities |
| WC | Waist Circumference |
| WHO | World Health Organization |

CHAPTER 1

INTRODUCTION

1.1 Background

During the twenty-first century, population aging is a major demographic trend of the world population, including developing countries. According to demographic transition theory, there is a shift from high fertility and mortality rates to low fertility and mortality rates; therefore, the age structure increases. In Vietnam, the total fertility rate decreases from 3.8 in 1989 to 2.0 in 2009 and the life expectancy increases from 66 years in 1989 to 72 years in 2009 (Census United State Bureau 2009).

Vietnam is one of the developing countries in the post transitional phases of demographic transition. As the Vietnam age structure changes from young population to old population, the number of the population aged 60 and above increases by almost threefold from 3.71 million in 1979 to 9.47 million in 2008. During the same period, the proportion of older persons increases from 6.9 percent to around 10 percent (Binh 2012). The population proportion of the elderly in Vietnam is projected to reach 26.10 percent by 2049 (MoH, GOPFP et al. 2009).

One of the major challenges to rapid population aging is the shift in morbidity pattern from communicable diseases to non-communicable diseases (UNDESA 2012). In the case of Vietnam, the incidence of communicable diseases has fallen while the incidence of non-communicable diseases has increased in recent decades (Fitzpatrick, Ngo et al. 2012). The contribution of morbidity due to communicable diseases has reduced from 55.5 percent in 1976 to 24.9 percent in 2006, while non-communicable diseases has increased from 39.0 percent in 1986 to 62.4 percent in 2006. Likewise, the mortality rate due to communicable diseases has declined from 53.1 percent in 1976 to 13.2 percent in 2006, while the mortality due to non-communicable diseases

has respectively increased from 41.1 percent in 1986 to 61.6 percent in 2006. It is clear that the non-communicable diseases have become one of the leading causes of death among both young adults and older people, particularly among older persons (Hoi and Phuc 2009). In Vietnam, there were four main groups of the non-communicable diseases: heart disease, cancer, type II diabetes, epilepsy and depression. The prevalence of heart disease related to high blood pressure was highest among elderly aged 60-74 years old about 42% (MoH, GOPFP et al. 2009). According to Dam Huu Dac and colleagues (2010), the study indicated that 95% older people suffered at least one non-communicable disease such as joint disease, diabetes, stroke (UNFPA 2011).

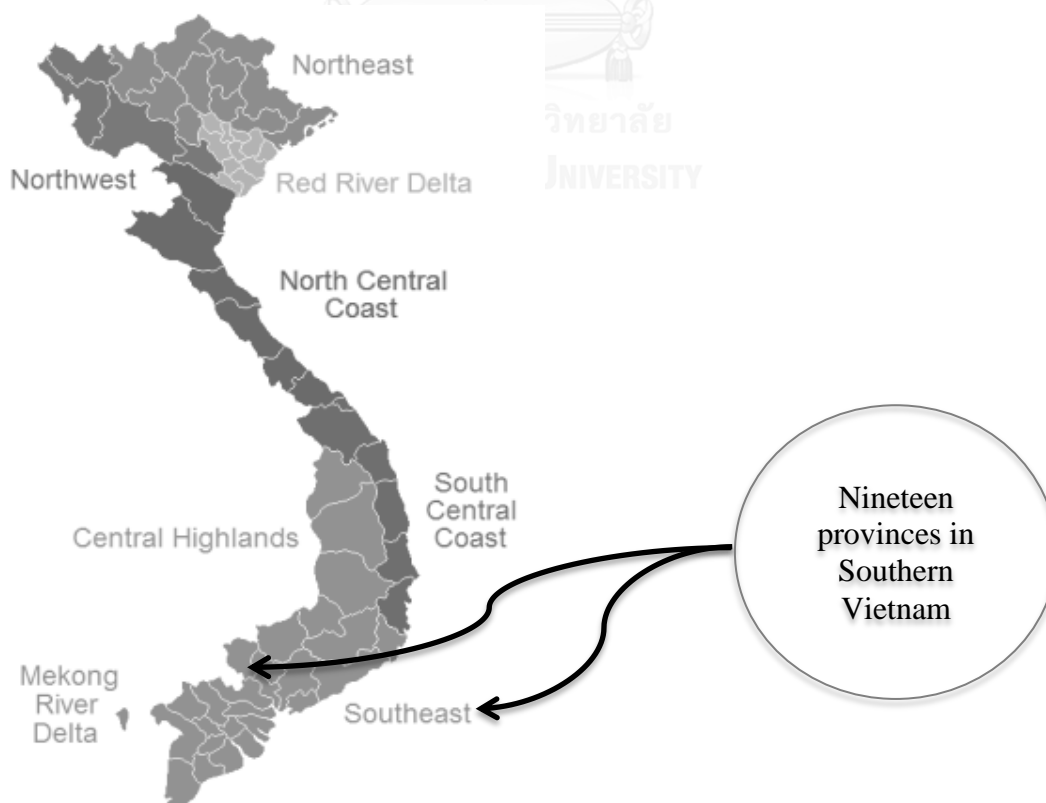
Moreover, population aging has high health expenditures because of high incidence of morbidity and the increased demand for long term health care (UNDESA 2013). Therefore, the shift in morbidity and mortality patterns among older persons is likely to increase the burden of chronic diseases in Vietnam, which may result in a heavy economic burden on older persons, their family, and the government.

In order to tackle with non-communicable diseases, health promoting behavior has been introduced as an important measure. Beginning in the 1990s, many notable demographers found that health promoting behaviors are considered as an effective means to reduce health expenditure and also to enhance the quality of life of elderly people (Goldberg and Chavin 1997 , Leveille, Guralnik et al. 1999, Sims, Kerse et al. 2000). These behaviors include: exercising regularly, smoking cessation, avoiding excessive alcohol consumption, nutrition balance, and having suitable immunization (US DHHS 2000).

Although the health status and health behavior of the elderly are one of the major challenges for the elderly well-being and the sustainability development of the country, there are very few studies in Vietnam focusing on this issue. So far, there are few studies about health status of the elderly in Southern Vietnam because most of the studies are concentrated in Northern Vietnam. However, Southern Vietnam has many prominent characteristics. Firstly, this area has the high population distribution

compare with two other regions that accounts for 36.4 percent of the population in 2006 (Census United State Bureau 2006, Evers and Benedikter 2009). Secondly, the Southern area has the highest number of elderly people who are living in temporary houses such as camps, tents or places used for living like under bridges, containers, etc., compared to the North, about 12.0 percent and 0.8 percent (Vietnam Women's Union 2011). Thirdly, older people in the South are currently working at 44.2 percent compared to 29.2 percent in the North; however, they have less savings for emergencies and health care such as for sickness or for spending on health prevention than those in the North, 6.0 percent and 11.4 percent (Vietnam Women's Union 2011). Finally, Vietnam has limited research on the relationship between the health promoting behavior and health status of the elderly. Therefore, this study will explore the health status of the elderly in Southern Vietnam and its relationship to health promoting behavior. Furthermore, this study aims to improve the understanding of the trends and disparities in the health condition of older persons, which will in turn assist in supplying a suitable policy on the older persons' needs for health and social care system.

Figure 1: Map of Vietnam



1.2 Research question

How and to what extent does the health promoting behavior influence the health status of older people in Southern Vietnam?

1.3 Objectives of the study

To investigate the effect of health promoting behavior on the health status of older people in the Southern Vietnam.

1.4 Thesis structure

Chapter 1: Introduction

This chapter includes five sections. It covers background information about Vietnam, and highlights the burden of older people in Southern Vietnam. The objective of this study is given to bring benefits of health care for older people. This study is first step for continued research of the Vietnamese elderly.

Chapter 2: Literature Review

This chapter contains six sections. Firstly, it describes briefly about past demographic trend in Vietnam regarding the increase in aging population. Then, it synthesizes previous studies with suitable factors linking the objective and outcomes of this thesis. Theories and models by researchers are applied to develop the framework for clarity with the boundary of thesis.

Chapter 3: Research Method

This chapter shows six parts. This chapter starts with the introduction to data from “The Survey on Inequity on Health and Nutritional Status of Aged People Living in

Urban and Rural Areas of the Southern Vietnam and Its Social Determinants” and is conducted by the Institute of Hygiene and Public Health in cooperation with WHO in 2010. Then, it explains dependent and independent variables in this study. Some limitations of this study also are presented in chapter three.

Chapter 4: Research Findings

Based on the secondary data of “The Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants”, this chapter presents the resulting study association with frame work in chapter two and the remarkable significance of the data, thus indicating the main objective of this study.

Chapter 5: Discussion and recommendations

This chapter demonstrates not only the summary but also discussion of the findings in previous chapters. Throughout the limitations of the study, recommendations are given to enhance health care system for elderly people in Vietnam.

CHAPTER 2

LITERATURE REVIEW

The literature review consists of six parts. The first part describes the demographic trend in Vietnam. The second part describes Vietnam's health transition. The third part explains why Body Mass Index (BMI) is used as a measurement of health status of the elderly. The fourth part focuses on the synthesizing of the effect of health promoting behavior on the health status of the elderly leading to the conceptual framework of this research. The fifth part focuses on the relationship between health promoting behavior and health status. The last part considers the effect of other factors that influence on health status.

2.1 Demographic trends

During the Vietnam War, it was difficult to count the number of births and deaths due to the lack of vital registrations. Also, Vietnam was divided into two regions, the North and the South, after the First Indochina War in 1954. In addition, internal and international migratory flows followed the reunification of Vietnam in 1975 (Demeny P.G. 1967).

Despite limited and poor demographic data, fertility and mortality rates were estimated and the data showed the declining trend from very high levels to very low levels for Vietnam. However, North and South Vietnam have different demographic transition processes. For the North, crude death rate dropped sharply from 26 per thousand in 1936 to 6.6 per thousand in 1970, while mortality in the South still stayed at higher level or about 12 per thousand for the first half of the 1970s (Jones 1982). After the reunification of Vietnam in 1975, fertility and mortality rates were assessed for the whole country. The mortality rate of Vietnam has continued to decline from around 8 per thousand in 1980s and 1990s period to about 6 per thousand in 2014, while fertility rate has also declined from 3.8 children per woman to 1.8 children per woman. Life expectancy of Vietnamese has also increased from 66 years to 73 years

during the same period (Census United State Bureau 2014). However, there were TFR differences between the North and the South in 2009 (2.11 – 2.24 children per woman in the North compared to 1.69 – 1.84 children per woman in the South respectively). There was also a difference between urban and rural, around 1.81 children per woman compared to 2.14 children per woman in 2009 respectively (GSO 2010).

The Total Fertility Rate (TFR) in Vietnam reduced slowly during the transitional periods in the late 1960s. It took about twenty years for TFR to reduce from over 6 children per woman in 1969 to around 4 children per woman in 1989. During this period TFR in the South had declined from 6.6 children per woman to 4 children per woman, while TFR in the North had declined from 5.7 children per woman to 4.3 children per woman. TFR difference in 1969 between the North and the South was due to the family planning services launched earlier in the Northern in 1963 (Allman and et al. 1991). After 1990, TFR for both parts of the country declined in similar pace. The TFR for the whole country decreased from 3.2 children per woman in 1990s to 1.9 children per woman in 2012 (UN 2012).

Sharp reductions in fertility and mortality rates led to a change in population age structure in Vietnam. As a result, the proportion of child population (aged 0-14) has decreased rapidly, while the proportion of older population (aged 60 and over) has increased sharply. According to United Nations and Department of Economic and Social Affairs, aging index (the number of older persons per child) was about 22 percent in 2000, and it has been projected to be about 52.8 percent in 2025, and over 100 percent in 2050 (UNDESA 2002a). This means that the older people will outnumber the children in 2050 or so.

By reviewing the demographic trends of the shifting population age structure from young population to old population in Vietnam, there are new challenges to the well-being of older persons, especially on how to maintain healthy status in old age.

2.2 Health transition

The demographic transition process is closely associated with the health transition or epidemiological transition process. According to Omran 1971, the epidemiological transition theory focused on the change of disease patterns in relation to fertility and mortality transition as well as the change in lifestyles, improvement of health care services, and medical and technological advancement. Omran (1971) divided health transition into four stages: 1) the “age of pestilence and famine”; 2) the “age of receding pandemics”; 3) the “age of degenerative and man-made diseases”; 4) the “age of delayed degenerative diseases” (see Table 1).

Table 1: The four stages of epidemiological transition (Omran 1971)

| Stage | Degree of socio-economic development | Life Expectancy (years) | Broad disease Categories | Change within broad disease categories (proportionate mortality) |
|-------------------------------------|--------------------------------------|-------------------------|--|--|
| 1) The age of pestilence and famine | + | about 30 | High infections and nutritional deficiencies | Cardiovascular diseases (CVDs): 5-10% related to nutrition/infection (e.g. Rheumatic heart disease (RHD). Infectious diseases: 3/4 of deaths |
| 2) The age of Receding pandemics | ++ (developing countries) | 30 - 50 | Improve sanitation: decrease infections, increase dietary risks (Katsarou, Tyrovolas et al.), increase aging | CVDs: 10-35% hypertensive heart disease, stroke, sequels of RHD |

| Stage | Degree of socio-economic development | Life Expectancy (years) | Broad disease Categories | Change within broad disease categories (proportionate mortality) |
|---|--------------------------------------|-------------------------|---|---|
| 3) The age of degenerative and man-made disease | +++ (countries in transition) | 50-55 | Raise in the aging population, change lifestyles related to better socio-economic Status (consume behavior, physical activities, alcohol consumption) | CVDs: 35 – 65%. Obesity, dyslipidemias, high blood pressure, smoking, coronary heart disease, stroke |
| 4) The age of Delayed degenerative diseases | ++++ (Western countries) | about 70 | Decrease in health-risk factors and behaviors in the population (by prevention, health promotion, and increase new treatment) | CVDs < 50% (delayed decrease total CVDs due to aging population & increase prevalence due to better treatment) |

Source: (Omran 1971) "The epidemiological transition: a theory of the epidemiology and population change." *Milbank Q* 49: 509-538.

After 1955, life expectancy at birth of the Vietnamese had continued to increase and reached 60 years old in 1978 (Banister J. 1985). A decrease in infectious diseases seemed to be the main reason for an increase in life expectancy. The proportion of

deaths caused by communicable diseases reduced from 53 percent in 1976 to merely 17.4 percent in 2003. These numbers had reflected a successful program of controlling communicable diseases, namely the Expanded Program of Immunization (WHO in the Western Pacific 2006).

In 1986, the Vietnam Government reformed its economic political system called “Doi Moi” or moving towards the socialist-oriented market economy. This reform led to a rapid economic development as well as an enhanced human capital in terms of education and health status as well as the nutritional status. The number of households with poor nutrition intakes (fewer than 2,100 calories/person/day) reduced from 58 percent to 29 percent from 1993 to 2002 (Huong 2006). In this period of economic reform, there were also rising trends of morbidity and mortality due to non-communicable diseases (NCDs). Morbidity due to non-communicable disease increased from 39 percent in 1986 to 65 percent in 1997 (MoH 1998). The non-communicable diseases, such as cardiovascular diseases, stroke, hypertension, and heart failure seemed to relate to the changing lifestyle and increasing affluence. In 2009, stroke was ranked number one as the leading cause of death for both male and female, while hypertension ranked third among women (Hoa, Rao et al. 2012). Although Vietnam has completed the stage 3 of health transition, the country has to deal with both communicable diseases (such as tuberculosis, HIV/AIDS, dengue fever and Japanese encephalitis) and non-communicable diseases in the stage 3 of health transition. Furthermore, the pattern of morbidity and mortality happened similarly in the North and the South of Vietnam (Huong 2006).

2.3 Body Mass Index as a measurement of health status

In this study, Body Mass Index (BMI) was used as a measure of health status of the elderly people.

BMI is an anthropometric measure that considers the relationship between the weight and the height of individual. BMI is an index of weight-for-height that is usually used

for classifying overweight and obesity in populations. BMI is calculated by dividing a person's weight in kilograms by the square of his/her height in meters (WHO 2004).

BMI can be used as a simple measurement for assessing nutrition and health status (Saith and Harris-White 1999). Those with malnutrition diet or are underweight or overweight are at greater risk for morbidity and mortality. According to Centers for Disease Control and Prevention in 2014, overweight or obese persons are at greater risk for hypertension, high LDL cholesterol, type 2 diabetes, and coronary heart disease, stroke (CDC 2014). Previous research indicates that underweight older people are at greater risk for illness, poorer recovery from illness, and poorer quality of life (Elia 2000, Margetts and Thompson 2003). In addition, BMI is also associated with disabilities, especially the older women (Matos and Dihogo 2013).

BMI is used to test the relationship between the level of well-being and the inequality at inter country and intra household. BMI is useful to explore this issue for five reasons: it is measured at the individual level; it reflects how food consumption affects health status such as sanitary conditions and labor saving technologies; it counts caloric consumption; it is measured easily; and any error in measurement is likely to be random (David and Stephen 2009). However, there were some arguments with ideal ranges for elderly people, and BMI cut-off values for ethnic groups (Bahat and Tufan 2012).

Food shortages caused lower BMI of adult household members relating to diseases such as malaria, tuberculosis, or diarrhea (Pednakar, Hakama et al. 2008). According to the study “Adult BMI as a Health and Nutritional Inequality Measure, Application at Macro and Micro Levels” in the context of Vietnam, overweigh (BMI > 25) or obesity (BMI > 30) leads to reduced health (Molini, Nube´ et al. 2009).

After obesity epidemic around the world, WHO and experts from the International Obesity Task Force (IOTF) classified BMI cut-off points for obesity and published as a report in 1998 (Table 2). However, this classification was applied only for the North American and European populations (WHO 2000).

Table 2: WHO 1998 classification of BMI categories for European

| Classification of nutritional status | BMI cut-off point |
|---|--------------------------|
| Underweight | < 18.5 |
| Normal | 18.5 – 24.9 |
| Pre-obese | 25.0 – 29.9 |
| Obese 1 | 30.0 – 34.9 |
| Obese 2 | 35.0 – 39.9 |
| Obese 3 | ≥ 40 |

Source: WHO (2000). Obesity: Preventing and managing the global epidemic. Report of WHO Consultation. WHO Technical Report Series.

This classification in table 2 was unsuitable for Asian populations due to the difference of body size between Asian and Caucasian populations. WHO Western Pacific Regional Office gave lower BMI cut-off points than previous classification (WHO 2004). Therefore, this study uses WHO cut-off points BMI categories for Asians and Pacific in table 3.

Table 3: WHO classification of BMI categories for Asians and Pacific

| Classification of nutritional status | BMI cut-off point |
|---|--------------------------|
| Chronic energy deficiency | < 18.5 |
| Normal | 18.5 - 22.9 |
| Overweight | ≥ 23 |
| Almost obesity | 23 – 24.9 |
| Obesity level 1 | 25 – 29.9 |
| Obesity level 2 | ≥ 30 |

Source: WHO (2004). “Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies” The Lancet 363: 157-163.

2.4 Health Promoting Behavior

According to WHO in 2014, “health promoting” is defined as “the process of increasing people ability to control over and to improve their health” (WHO 2014). The health promoting behaviors include: nutrition control, injury control, high blood pressure control, stress control, exercise, smoking behavior, alcohol restriction, dental care, and occupational safety (Thornbeny, Wilson et al. 1986).

However, Engbers defined “health promoting” as “the combination of educational and environmental supports for actions and conditions of living beneficial for health”. The term ‘environmental supports’ was defined as the means to decrease barriers or increase chances for healthy choices such as eating more fruits/vegetables, doing more exercises, or avoiding less healthy options such as smoking and drinking (Engbers 2008).

According to Kulbok and Baldwin (1997), “health behaviors are categorized as behaviors that sustain and or enhance well-being” (Kulbok and Baldwin 1997). The meaning of health behaviors is emphasized as a new stage of health promotion. There are no simple ways to prevent diseases that are resources of living (Breslow 1999).

Previous studies indicated that older people aged 65 years and over benefit from the health promoting behaviors (Leveille, Guralnik et al. 1999, Bloom 2001, Dwyer 2001). According to Resnick (2000), health promoting behaviors are categorized into two groups: primary for the prevention of diseases; and secondary for the detection of diseases at early period (Resnick 2000).

The US Department of Health and Human Services (2000) highlights health promoting and aging associations with daily exercises, non-smoking, and suitable nutrition. These behaviors should be encouraged to decrease the prospective years of life lost in pre-mature mortality and to ensure better quality of remaining life (Bloom

2001), as well as to minimize the cost of health care (Higgins 1988, Heidrich 1998, Beattie and et al. 2003).

Self-reported assessments of health-related lifestyle behaviors is used to indicate the associations between health behaviors and health status (Becker and Arnold 2004). Lee and Ko (2006) who are in charge of the elderly research suggest “health promoting behaviors become even more important, particularly with regard to maintaining functional independence and improving quality of life” (Lee, Ko et al. 2006).

In this study, health promoting behavior is measured by nutrition intake, smoking behavior, alcohol use, and walking. Nutrition intake is measured by how many times the elderly consume fruit or vegetables in the past week and whether the food consumed are beneficial to their health.

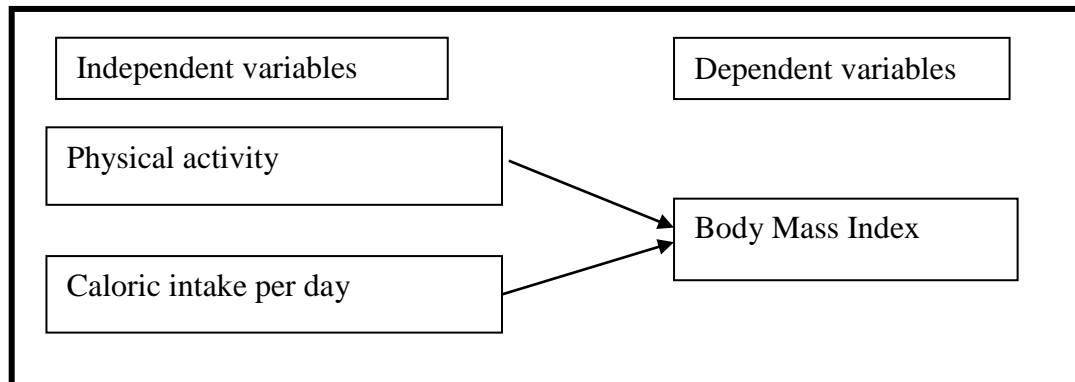
2.5 Theoretical framework of health promoting behavior and health status

This section reviewed some models as well as theories that revealed the relationship between health promoting behavior and health status.

2.5.1 Simple model for Body Mass Index

Ladabaum and colleagues (2014) created a very simple model to apply on Body Mass Index in their study "Obesity, Abdominal Obesity, Physical Activity, and Caloric Intake in U.S. Adults: 1988-2010" (Figure 2). According to this model, physical activity and caloric intake were health promoting behaviors that significantly influenced BMI. In this survey, participants aged 18 years and older were chosen from the data of the National Health and Nutrition Examination Survey (NHANES). Activities such as walking, bicycling, and going around the house and the yard are considered physical activities (Ladabaum and et al. 2014).

Figure 2: Simple model for Body Mass Index

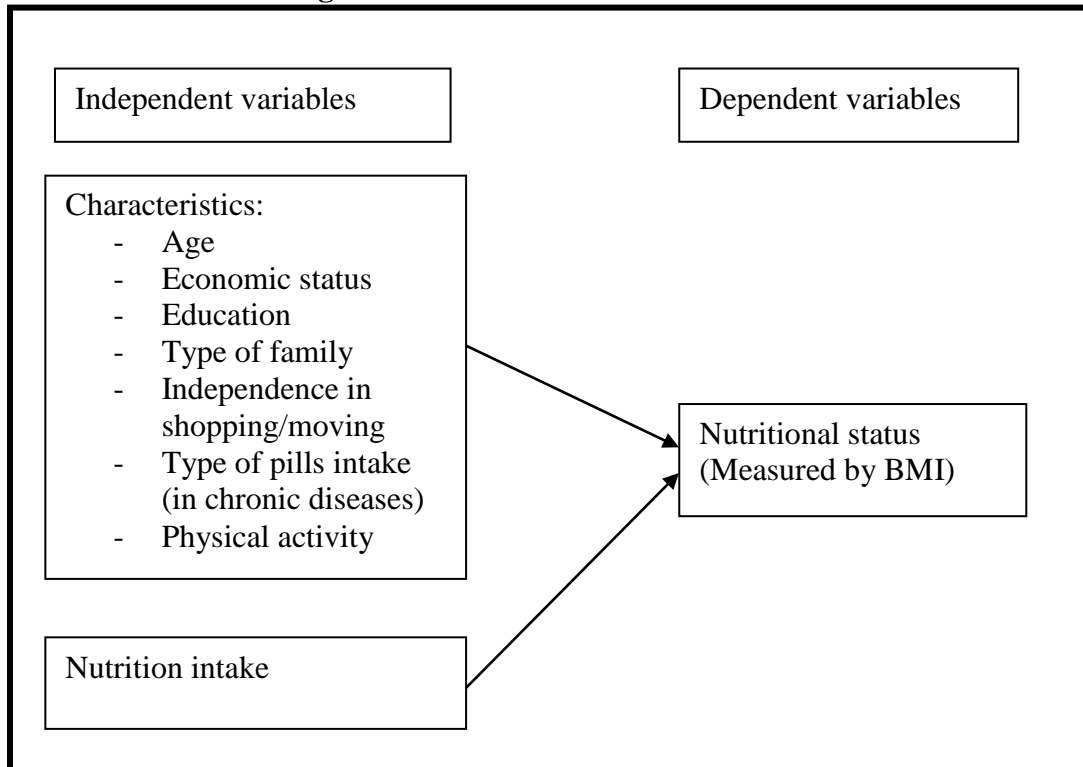


Source: Ladabaum et al. (2014). "Obesity, Abdominal Obesity, Physical Activity, and Caloric Intake in U.S. Adults: 1988-2010." *The American Journal of Medicine*: 1-50.

2.5.2 The nutritional status model

Another model proposed by Wyka and Biernat (2012) contained factors such as characteristics of respondents, nutrition, and BMI. This model used Mini Nutritional Assessment tool (MNA tool) to assess nutritional status of elderly people through BMI. This study divided respondents into two groups: one at risk of malnutrition and one with adequate nutrition (Wyka, Biernat et al. 2012).

Characteristics of older persons associated with BMI were age, economic status, education, type of family, independence in shopping or moving, pills intake, and physical activity (Figure 3). Nutrition intake was another factor that had an impact on BMI. Nutrition intake was measured by the number of meals, proteins, fruits, vegetables, fluid intake and the autonomy of feeding.

Figure 3: The nutritional status model

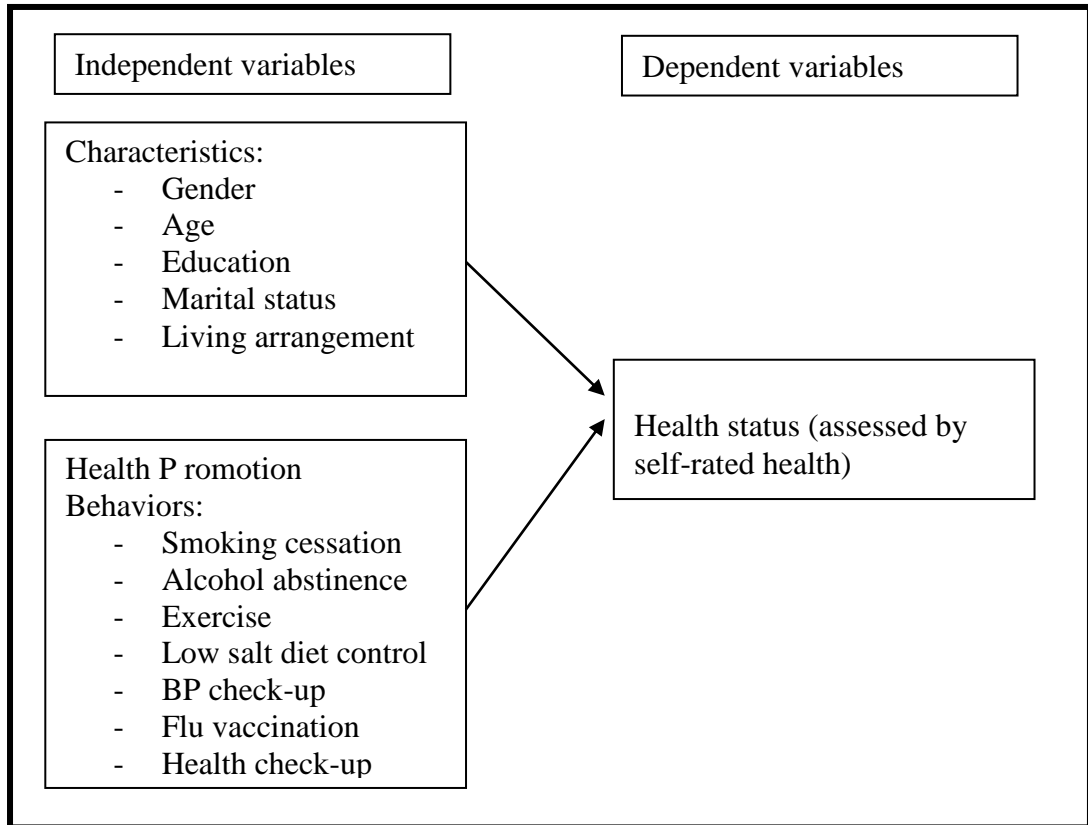
Source: Wyka, Biernat, et al. (2012). "Assessment of dietary intake and nutritional status (MNA) in Polish free-living elderly people from rural environments." *Archives of Gerontology and Geriatrics* 54: 44–49.

2.5.3 Theoretical framework of the relationship between health promoting behaviors and health status

Lee and colleagues (2006) developed the framework to explain how health promoting behavior affects the health status of the elderly. This framework assessed elderly health status through their behaviors and their self-rated health in Figure 4 (Lee, Ko et al. 2006).

The elderly health promoting behaviors included smoking cessation, alcoholic abstinence, exercising, and low salt diet control. Moreover, older persons were asked to enhance their health with blood pressure check-up, flu vaccination within the previous year, and health check-up within the previous 1–2 years.

Figure 4: Theoretical Framework of the relationship between health promotion behaviors and health status



Source: Lee, Ko et al. (2006). "Health promotion behaviors and quality of life among community-dwelling elderly in Korea: A cross-sectional survey." *International Journal of Nursing Studies* 43: 293–300.

2.6 The effect of health promoting behavior and other independent variable on health status

Literature is reviewed related to the effect of health promoting behavior and others background characteristics on health status of the elderly.

2.6.1 Health promoting behavior

Nutrition intake:

According to the previous research, fruits and vegetables, a natural antioxidant, were significant factors associated with the weight and height as well as reducing risk of chronic diseases such as cancer, cardiovascular disease, hypertension, and stroke (Hofe, Feng et al. 2014). Higher intakes of fruits and vegetables were beneficial to bone health of elderly people, especially of elderly women. According to the report of World Health Organization 1990, older people who ate more than 400 grams or five times of fruit and vegetables per day were at decreased risk of chronic diseases such as cardiovascular disease and cancer (Amine, Baba et al. 2003; Prynne and Mishra 2006).

Dai and colleagues found that people who drank fruit and vegetable juices at least three times per week were at less risk of Alzheimer's disease than those who drank juices one to two times per week. In addition, fruit and vegetables juices may contributed to the delay of Alzheimer's disease for those at high risk (Dai and et al. 2006). Therefore, people were recommended to eat more fruits and vegetables to promote their health later life (Polidori and et al. 2009).

Degenerative processes of many organs happen for human during old age. The elderly usually complain about health issues regarding the activities of the digestive system (appetite, digestion, excretion). Most of the fruits and vegetables have low calories, low fat, and high fiber, thus fruits and vegetables assist in reducing constipation, and

assisting weight management (CDC 2014). The previous study showed that people who consumed fruits and vegetables were more likely to be healthy later in life (Azagbam and Sharaf 2012).

According Halkiaer and Tionneland in 2009, a diet low in fruits and vegetables increased the risk of central obesity (Halkiaer and Tionneland 2009). Malnutrition in older people also contributed to unhealthy measurements of BMI resulting from inadequate consumption of fruits and vegetables as well as different drugs intake (Wyka, Biernat et al. 2012).

In order to control and prevent obesity, Burke and colleagues made a trial for older people aged 60 to 70 years by improving both physical activity and dietary behavior such as reduce fat, raise fiber, fruit and vegetable intake. They found that: physical activity and dietary behavior had an association with BMI. In this sample, the existence of chronic diseases had been associated with elevated BMI (Burke and et al. 2012).

Risk behaviors due to smoking cigarettes and drinking alcohol

A previous study showed that the proportion of smokers was higher in elderly men than elderly women, and that people who smoke cigarettes were associated with respiratory disease (Seal and Branca 2001). Also, there was a significant relationship between smokers and poor health (Cochrane and Afolabi 2004). Fitzpatrick and Ngo (2012) indicated that over half of adult men (aged 35 years and above) who were smokers reported that they had severe chest pain lasting over 30 minutes (Fitzpatrick, Ngo et al. 2012).

Drinkers who consumed more than 150g of ethanol per week had a higher risk of Esophageal Squamous Cell Carcinoma (ESCC) disease than non-drinkers. Equally, smokers had a higher risk with ESCC than non-smokers (Ishiguro, Sasazuki et al. 2009). Drinking alcohol and smoking significantly modified the BMI and increased the risk of obesity (Leite and Nicolosi 2006).

Health promoting behaviors included non-smoking, moderate alcohol consumption, maintaining weight, and playing suitable sports (Peel, McClure et al. 2006). Furthermore, self-health behavior such as walking is important for healthy aging (WHO 2007).

Physical activities

To maintain a healthy lifestyle, a previous study suggested that adults and older people should have a minimum of 30 minutes of physical activity per day (Atlanta, DHHS et al. 1996). Physical activity such as walking played an important role for an ideal body shape which was related to overweight, obesity and other diseases (Lyon 2002). For example, the moderate to high fitness levels of people who exercise regularly were less likely to be at risk of chronic diseases such as cardiovascular diseases (Amine, Baba et al. 2003).

According to Warburton and colleagues (2006), adults who exercised for at least 40 minutes per week were at reduced risk of premature death by type II diabetes. In addition, physical activity for about 30 – 60 minutes per day had a greater protective impact against colon and breast cancer (Warburton, Nicol et al. 2006).

Previous research also showed that there was a linear relation between physical activity and health status. Increased physical activity and fitness level lead to better health status (Warburton, Nicol et al. 2006). Matos (2013) used the randomized controlled trial for elderly women and found that those women in experimental group who participated in 16-week exercise program showed significant improvement in blood lipid, functional autonomy, blood pressure, and BMI measurement (Matos and Dihogo 2013).

Conversely, Ladabaum and colleagues demonstrated that physical inactivity was an indicator of mortality. Physical activity provided protection against weight gain and reduced mortality risk associated with BMI (Ladabaum and et al. 2014).

However, modern urbanization has transformed into human lifestyle and people participated less in physical activity as a result. The study of Wyka and colleagues showed that twenty percent of participants who were inactive had trouble with BMI and their health (Wyka, Biernat et al. 2012). The another study demonstrated that physical activity positively changed central obesity and it was used as BMI measurement (Burke and et al. 2012).

2.6.2 Other background characteristics

Age and gender

There was a negative relationship between age and self-perceived health as the older old and oldest old people often had poorer health conditions than younger old people. In addition, elderly women perceived their health to be less healthy than elderly men (Tomás and et al. 2012). The younger old (aged 65-74) evaluated their quality of life higher than the older old (Lee, Ko et al. 2006). Dao and colleagues showed that increased age increased the burden of health status association with NCDs and effect on mortality rates (Dao and et al. 2006).

In the 2007 research, elderly male with self-reported diabetes were more prevalent than elderly female in all BMI categories. Also, higher BMI increased the prevalence of diabetes in both older males and females (Barcelo´ A. and et al. 2007).

However, elderly women suffered functional disability and were less mobile than elderly men. Furthermore, elderly women had poorer depression conditions as well as poorer health than elderly men; older men were at a higher risk of heart disease than older women, while older women had remarkably higher incidence of hypertension (Castel, Shahar et al. 2006). Elderly women had poorer mental health over twofold than elderly men, and were also limited in long term illnesses (Rueda and Artazcoz 2009).

Education level

The elderly with low education levels had the poorest self-perceived health and mental health status compared to those with higher education levels (Rueda and Artazcoz 2009). It was explained that older persons with higher education levels were more resourceful about their health information, while those with lower education levels revealed risky health behaviors such as smoking, drinking, and lacking of physical activity, which affected BMI negatively. Also, these behaviors had permanent effects on the health of the elderly (Population Reference Bureau April 2009).

Education imbalance affected the health status of older people because education provided background knowledge, as well as life skills to access information and resources to enhance the elderly health (Hoi and Phuc 2009). Higher education was a preventive factor in elderly males and females health status. Education had a strong role in preventing NCDs in elderly people, particularly injuries in males by affecting the BMI positively (Dao and et al. 2006).

Another study "Socioeconomic differences in incident depression in older adults: The role of psychosocial factors, physical health status, and behavioral factors" by Koster and Bosma indicated that older people with lower education were less healthy than those with higher education as indicated by BMI (Koster and Bosma 2006). Education level was a basic factor to improve health status in improving BMI (Akbulut and Ersoy 2008).

Marital status

Although marital status is one of factors that may have an impact on health status in older persons, there are very few studies regarding relationships between marital status and health status, particularly for elderly people. The elderly living with a spouse or family were more likely to have normal BMI than those living alone (Lee,

Ko et al. 2006). Nevertheless, another study indicates that widowed elderly have slightly better health condition than married elderly people (Tomás and et al. 2012).

As indicated by the US 1989 National Health Interview Survey and the 1997 US National Death Index, the mortality rate of unmarried older adults (aged 18 and above) was significantly higher than married older adults. This rate affected those who never married, especially older adult men and women (Kaplan and Kronick 2006).

BMI is used as an indicator to elevate the health status (i.e. depressive symptoms, obese) for people aged 45-84. It is suggested that people get married to minimize activities that could lead to obesity (Remigio-Baker and Diez Roux 2014).

Main source of cash income

Previous research indicated that older person with good economic status were in better health than those with poor economic status (Hambleton, Clarke et al. 2005). Income was one of the measures for economic status of the elderly. Koster and colleagues (2006) found that older persons with low income had twofold prevalence of depression than those with high income (Koster and Bosma 2006).

According to the study of Hoi and Phuc in 2009, higher socio-economic status translated to better health and longer life (Hoi and Phuc 2009). Skrzypczak and Szwed showed that women aged 25 to 95 with low income were overweight and obese (measured by BMI) in comparison with those with high income (Skrzypczak and Szwed 2008).

Place of residence: Urban and rural

According to Duong and colleagues in 2009, elderly people living in urban areas had higher proportion of hypertension than those living in rural areas (30 percent compared to 20 percent) (Duong and et al. 2003, Pham and Au 2009). However, rural

areas of Vietnam had increased risk of chronic diseases for those aged 25-64 years (Hoang, Byass et al. 2007).

Another research indicated that place of residence was a predictive value of BMI, one of indicators for obesity. Older women who lived in urban areas had higher risk of obesity than those who resided in rural areas (Skrzypczak and Szwed 2008).

Wyka and colleagues (2012) showed that living in village, town, or a city affected in a positive way of how older people decide their nutrition intakes and other behaviors that affected their health. The older people who lived in rural areas were more likely to make mistakes in their nutrition intakes and lifestyle due to difficulty finding doctors, long distances to go to health care centers, or lack of prevention programs for elderly among rural community (Wyka, Biernat et al. 2012).

Water and sanitation facilities

The measures of water and sanitation provisions captured the socio-economic status, home environment, and disease risks (Remigio-Baker and Diez Roux 2014). For example, facilities shared were less optimal because of the absence of safe water, thus the risk of morbidity increased (Griffiths, Johnson et al. 2013).

As evident from WHO/UNICEF, safe and clean water enhanced people's health. In the 21st century, an estimation of one billion people worldwide did not have access to safe water, particularly people from developing countries in the rural areas (WHO/UNICEF 2006, WHO 2007).

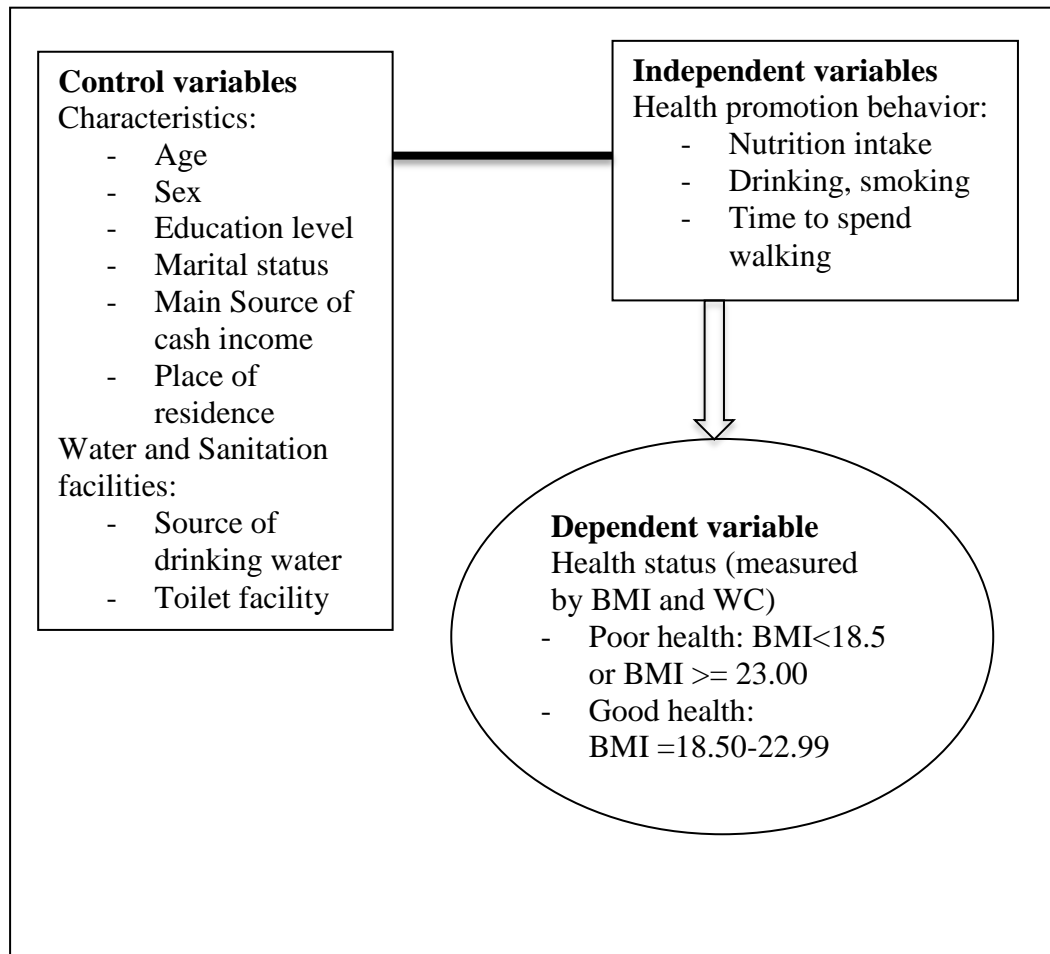
According to Knodel and Anh, the health expectancy of the older persons in Vietnam was improving over time as housing conditions changed. The older persons who had better housing conditions such as access to clean water and a good toilet facility were more likely to be healthy (Knodel and Anh 2002).

As indicated by research by Long and Pfau, hygiene situations in terms of toilet facilities were also significantly improved over the past decade in Vietnam. The percentage of people using modern toilet types, namely flushed toilets, remarkably increased in the elderly households from 12.88 percent in 1992 to 25.44 percent in 2004, while the percentage of using simple toilets decreased in these years with 55.78 percent and 24.13 percent respectively. However, 15 percent of elderly households did not have safe toilet facilities, thus people had poor health due to the lack of good hygiene (Long and Pfau 2007).

2.7 Conceptual framework of the proposed study

The conceptual framework of this study derived from synthesizing the conceptual/theoretical framework from the previous studies. There are three groups of independent variables that are likely to have an influence on the health status of the elderly: the characteristics of the elderly, such as age, sex, education, marital status, main source of cash income, and place of residence; source of water drinking and sanitation facilities; health promoting behavior, including nutrition intake, drinking alcohol and smoking behavior, and time to spend walking (Figure 5).

Figure 5:



2.8 Hypotheses

There are four main hypotheses and some related hypotheses

The four main hypotheses:

1. The older persons who eat more fruits and vegetables are more likely to have better health.
2. The older persons who do not drink alcohol are more likely to have better health than those who drink alcohol.
3. The older persons who do not smoke are more likely to have better health than those who smoke.
4. The older persons who walk regularly are more likely to have better health than those who do not walk regularly.

Some related hypotheses:

5. The probability of poor health increases with age.
6. The older men are more likely to have better health than older women. Older people with higher education are more likely to have better health than those with lower education.
7. Married older persons are more likely to have better health than those who are unmarried.
8. The older persons with high income are more likely to have better health than those with low income.
9. The older persons who can access safe water facilities are more likely to have better health than those who cannot access safe water facilities.
10. The older persons who can access sanitation facilities are more likely to have better health than those who cannot access it.

CHAPTER 3

RESEARCH METHOD

3.1 Data source and access

This study utilizes the secondary data from “the Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants” conducted by the Institute of Hygiene and Public Health in cooperation with WHO in 2010.

3.2 Sample design and coverage

“The Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinant” used multistage sampling procedures. In the first stage, two provinces out of nineteen provinces in Southern Vietnam were randomly selected: Dong Nai and Vinh Long provinces. In the second stage, the sampling strategy utilized cluster sampling in two strata, urban and rural for each province. The location of the clusters was decided by two-stage procedure. At the district level, one urban and one rural area for Dong Nai and Vinh Long were selected from the administrative unit list. Next, local authorities of two districts provided a list of hamlets and 30 clusters randomly selected. At the cluster level, 20 households which had people aged 60 and over were chosen to interview. Therefore, the sample size will be $20 \text{ household} * 30 \text{ clusters} * 4 \text{ districts} = 2,400$ households. From the list of households that had people aged 60 and over provided by local authorities, the households progressively in a list were numbered and randomly picked the first single household up. For those households that had more than one people aged 60 and over, only one of them was interviewed by chance. If the older persons were not able to answer the questions by themselves, the caregivers answer for older persons.

3.3 Study sample

The total sample size of the Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of Southern Vietnam was 2,400 cases; only one case refused to interview. Because the older persons and caregivers can ensure the questionnaire is answered, this survey was satisfied with 99.96 percent of response rate. Therefore, the total case of the analysis was 2399 cases. This study uses all the interviewed cases of analysis.

3.4 Operationalization and Variables

3.4.1 Dependent variable

Dependent variable in this study is Body Mass Index relating to the health status of older people. According to WHO, Body Mass Index of Asian population is calculated by the weight in kilograms divided by the square of the height in meter (kg/m^2) (WHO 2004).

Table 4: Classification of BMI for Asians and Pacific for both sexes

| Classification of nutritional status | BMI |
|---|-------------|
| Chronic energy deficiency | < 18.5 |
| Normal | 18.5 - 22.9 |
| Overweight | ≥ 23 |
| Almost obesity | 23 – 24.9 |
| Obesity level 1 | 25 – 29.9 |
| Obesity level 2 | ≥ 30 |

Source: WHO (2004). “Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies” *The Lancet* 363: 157-163.

In this study, the health status is divided into two categories: poor health and good health. “Poor health” is defined as the older persons who either are underweight or overweight ($BMI < 18.50$ or $BMI \geq 23$). “Good health” is defined as those whose BMI are in the normal range ($BMI = 18.50 - 22.99$).

3.4.2 Explanatory variables

Explanatory or Independent variable in this study can be summarized by the following table.

Table 5: Summary of variables’ description, measurement scale and source of information

| Variable | Description | Measurement scale | Source of information |
|------------------------------|---|---|-----------------------|
| Independent variables | | | Part 1 |
| Age | Age at last birth date of respondents | 60-69 = 1 70-79 = 2 80+ = 3 | Q1 |
| Education level | Level of education of respondents | No education=0 Incomplete primary school=1 Primary school=2 Secondary school and higher=3 | Q4 |
| Marital status | Current marital status of respondents | Single = 1 Currently Married = 2 Formerly married (Divorce /separate/ widow)=3 | Q5 |
| Main source of cash income | One main source of income that respondents have received the most | Private business=1 Pension=2 Welfare=3 Farming=4 Wage earner=5 Supported by family members=6 No cash income=7 | Q6 |

| Variable | Description | Measurement scale | Source of information |
|--|---|---|-----------------------|
| Independent variables | | | Part 1 |
| Nutrition intake | The number of days that respondents consumed vegetables and fruits in the previous week | 0-7 days | Q15, Q16 |
| Water and sanitation toilet facilities | Source of drinking water | - Unsafe water (unprotected dug well/filtered river water; unfiltered river water/rain water) = 0 - Safe water (tap water/well water/public well water/protected dug well) = 1 | Q17, Q18 |
| | Toilet facility | - Non-sanitary toilet (flush to river/covered dry latrine/no toilet) = 0 - Sanitary toilet (septic tank)= 1 | |
| Health promoting behaviors | Drinking alcohol | - Never drink alcohol = 0 - Drink alcohol (occasionally /once a week /once a day / more than once a day)= 1 | Q31 |
| | Smoking cigarettes | - Do not smoke = 0 - Smoke = 1 | Q32 |
| | Time to spend walking | - Do not walk=0 - Walk less than 1 hour=1 - Walk 1-2 hours=2 - Walk more than 2 hours=3 | Q27 |

Then, owing to express the idea about how to construct the dependent and independent variables to put into the model for binary analysis in chapter 4, the construction of variables in this study is shown in Table 6.

Table 6: The construction of dependent and independent variables

| Variables | Code | Construction |
|--|---|----------------------------------|
| Dependent | | |
| Health status is measured by BMI | Poor health (PH): BMI<18.5 or BMI>=23.0 Good health (GH): BMI=18.5-22.99 | PH = BMI = 0 GH = BMI = 1 |
| Independent | | |
| Model: Using vegetables and fruits as interval category | from 0 day to 7 days | No |

3.5 Methods of analysis

Descriptive statistics are used to describe the background characteristics of the sample population. Then, the binary logistic regression analysis is used for exploring the relationship between the independent variables and dependent variables.

3.6 Limitation of the study

This study uses the secondary data, which has a different objective from this study. Therefore, some of the variables had not been included in the thesis such as the number of Kcal intake each day and the food intake diary, as well as alcohol consumption and what kind of alcohol. The survey did not provide sample weight which caused over sampling issue. The survey also revealed the lack of cash income amount which obligated the use of proxy income. In addition, this is a cross-sectional study, thus we may not know the relationship of health status and behaviors.

CHAPTER 4

RESEARCH FINDINGS

Chapter 4 shows the analysis of data from “the Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants” in 2010, which aims to understand the elderly health status. This chapter also investigates the relationships between health promoting behaviors and health status by using binary logistic regression analysis.

4.1 The elderly characteristics:

The sample size of the population aged 60 years old and over in this study was 2,399 cases. The descriptive statistics of their characteristics are shown in Table 7. The ages of older people are categorized into three groups: the younger old (aged 60 – 69), the older old (aged 70 – 79), and the oldest old (aged 80+). The mean age of respondents is 72.6 years. About 39.1 percent of respondents are in the older old group, following by the younger old group (37.8 percent) and the oldest old group (23.1 percent). The female is found to be more prevailing than the male (65.2 percent and 34.8 percent respectively). In comparison with the data from the past four Censuses during the period 1979-2009 that shows the same trend, the younger old (aged 60-69) increased slowly, whereas the older old (aged 70 – 79), and the oldest old (aged 80+) increased faster. In 2009, the data showed the percentage of elderly in the younger old (4.07 percent), following older old (3.05 percent) and oldest old (1.47 percent) (GSO 2010).

Vietnam has 54 ethnicities such as Kinh, Chinese, K’me, Tay, Nung, and so on. The majority of Vietnamese are Kinh. The current data set also reflects similar to ethnic composition as the whole country, about 96.2 percent are Kinh.

In terms of education levels and trainings, older people who never received any types of education or training are identified as “no education”, while those who studied for less than fifth grade are identified as “incomplete primary school”. Older people who

finished from fifth grade to eighth grade are identified as “primary school”. In addition, older people who have completed ninth grade and above are identified as “secondary school and higher”. Based on the data, the respondents who had incomplete primary school experience has the highest proportion about 42 percent, followed by those having secondary education about 25.0 percent, than those having no education about 19.4 percent, and those having primary school about 13.6 percent, respectively.

Current marital status of older persons is categorized into three groups: older people who never get married are defined as “single”; while those who are separated, widowed, or divorced are defined as “formerly married”; and the married elderly. According to table 7, the proportion of married elderly people is highest, about 55.3 percent, followed by ever married about 35.4 percent, and single about 9.3 percent. Similar to the report on “The Aging Population in Vietnam” of UNFPA, the married elderly make up 59.1 percent, while those who are widowed are 35.4 percent and those who are single are 2.25 percent (UNFPA 2011).

The dataset did not include the information of the amount in cash income. The only information that can be used as cash income is proxy income, and economic security is the main source of cash income. According to the survey, main source of cash income is divided into seven main sources: private business, pension, welfare, farming, wage earner, supported by family members, and no cash income. The largest proportion of respondents has income from family members about 48.4 percent, followed by those who has income from farming (17.5 percent), than those who has income from pension (9.2 percent), those who has income from private business as well as who has no cash income (8.3 percent), those who has income from welfare (4.7 percent), and those who has income from wage earner (3.7 percent).

Place of residence is classified as “rural” and “urban”. Around 50 percent of older people living in urban and rural areas according to sample design presented in chapter 3. The 2008 Vietnam report showed that about 72.9 percent of the elderly live in rural areas and about 27.51 percent of the elderly live in urban areas (UNFPA 2011).

Therefore, this data set has substantially more respondents in urban areas; it may be due to an over sampling of the older persons in urban areas.

Table 7: Percentage of the elderly characteristics

| Variable | Categories | Percent |
|-------------------------------|---|----------------|
| <u>Age group</u> | 60-69 | 37.8 |
| | 70-79 | 39.1 |
| | 80+ | 23.1 |
| | Total | 100 |
| | Mean age (years) | 72.6 |
| | N | 2399 |
| <u>Gender</u> | Male | 34.8 |
| | Female | 65.2 |
| | Total | 100 |
| | N | 2399 |
| | <u>Ethnicity</u> | Kinh |
| Chinese | | 2.3 |
| Others: Kho me, Nung, Tay | | 1.5 |
| Total | | 100 |
| N | | 2398 |
| <u>Education level</u> | No education | 19.4 |
| | Incomplete primary school | 42.0 |
| | Primary school | 13.6 |
| | Secondary school and higher | 25.0 |
| | Total | 100 |
| | N | 2398 |
| <u>Marital status</u> | Single | 9.3 |
| | Currently married | 55.3 |
| | Formerly married (Divorced/ Separate/ Widow) | 35.4 |
| | Total | 100 |
| | N | 2394 |

| Variable | Categories | Percent |
|--|-----------------------------|---------|
| <u>Main source of cash income</u> | Private business | 8.3 |
| | Pension | 9.2 |
| | Welfare | 4.7 |
| | Farming | 17.5 |
| | Wage earner | 3.7 |
| | Supported by family members | 48.4 |
| | No cash income | 8.3 |
| | Total | 100 |
| | N | 2394 |
| <u>Place of residence</u> | Rural | 50.1 |
| | Urban | 49.9 |
| | Total | 100 |
| | N | 2399 |

4.2 Individual living conditions:

There are eight types of drinking water sources: tap water, well water, public well water, protected dug well, unprotected dug well, filtered river water, unfiltered river water, and rain water. In this study, safe water includes: tap water, well water, public well water, and protected dug well; rest is classified as “unsafe water”.

Table 8 shows the percentage of drinking water source and toilet facility in comparison between the urban and rural areas. The majority of older persons can access safe water (80.6 percent). As expected, older persons who live in urban areas are more likely to access safe water than rural areas (96.8 percent compared with 64.4 percent). This number is relatively high compared to the UNFPA report in 2011, merely 68.4 percent of older people can access safe water; this means that 31.6 percent of the elderly unfortunately have no access to safe water (UNFPA 2011).

In terms of toilet facility, there are four types: septic tank, flush to river, covered dry latrine, and non-toilet facility. Older persons who used covered dry latrine are classified as “sanitary toilet”, while other types are classified as “non-sanitary toilet”.

Most of the older persons use sanitary toilet facility at about 59.6 percent, whereas those who use non-sanitary toilet are at about 40.4 percent. According to the data of UNFPA 2011, most of the elderly used sanitary toilet at 61.5 percent, while those who used non-sanitary toilet were 38.5 percent (UNFPA 2011). Access to toilet facility is different between rural and urban areas, older persons in urban areas use sanitary toilet rather than those who reside in rural areas (71.1 percent compared with 48.2 percent respectively).

Table 8: Percentage of drinking water source and toilet facility

| Variable | Categories | Total | Rural | Urban |
|--|---------------------|--------------|--------------|--------------|
| <u>Source of drinking water</u> | Unsafe water | 19.4 | 35.6 | 3.2 |
| | Safe water | 80.6 | 64.4 | 96.8 |
| | Total | 100 | 100 | 100 |
| | N | 2397 | 1201 | 1196 |
| <u>Toilet facility</u> | Non-sanitary toilet | 40.4 | 51.8 | 28.9 |
| | Sanitary toilet | 59.6 | 48.2 | 71.1 |
| | Total | 100 | 100 | 100 |
| | N | 2393 | 1200 | 1193 |

4.3 Health promoting behaviors:

This section presents the percentage of health promoting behaviors which were measured by nutrition intake, drinking alcohol, smoking, and walking. It also shows the difference in rural and urban areas. Table 9 presents percentage distribution of five health promoting behaviors.

In this study, nutrition intake is considered from how often older people eat vegetables or fruits. According to traditional Vietnamese habits, older people tend to eat more vegetables and fruits in usual meals.

a) Vegetables intake per week

The results reveal that 60.7 percent of older people eat vegetables every day. Notice that, those who reside in urban areas tend to eat more vegetables than those who reside in rural areas (about 67.2 percent and 54.1 percent respectively). However, the numbers of those who live in rural areas do not eat vegetables are slightly higher than those who live in urban areas (8.1 percent compared to 5.7 percent respectively). The average of days the elderly eat vegetables is over five days. Also, the results reveal that the elderly who reside in rural areas tend to consume more vegetables by 1 to 5 days than those who reside in urban areas.

b) Fruits intake per week

Likewise, the elders consumed fruits every day at about 21.8 percent. This number is contributed by older people who lived in urban areas at 26.1 percent and those who resided in rural areas at 17.6 percent. The average number of days the elderly ate fruits is over three days. The elderly who lived in rural areas who did not eat fruits are higher than those who lived in urban areas (26.6 percent compared to 11.6 percent respectively). Those who resided in rural areas ate more fruits by 3 days and under than those who lived in urban areas.

c) Drinking alcohol

Most of the older persons do not drink alcohol at 81.8 percent. The proportion of non-drinking older people in urban areas is higher than those who live in rural areas (88.1 percent compared to 75.4 percent respectively). The elderly who reside in rural areas are more likely to drink alcohol than those who live in urban areas (24.6 percent compared to 11.9 percent respectively).

d) Smoking

Almost all of the elderly do not smoke cigarettes at 80.5 percent. This number reveals that older people who reside in urban areas who do not smoke at 86.3 percent, compared to those who live in rural areas at 74.8 percent. The elderly who reside in rural areas are more likely to smoke cigarettes than those who live in urban areas (25.2 percent compared to 13.7 percent respectively).

e) Walking per day

Table 9 states that the majority of older people walk less than one hour per day at 50.4 percent. This number is high in both rural and urban areas (50.1 percent and 50.8 percent respectively). On the other hand, the percentage of older persons who do not walk is 28.5 percent, and those who live in rural areas have less physical activity than those who live in urban areas (32.2 percent and 24.8 percent respectively). In other words, the results reveal that the elderly who live in urban areas tend to have more physical activity per day than those who live in rural areas.

Table 9: Percentage of health promoting behaviors

| Variable | Categories | Total | Rural | Urban |
|--|-------------|-------|-------|-------|
| <u>Vegetables intake per week</u> | 0 day | 6.9 | 8.1 | 5.7 |
| | 1 day | 2.1 | 3.0 | 1.2 |
| | 2 days | 6.3 | 7.4 | 5.3 |
| | 3 days | 7.6 | 9.7 | 5.6 |
| | 4 days | 4.6 | 5.5 | 3.8 |
| | 5 days | 5.7 | 7.2 | 4.3 |
| | 6 days | 6.0 | 5.1 | 7.0 |
| | 7 days | 60.7 | 54.1 | 67.2 |
| | Total | 100 | 100 | 100 |
| | Mean (days) | 5.46 | 5.14 | 5.78 |
| | SE | .047 | .070 | .061 |
| | N | 2397 | 1201 | 1196 |

| Variable | Categories | Total | Rural | Urban |
|--|-------------------|--------------|--------------|--------------|
| <u>Fruits intake</u> <u>per week</u> | 0 day | 19.1 | 26.6 | 11.6 |
| | 1 day | 6.3 | 7.3 | 5.2 |
| | 2 days | 15.6 | 16.7 | 14.5 |
| | 3 days | 15.8 | 15.6 | 16.0 |
| | 4 days | 9.6 | 7.7 | 11.4 |
| | 5 days | 7.2 | 5.8 | 8.5 |
| | 6 days | 4.7 | 2.7 | 6.8 |
| | 7 days | 21.8 | 17.6 | 26.1 |
| | Total | 100 | 100 | 100 |
| | Mean (days) | 3.4 | 2.86 | 3.93 |
| | SE | .051 | .072 | .069 |
| N | 2397 | 1201 | 1196 | |
| <u>Drinking alcohol</u> | No | 81.8 | 75.4 | 88.1 |
| | Yes | 18.2 | 24.6 | 11.9 |
| | Total | 100 | 100 | 100 |
| | N | 2384 | 1195 | 1189 |
| <u>Smoking</u> | No | 80.5 | 74.8 | 86.3 |
| | Yes | 19.5 | 25.2 | 13.7 |
| | Total | 100 | 100 | 100 |
| | N | 2394 | 1200 | 1194 |
| <u>Time to spend</u> <u>walking per day</u> | Don't walk | 28.5 | 32.2 | 24.8 |
| | Walk < 1 hour | 50.4 | 50.1 | 50.8 |
| | Walk 1-2 hours | 14.9 | 12.3 | 17.5 |
| | Walk >2 hours | 6.2 | 5.4 | 7.0 |
| | Total | 100 | 100 | 100 |
| | N | 2385 | 1194 | 1191 |

4.4 The association between explanatory variables and the health status:

In order to cope with the possibility of over sampling of urban elderly, all the bivariate analysis and multivariate analysis were performed separately for rural and urban areas. This section depicts the bivariate relationship of health status of older people with their characteristics and health promoting behaviors by using Chi-square (X²) test; the association is found in the 0.001 and 0.01 and 0.05 significance levels.

Table 10 presents the percentage of health status of older persons based on BMI cut-off and its difference between rural and urban areas. Older people who have BMI cut-off less than 18.5 points and equal or more than 23.0 points are classified as “poor health”, while those who have BMI cut-off from 18.5 till 22.99 points are classified as “good health”. It is clear that the older persons tend to be poor health than good health, about 52.2 percent compared to 47.8 percent respectively. In terms of place of residence, the proportion of the poor health of older persons who reside in urban areas is higher than those who reside in rural areas (54.3 percent compared to 50.1 percent respectively).

Table 10: Percentage of health status (measured by BMI)

| Health status (BMI) | Percent | Rural | Urban |
|----------------------------|----------------|--------------|--------------|
| Poor health | 52.2 | 50.1 | 54.3 |
| Good health | 47.8 | 49.9 | 45.7 |
| Total | 100 | 100 | 100 |
| N | 2395 | 1199 | 1196 |

a) Relationship between the health status (BMI) and health promoting behaviors

Table 11 shows the relationship between the elderly promoting behaviors and health status (measured by BMI). The relationship between fruits intake and the health status is found to be significant at $p = 0.003$. The elderly who eat fruits from 2 to 6 days are more likely to have better health than those who eat in other days (over 50 percent compared to around 41.4 percent and 49 percent), especially for the elderly who live in rural areas ($p=0.027$). As stated by the CDC 2014, consuming fruits and vegetables help people to manage weight to live a healthy lifestyle (CDC 2014).

Similarly, drinking alcohol is found to be significant with the elderly health status at $p=0.034$. However, it is interesting that the elderly who drink alcohol tend to be healthier than those who do not drink alcohol (56.7 percent and 44.0 percent respectively), particularly for the elderly who reside in urban ($p=0.004$). From the literature in chapter 2, drinking alcohol has significantly affected on non-communicable diseases such as obesity due to BMI (Leite and Nicolosi 2006). This may due to the limitation of this study since the data lacks details about the frequency and the amount of alcohol consumption. In addition, Peer and colleagues show the evidence of moderate alcohol consumption, improving the health status, and that is one of the target of health promoting behaviors (Peel, McClure et al. 2006).

Table 11: Relationship between the health status (BMI) and health promoting behaviors

| Health promoting behaviors | Rural | | Chi-square (X ²) | Urban | | Chi-square (X ²) | Total Chi-square (X ²) |
|--|---------------------|-----------------|------------------------------|---------------------|-----------------|------------------------------|------------------------------------|
| | Health status (BMI) | | | Health status (BMI) | | | |
| | Poor health (%) | Good health (%) | | Poor health (%) | Good health (%) | | |
| | | | | | | | |
| <u>Vegetables intake per week</u> | | | | | | | |
| 0 – 1 day | 57.1 | 42.9 | | 48.8 | 51.2 | | |
| 2 – 3 days | 48.3 | 51.7 | .378 | 60.0 | 40.0 | .411 | .872 |
| 4 – 6 days | 48.8 | 51.2 | | 52.8 | 47.2 | | |
| 7 days | 49.7 | 50.3 | | 54.2 | 45.8 | | |
| <u>Fruits intake per week</u> | | | | | | | |
| 0 – 1 day | 51.0 | 49.0 | | 57.2 | 42.8 | | |
| 2 – 3 days | 46.4 | 53.6 | .027 | 51.1 | 48.9 | .143 | .003 |
| 4 – 6 days | 46.7 | 53.3 | | 51.7 | 48.3 | | |
| 7 days | 58.6 | 41.4 | | 58.7 | 41.3 | | |
| <u>Drinking alcohol</u> | | | | | | | |
| No | 49.9 | 50.1 | .933 | 56.0 | 44.0 | .004 | .034 |
| Yes | 49.7 | 50.3 | | 43.3 | 56.7 | | |
| <u>Smoking</u> | | | | | | | |
| No | 50.6 | 49.4 | .528 | 53.9 | 46.1 | .500 | .706 |
| Yes | 48.5 | 51.5 | | 56.7 | 43.3 | | |

| Health promoting behaviors | Rural | | Chi-square (X ²) | Urban | | Chi-square (X ²) | Total Chi-square (X ²) |
|----------------------------|---|-----------------|------------------------------|---------------------|-----------------|------------------------------|------------------------------------|
| | Health status (BMI) | | | Health status (BMI) | | | |
| | Poor health (%) | Good health (%) | | Poor health (%) | Good health (%) | | |
| | <u>Time to spend walking per day</u> | | | | | | |
| Do not walk | 52.7 | 47.3 | | 59.0 | 41.0 | | |
| Walk < 1 hour | 47.9 | 52.1 | .434 | 52.1 | 47.9 | .102 | .092 |
| Walk 1-2 hours | 53.1 | 46.9 | | 51.4 | 48.6 | | |
| Walk > 2 hours | 50.8 | 49.2 | | 61.4 | 38.6 | | |

b) Relationship between the health status (BMI) and the elderly characteristics

Table 12 indicates the relationship between the characteristics and the health status of older persons. As can be seen, gender is closely associated with the elderly health at $p= 0.056$. The majority of poor health belongs to elderly women at over 50 percent. As mentioned in chapter 2, older women had higher at risk of non-communicable diseases compared to older men (Rueda and Artazcoz 2009).

Table 12: Relationship between the health status (BMI) and the elderly characteristics

| Characteristic variables | Rural | | Chi-square (X ²) | Urban | | Chi-square (X ²) | Total Chi-square (X ²) |
|---|---------------------|-----------------|------------------------------|---------------------|-----------------|------------------------------|------------------------------------|
| | Health status (BMI) | | | Health status (BMI) | | | |
| | Poor health (%) | Good health (%) | | Poor health (%) | Good health (%) | | |
| | | | | | | | |
| <u>Age group</u> | | | | | | | |
| 60-69 | 49.6 | 50.4 | | 51.1 | 48.9 | | |
| 70-79 | 50.0 | 50.0 | .937 | 55.3 | 44.7 | .150 | .341 |
| 80+ | 51.0 | 49.0 | | 58.4 | 41.6 | | |
| <u>Gender</u> | | | | | | | |
| Male | 48.0 | 52.0 | .234 | 51.6 | 48.4 | .224 | .056 |
| Female | 51.5 | 48.5 | | 55.4 | 44.6 | | |
| <u>Education level</u> | | | | | | | |
| No education | 52.2 | 47.8 | | 59.8 | 40.2 | | |
| Incomplete-primary school | 51.4 | 48.6 | .333 | 54.7 | 45.3 | .388 | .355 |
| Primary school | 44.3 | 55.7 | | 53.4 | 46.6 | | |
| Secondary school and higher | 47.4 | 52.6 | | 52.0 | 48.0 | | |
| <u>Marital status</u> | | | | | | | |
| Single | 60.0 | 40.0 | .135 | 50.8 | 49.2 | .254 | .424 |
| Currently married | 49.4 | 50.6 | | 52.8 | 47.2 | | |
| Formerly married (Divorced/ Separate/ Widow) | 49.1 | 50.9 | | 57.2 | 42.8 | | |

| Characteristic variables | Rural | | Chi-square (X ²) | Urban | | Chi-square (X ²) | Total Chi-square (X ²) |
|--|---------------------|-----------------|------------------------------|---------------------|-----------------|------------------------------|------------------------------------|
| | Health status (BMI) | | | Health status (BMI) | | | |
| | Poor health (%) | Good health (%) | | Poor health (%) | Good health (%) | | |
| | | | | | | | |
| <u>Main source of cash income</u> | | | | | | | |
| No cash income | 55.9 | 44.1 | | 54.3 | 45.7 | | |
| Working (Private business/farming/wage-earner) | 49.7 | 50.3 | .420 | 54.1 | 45.9 | .999 | .631 |
| Pension/Welfare | 45.8 | 54.2 | | 54.8 | 45.2 | | |
| Supported by family members | 50.6 | 49.4 | | 54.3 | 45.7 | | |
| <u>Source of drinking water</u> | | | | | | | |
| Unsafe water | 51.2 | 48.8 | .590 | 50.0 | 50.0 | .592 | .590 |
| Safe water | 49.5 | 50.5 | | 54.4 | 45.6 | | |
| <u>Toilet facility</u> | | | | | | | |
| Non-sanitary toilet | 49.8 | 50.2 | .769 | 53.6 | 46.4 | .759 | .376 |
| Sanitary toilet | 50.6 | 49.4 | | 54.6 | 45.4 | | |

4.5 Logistic regression analysis

a) Multi-collinearity test

It is worthy to test multi-collinearity for all explanatory variables before examining the binary logistic regression analysis. The following table shows that there is no multi-collinearity between the explanatory variables.

Table 13: Tolerance and Variance Inflation Factor (VIF) for explanatory variables

| Explanatory variables | Tolerance | VIF |
|----------------------------|-----------|-------|
| Age group | .833 | 1.200 |
| Gender | .798 | 1.253 |
| Education level | .691 | 1.446 |
| Marital status | .918 | 1.089 |
| Main source of cash income | .879 | 1.138 |
| Place of residence | .731 | 1.369 |
| Source of drinking water | .736 | 1.359 |
| Toilet facility | .828 | 1.208 |

b) Logistic regression analysis

Table 14 presents the multivariate analysis on the association of health promoting behaviors and the elderly characteristics and the health status (measured by BMI). Regarding the general validity of the model, the chi-square is 29.755, which is the gap between the -2 Log likelihood of adjusted model when all independent variables are included and the -2 Log likelihood of the initial model when only the constant is included.

According to table 14, two significances are found that are fruit intake and time spent walking. The frequency of fruit intake has negative effect on the elderly health with statistically significant $p < 0.01$. The elderly who do not walk every day have a decreased chance of being healthy by 0.809 times the odds compared to those who walk an hour per day. Another factor is almost significant with the health status is the place of residence ($p = 0.055$). The elderly who reside in urban areas tend to be less healthy than those who reside in rural areas if sample size is raised in amount.

Table 14: Logistic regression analysis of likelihood of factors affecting the elderly health status (BMI)

| Characteristic variables | | B | SE | OR |
|--------------------------|-----|-----------------|-------------|-------------|
| <u>Vegetables Intake</u> | | .019 | .020 | 1.019 |
| <u>per week</u> | | | | |
| <u>Fruits Intake</u> | | -.049*** | .018 | .952 |
| <u>per week</u> | | | | |
| <u>Drinking alcohol</u> | Yes | | | 1 |
| | No | -.136 | .127 | .873 |
| <u>Smoking</u> | Yes | | | 1 |
| | No | .105 | .114 | 1.111 |

| Characteristic variables | | B | SE | OR |
|---|--|----------------|-------------|-------------|
| <u>Time to spend walking per day</u> | Walk < 1 hour | | | 1 |
| | Don't walk | -.212** | 1.00 | .809 |
| | Walk 1-2hours | -.125 | .123 | .882 |
| | Walk > 2 hours | -.300 | .181 | .741 |
| <u>Age group</u> | 60-69 | | | 1 |
| | 70-79 | -.071 | .100 | .932 |
| | 80+ | -.110 | .125 | .895 |
| <u>Gender</u> | Female | | | 1 |
| | Male | .065 | .117 | 1.067 |
| <u>Education level</u> | No education | | | 1 |
| | Incomplete-primary school | .078 | .120 | 1.081 |
| | Primary school | .223 | .159 | 1.250 |
| | Secondary school and higher | .186 | .154 | 1.205 |
| <u>Marital status</u> | Single | | | 1 |
| | Currently married | .088 | .155 | 1.092 |
| | Formerly married (Divorced/ Separate/ Widow) | .095 | .156 | 1.099 |
| <u>Main source of cash income</u> | No cash income | | | 1 |
| | Working (Private business/ Farming/ Wage earner) | .178 | .168 | 1.195 |
| | Pension/Welfare | .206 | .188 | 1.229 |
| | Supported by family members | .205 | .161 | 1.228 |
| <u>Place of residence</u> | Rural | | | 1 |
| | Urban | -.192* | .100 | .825 |
| <u>Source of drinking water</u> | Unsafe water | | | 1 |
| | Safe water | .065 | .125 | 1.067 |

| Characteristic variables | B | SE | OR |
|---------------------------------|----------|-----------|-----------|
| <u>Toilet facility</u> | | | 1 |
| Non-sanitary toilet | | | |
| Sanitary toilet | -.087 | .094 | .917 |
| R² | | | .017 |
| -2 Log likelihood | | | 3238.066 |
| Model chi-square | | | 29.755 |
| Number of observation | | | 2361 |

Note: *** significance level of 1 percent, ** significance level of 5 percent, * p=.055

Table 15 shows factors that affect the health status and is measured by BMI in comparison between urban and rural areas. In rural areas - concerning to the general validity of the model - the chi-square is 19.769, which is the gap between the -2 Log likelihood of adjusted model when all independent variables are included and the -2 Log likelihood of the initial model when only the constant is included.

For urban areas, the findings in table 15 indicate that the health promoting behavior that has associations with the health status is drinking alcohol; the elderly who do not drink alcohol have poorer health than those who drink alcohol by 0.578 times ($p < 0.01$). Due to the limitation of this study, there are no details about what kind and amount of alcohol per day the elderly consumed. Some previous studies found that drinking little amount of wine may be beneficial for older persons (Yeomans 2010). Moreover, walking behavior of older persons is almost a significant association with the health status. If this study increases its sample size, a significant relation may be found with the health status; the elderly who do not walk or walk more 2 hours per day may be less healthy than those who walk under 1 hour at $p = 0.067$ and $p = 0.077$.

For rural areas, the results in table 15 show that the health promoting behavior that has a relationship with the health status is fruits intake. Fruits intake is recommended for older people to maintain their health. Nevertheless, accurate fruits intake evaluation is hard and high sugar content in fruits may have negative association with BMI. Ham and Kim found that the number of evening fruit intake had a positive

correlation with the BMI of adolescent in Korea. This was related to high sugar in fruits and caused to overweight if over intake of fruits (Ham and Kim 2014). Besides, marital status of older persons is almost significant relationship with the health status, particularly in formerly married group. If this study increases its sample size, it might be found statistically significant association with the health status; the elderly who are formerly married are more likely to have good health compared to those who are single.

Table 15: Factors affecting the elderly health status (BMI) in comparison between urban and rural areas

| Variables | Rural | | | Urban | | |
|----------------------------------|----------------|-------------|-------------|-----------------|-------------|-------------|
| | B | SE | OR | B | SE | OR |
| <u>Vegetables</u> | .038 | .028 | 1.039 | -.009 | .030 | .992 |
| <u>Intake/week</u> | | | | | | |
| <u>Fruits Intake/week</u> | -.065** | .026 | .937 | -.036 | .027 | .965 |
| <u>Drinking alcohol</u> | | | | | | |
| Yes | | | 1 | | | 1 |
| No | .120 | .162 | 1.128 | -.547*** | .209 | .578 |
| <u>Smoking</u> | | | | | | |
| Yes | | | 1 | | | 1 |
| No | .024 | .153 | 1.025 | .225 | .180 | 1.252 |
| <u>Time to spend</u> | | | | | | |
| <u>walking/ day</u> | | | | | | |
| Walk < 1 hour | | | 1 | | | 1 |
| Don't walk | -.181 | .137 | .835 | -.278* | .152 | .757 |
| Walk 1-2hours | -.273 | .189 | .761 | -.027 | .165 | .974 |
| Walk > 2 hours | -.133 | .271 | .876 | -.443* | .250 | .642 |

| Variables | Rural | | | Urban | | |
|--|--------------|-------------|--------------|-------|------|-------|
| | B | SE | OR | B | SE | OR |
| <u>Age group</u> | | | | | | |
| 60-69 | | | 1 | | | 1 |
| 70-79 | .005 | .144 | 1.005 | -.136 | .141 | .873 |
| 80+ | -.029 | .173 | .971 | -.222 | .183 | .801 |
| <u>Gender</u> | | | | | | |
| Female | | | 1 | | | 1 |
| Male | .170 | .167 | 1.185 | -.046 | .169 | .955 |
| <u>Education level</u> | | | | | | |
| No education | | | 1 | | | 1 |
| Incomplete-primary school | -.016 | .157 | .984 | .256 | .197 | 1.291 |
| Primary school | .260 | .224 | 1.297 | .284 | .240 | 1.328 |
| Secondary school and higher | .094 | .231 | 1.098 | .312 | .224 | 1.366 |
| <u>Marital status</u> | | | | | | |
| Single | | | 1 | | | 1 |
| Currently married | .356 | .236 | 1.428 | -.146 | .211 | .864 |
| Formerly married (Divorced/ Separate/ Widow) | .432* | .237 | 1.541 | -.188 | .212 | .828 |
| <u>Main source of cash income</u> | | | | | | |
| No cash income | | | 1 | | | 1 |
| Working (Private business/ Farming/ Wage earner) | .275 | .218 | 1.317 | .065 | .274 | 1.068 |
| Pension/Welfare | .378 | .255 | 1.459 | -.018 | .286 | .982 |
| Supported by family members | .235 | .217 | 1.265 | .117 | .247 | 1.124 |

| Variables | Rural | | | Urban | | |
|----------------------------------|-------|------|----------|-------|------|----------|
| | B | SE | OR | B | SE | OR |
| <u>Source of drinking</u> | | | | | | |
| <u>water</u> | | | | | | |
| Unsafe water | | | 1 | | | 1 |
| Safe water | .065 | .141 | 1.067 | -.235 | .353 | .791 |
| <u>Toilet facility</u> | | | | | | |
| Non-sanitary toilet | | | 1 | | | 1 |
| Sanitary toilet | -.086 | .134 | .918 | -.106 | .139 | .900 |
| R² | | | .022 | | | .027 |
| -2 Log likelihood | | | 1620.216 | | | 1598.584 |
| Model chi-square | | | 19.769 | | | 24.184 |
| Number of observation | | | 1183 | | | 1178 |

Note: *** significance level of 1 percent, ** significance level of 5 percent, * p=.068 (rural areas), * p=.067; p=.077 (urban areas)

CHAPTER 5

DISCUSSIONS AND CONCLUSIONS

5.1 Introduction

This chapter elaborates on reasonable discussions and recommendations based on the research findings. It starts with a brief consideration of the study that outlines the study objective. The study objective is then discussed according to major findings. Next, policies and their implementations are recommended for policy makers. The final section highlights guidelines for future studies.

5.2 A brief review of the thesis

The study emphasizes the importance of health promoting behavior for the elderly people in South Vietnam due to rapidly aging populations and non-communicable diseases. Health promoting behaviors affect the health status directly, but the concept is new in Vietnam. Descriptive statistics are employed to describe the background characteristics of the sample population and the binary logistic regression analysis is used for investigating the relationship between the health promoting behavior and other background characteristics and BMI in the data from "The Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants in 2010".

The Pearson's chi-square and binary logistics tests indicate that three factors are almost associated with health status of the elders: gender, marital status, and place of residence. The following paragraphs will explain more about these variables.

Chapter 4 indicates that the elderly male tend to be healthier than their female counterparts. The elderly women suffer from non-communicable diseases related to Body Mass Index as well as long term illnesses (Castel, Shahar et al. 2006).

Interestingly, the results reveal that the elderly who are single tend to have weaker health than those who are formerly married, particularly for those who live in rural areas. In chapter 2, older persons who are single have higher mortality rates than those who are in other marital status (Kaplan and Kronick 2006).

Lastly, the elderly who live in urban areas tend to be weaker than those who reside in rural areas. According to Duong's 2009 research, the elderly who live in urban areas are at the risk of chronic diseases due to BMI being at higher levels than those who live in rural areas (Duong and et al. 2003, Pham and Au 2009).

5.3 Summary of significances from this study

The results show factors that have statistically relationship with BMI are fruits intake, drinking alcohol and walking behaviors, which can be summarized by the following table:

Table 16: Factors affecting the elderly health from binary logistics analysis

| Variables | Health status (BMI) | Health status (BMI), especially for urban areas |
|-------------------------|----------------------------|--|
| Fruits intake | Negative significance*** | |
| Do not drinking alcohol | | Negative significance*** |
| Do not walking | Negative significance** | |

Note: *** significance level of 1 percent, ** significance level of 5 percent

Fruits intake has a negative effect on the health status of older persons, especially for those who live in rural areas. Most previous studies show adequate fruits and vegetables consumption may reduce the risk of mortality from chronic diseases (Terry and Suzuki 2001, Fung TT and et al. 2004, Hung, Joshipura et al. 2004, Winkleby and Cubbin 2004). Inadequate intake of products including fruits, vegetables, proteins, and lipids may cause malnutrition, thus reduce the elderly health status (Wyka, Biernat et al. 2012). However, several studies found that inappropriate fruits intake

may have reverse effect on health status fruits: some types of fruits contain high sugar content; if the older persons intake high sugar fruits in a large amount or regularly, it may increase their weight and the risk of getting some diseases, such as diabetes (Ham and Kim 2014).

Also, this study indicates that the elderly who do not walk every day are not healthy. This finding is consistent with the previous research findings. Burke and colleagues found that physical activity such as walking positively changed central obesity which measured by BMI (Burke and et al. 2012). Furthermore, physical activity for about 30–60 minutes per day had a greater protection against non-communicable diseases (Warburton, Nicol et al. 2006).

The elderly who do not drink alcohol tend to be weaker than those who drink alcohol. Such findings do not support the hypothesis of this study. In order to have a better understanding on this relationship, the information on type and amount of alcohol consumption is required. Nevertheless, some previous studies revealed that alcohol consumption may have positive effect on elderly health. For example, Peel et al (2006) indicated that moderate alcohol consumption helped improve the elderly health. Another study stated that moderate alcohol intake may protect against obesity, especially in women (Yeomans 2010).

5.5 Policy implications of this study

Taking care of the elderly is an important policy component that Vietnam Government has emphasized in its development. This study's findings will enrich the understanding about the factors that may enhance elderly health. Based on the results, the policy makers and health departments should give more concern on two aspects of health promoting behaviors for the elderly: fruits intake and walking amount per day. The Vietnamese Government should promote IEC programs such as information, education, communication via mass media and training programs for the elderly to strengthen their knowledge. The program should emphasize health promoting behaviors especially adequate and appropriate fruits intake, the importance of walking

30 minutes per day or riding a bicycle. In particular, for the elderly who live in rural areas, the results reflect that more frequency of fruits intake tends to lead abnormal BMI. Thus, the IEC programs for health promoting behaviors should not only introduce older people to have adequate fruits intake but also give information on appropriate fruits intake. The IEC should provide detailed and easy understanding information on the types of fruits, such as the sugar and fiber contents in each type of fruits, fruits to avoid for weight control, and the appropriate amount of fruits intake per day.

5.5 Contributions to the elderly health research

This study shows that health promoting behaviors are significant with the elderly health and that the knowledge on these issues in the case of Southern Vietnam should be enhanced. Also, the results of this study provide useful evidence-based information for policy implication and the program development on health promoting in Southern Vietnam. In order to improve the understanding on health promoting behavior in Vietnam, the future research should collect detail using dietary intake diary to capture more detailed on food components, and the type and amount of alcohol consumption and smoking should be included in the questionnaire. In addition, the type, the time spending, and the frequency of exercise should be gathered.

5.6 Directions for future studies

By conducting this research, there are still various issues relating to health promoting behavior and the health status of the elderly that needed to be explored in Vietnam. The possible topics for the future research are as follows

1. Study on the knowledge and practice of healthy diet of the elderly and their longevity.
2. Comparative study on the situations of older people in three regions: the North, the Central, and the South of Vietnam.
3. Research on appropriate physical activities for the elderly
4. Impact of alcohol consumption on physical health of the older persons.

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APPENDIX



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

QUESTIONNAIRE

The Survey on Inequity on Health and Nutritional Status of Aged People Living in Urban and Rural Areas of the Southern Vietnam and Its Social Determinants

ID: _____

Date:.....

Address: Commune.....District.....

Province:.....

PART 1: General information

| No. | Questions | Answer |
|-----|---|--|
| | Age (in years) | 9. Don't remember |
| | Sex | Male Female |
| | Ethnic | Kinh Chinese K'me Other |
| | Education level | Illiterate Incomplete primary school Primary school Secondary school High school Vocational school College/ University Upper university |
| | Marital status | Single Married Divorce or separate Widow Live with partner 9. No answer |
| | What is your main source of cash income? | Private business Pension Welfare Farming Wage earner Supported by family members No cash income |
| | During the last week, had your family received any food support from relatives, friends | Yes No |

| No. | Questions | Answer |
|-----|---|--|
| | or neighbor? | No answer |
| | During the last 6 months, had your family received any food support (including from Government of Charitable Organization)? | Yes No No answer |
| | Do you grow any vegetables or fruits? | Yes No No answer |
| | Do you breed chickens, pigs or fishes? | Yes No No answer |
| | Are you living with disable person? | No Yes, blind one Yes, deaf one Yes, paralysed muscle Yes, disabled mental Yes, malignancy No answer |
| | In the last week how many days did your meals include meat or fish? | Enter number:..... 9. No answer |
| | In the last week how many days did your meals include milk, sour milk? | Enter number:..... 9. No answer |
| | In the last week how many days did your meals include rice? | Enter number:..... 9. No answer |
| | In the last week how many days did your meals include vegetables? | Enter number:..... 9. No answer |
| | In the last week how many days did your meals include fruit? | Enter number:..... 9. No answer |
| | What is the source of drinking water for you? | Tap water Well water Public well water Protected dug well Unprotected dug well Filtered river water |

| No. | Questions | Answer |
|-----|--|--|
| | | Unfiltered river water Rain water No answer |
| | What kind of toilet facility does your household use? | Septic tank Flush to river Covered dry latrine No facilities at all No answer |
| | How far is this toilet from your dwelling? | Within dwelling Less than 50m 50m and more 9. Don't know |
| | Do you need any help going to the toilet? | Yes No 9. No answer |
| | Do you need any help in washing yourself? | Yes No 9. No answer |
| | Do you need any help to get dressed? | Yes No 9. No answer |
| | In last week, how many times did you visit your friends/relatives? | No. (of time):..... 9.No answer |
| | Did you check your health any time in last week? | No. (of time):..... 9.No answer |
| | Do you pay medicine fees by yourself? | Yes No 9. No answer |
| | Are you able to feed yourself? | Yes No 9. No answer |
| | How long do you spend walking every day? | 0. don't walk 1. less than an hour 2. one-two hours 3. more than two hour 9. No answer |
| | Do you normally eat alone or in company? | Alone In company 9. No answer |

| No. | Questions | Answer |
|-----|-----------------------------------|--|
| | Do you have chewing difficulties? | Yes No 9. No answer |
| | Do you have a dental prosthesis? | Yes No 9. No answer |
| | How often do you drink alcohol? | Never Occasionally Once a week Once a day More than once a day 9. No answer |
| | Do you smoke? | Yes No 9. No answer |

PART 2: Current health status

| No. | Question | Answer |
|-----|---|-------------------------------|
| | Current Disease | |
| | Do you have cardiovascular disease? | 0. No 1. Yes, specify..... |
| | Do you have problem with digestive systems (including liver)? | 0. No 1. Yes, specify..... |
| | Do you have respiratory disease? | 0. No 1. Yes, specify..... |
| | Do you have cancer disease? | 0. No 1. Yes, specify..... |
| | Do you have osteoarticular disease? | 0. No 1. Yes, specify..... |
| | Do you have urology disease? | 0. No 1. Yes, specify..... |
| | Do you have diabetes disease? | 0. No 1. Yes, specify..... |
| | Do you have mental disease? | 0. No 1. Yes, specify..... |

| | | |
|---|---|---------------------------------------|
| | Any disabled? | Arm/leg broken Cannot moving No |
| Any symptoms that you felt in the last two week | | |
| | Headache | 1. Yes 2. No |
| | Vertigo | 1. Yes 2. No |
| | Difficult sleep | 1. Yes 2. No |
| | Depression | 1. Yes 2. No |
| | Palpitations | 1. Yes 2. No |
| | Breathing difficulties | 1. Yes 2. No |
| | Diarrhoea | 1. Yes 2. No |
| | Constipation | 1. Yes 2. No |
| | Stomach pain | 1. Yes 2. No |
| | Pain in joints or back | 1. Yes 2. No |
| | Can you hear clearly in normal speaking condition (volume)? | 1. Yes 2. No |
| | Do you have hearing aids? | 1. Yes 2. No |
| | Can you read newspaper/book? | 1. Yes 2.No (tell the reason why) |

| | | |
|--|---|-------------|
| | Weight |kg |
| | Height |m |
| | Waist circumference |m |
| | Blood pressure (the first time) |/..... |
| | Blood pressure (the second time after 10 minutes) |/..... |



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Mai.N, Nguyen.N, Hoa.N (2010). "Exploring the violence status of the married women aged from 15 to 49 years in Vinh Phu community, Binh Duong province, 2009". HCMC Medicine Journal; 14(2): 61-66.

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