

FACTORS INFLUENCING HEALTH CARE UTILIZATION
AMONG MIDDLE AGED AND ELDERLY PEOPLE IN CHINA



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ปัจจัยที่ส่งผลกระทบต่อการใช้บริการทางสุขภาพของคนวัยปานกลาง
และวัยสูงอายุในประเทศสาธารณรัฐประชาชนจีน



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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ฉีลี่มูเกอะ : ปัจจัยที่ส่งผลกระทบต่อการใช้บริการทางสุขภาพของคนวัยปานกลาง และวัยสูงอายุในประเทศสาธารณรัฐประชาชนจีน (FACTORS INFLUENCING HEALTH CARE UTILIZATION AMONG MIDDLE AGED AND ELDERLY PEOPLE IN CHINA) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร. วรรณิการ์ คำรงค์พลาศิทธิ, 101 หน้า.

ภูมิหลัง: นโยบายลูกคนเดียวของประเทศไทย การพัฒนาของระบบสุขภาพ อายุขัยของประชากรที่เพิ่มขึ้น อัตราการตายหลังคลอดที่ลดลง ต่างก็เป็นปัจจัยที่ทำให้จำนวนผู้สูงอายุเพิ่มขึ้น อัตราส่วนของผู้สูงอายุที่ค่อนข้างเพิ่มขึ้นอย่างต่อเนื่องก่อให้เกิดปัญหาในระบบสุขภาพที่มากขึ้นเช่นเดียวกัน การศึกษานี้สนใจศึกษาปัจจัยที่มีอิทธิพลต่อการใช้บริการระบบสุขภาพในกลุ่มวัยกลางคนและกลุ่มประชากรผู้สูงอายุในประเทศไทย

จุดประสงค์ เพื่อวิเคราะห์ปัจจัยที่ส่งผลต่อการเข้าใช้ระบบบริการสุขภาพของประชากรวัยกลางคนและวัยสูงอายุของประเทศไทย

วิธีศึกษา การศึกษานี้ใช้ข้อมูลทฤษฎี *the China Health and Retirement Longitudinal Study (CHARLS)* ในปี 2556 ผลลัพธ์ที่ต้องการศึกษา ได้แก่ การใช้บริการทางสาธารณสุขแบบผู้ป่วยนอกและผู้ป่วยใน การตรวจร่างกายและการเข้ารับบริการทางทันตกรรม สำหรับการใช้บริการแบบคนไข้ในและผู้ป่วยนอกนั้น งานวิจัยนี้ศึกษาถึงทางเลือกระหว่างสถานบริการสาธารณสุขของรัฐและเอกชน ตัวแปรอิสระที่ใช้เป็นรูปแบบแนวคิดการใช้การดูแลสุขภาพของ Andersen งานวิจัยนี้ใช้วิธี Binary logit เป็นวิธีการประมาณค่าหลัก การศึกษานี้ใช้ข้อมูลตัวอย่างทั้งหมดและแบ่งตัวอย่างย่อยออกเป็นสองกลุ่ม ได้แก่ กลุ่มวัยกลางคนและกลุ่มผู้สูงอายุ และใช้วิธี Likelihood ratio test เพื่อตัดสินใจว่าการวิเคราะห์แบบใช้ข้อมูลทั้งหมดหรือข้อมูลย่อยจะเหมาะสมกว่าสำหรับข้อมูลนี้ นอกจากนี้ความสำคัญของผลกระทบของตัวแปรแต่ละตัวแปรจะถูกตีความด้วยการใช้ Marginal Effect

ผลการศึกษา จากการศึกษาพบว่า อายุเป็นปัจจัยสนใจและมีความสัมพันธ์ในเชิงบวกต่อการใช้บริการทั้งในส่วนผู้ป่วยนอกและผู้ป่วยใน ณ สถานพยาบาลของรัฐ และการตรวจสุขภาพ เพศหญิงมีความน่าจะเป็นที่จะรับบริการทางทันตกรรมมากกว่าเพศชาย สำหรับปัจจัยที่ส่งผลต่อการใช้บริการสุขภาพในผู้ที่มีประกันสุขภาพพื้นฐานของผู้ที่ทำงานในเมืองมีแนวโน้มที่จะเป็นผู้ป่วยนอกและผู้ป่วยในและการได้รับการตรวจร่างกายมากกว่าผู้มีประกันแบบอื่นๆและผู้ไม่มีประกันสุขภาพ ในส่วนของปัจจัยด้านความต้องการ ผู้ที่มีผลประเมินสุขภาพว่าดีด้วยตัวเองมีความต้องการใช้บริการในระบบผู้ป่วยนอก ผู้ป่วยใน การตรวจสุขภาพร่างกายและทันตกรรมน้อยกว่าเมื่อเทียบกับผู้ที่มีผลการประเมินสุขภาพด้วยตนเองที่มีผลการประเมินว่าสุขภาพของตนเองไม่ดี

บทสรุป ความต้องการในการใช้บริการระบบสุขภาพที่เพิ่มสูงมากขึ้นทำให้เกิดภาวะการขาดแคลนในส่วนของผู้ให้บริการ ซึ่งก่อให้เกิดความไม่เท่าเทียมกันในการเข้าถึงบริการของผู้ป่วยที่จำเป็นต้องได้รับการดูแล ในการแก้ปัญหานี้ รัฐบาลกลางของประเทศไทยควรส่งเสริมและประชาสัมพันธ์การใช้บริการสุขภาพที่สมเหตุสมผลและเป็นไปตามความจำเป็นทางการแพทย์

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการ ลายมือชื่อนิสิต

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KEYWORDS: HEALTH CARE UTILIZATION / AGING POPULATION / ANDERSEN MODEL / MEDICAL INSURANCE

QILIMUGE -: FACTORS INFLUENCING HEALTH CARE UTILIZATION AMONG MIDDLE AGED AND ELDERLY PEOPLE IN CHINA. ADVISOR: ASST. PROF. KANNIKA DAMRONGPLASIT, Ph.D., 101 pp.

Background: China's one-child policy, significant advancement in health care, increase in life expectancy and decrease in birth rate all contribute to rapidly aging society. Proportion of elderly will continue to grow, which will put more burden on an already troubled health care system. This study tries to assess factors influencing health care utilization among middle-aged and elderly people in China.

Objective: To analyze factors influencing health care utilization among middle-aged and elderly people in China.

Methods: The study used secondary data from *the China Health and Retirement Longitudinal Study (CHARLS) 2013 wave survey*. The outcomes of interest include outpatient and inpatient utilization, physical examination and dental care visit. For outpatient and inpatient utilization, the study looked at the choice between public versus private facility. The independent variables are chosen based on the Andersen health care utilization conceptual model. Binary logit is employed as the main estimation method. The study is performed for full sample as well as two sub-samples of the middle-aged and elderly groups. Finally, likelihood ratio test is used to decide whether a full or sub-sample analysis is more appropriate for the data. Furthermore, the magnitude of the impact of each variable on the outcome is interpreted by using marginal effects.

Result: For predisposing factors, age has a positive effect on outpatient at public facility, inpatient care and physical examination. Females are more likely to admit and have dental checkup. Higher education attainment has positive effect on getting physical examination and dental care. For enabling factors, those with urban employee basic medical insurance are more likely to use outpatient and inpatient care, and get physical examination. For need factors, people with good self-rated health are less likely to use outpatient, inpatient, physical examination and dental care compared to poor self-rated health counterpart.

Conclusions: The increasing demand of health services leads to a shortage of supply, which causes the low accessibility of health care services. In order to cope with this problem, the Chinese government should promote scientific and rational use of health services. Thus, according to evidence from analysis results, the Chinese government must pay attention to factors like health insurance access and reimbursement method, as well as promoting preventive measures to maintain people's good health, like encouraging socialized and physical exercise.

Field of Study: Health Economics and Health Care
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Student's Signature

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CHAPTER 1

INTRODUCTION

1.1 Problems and Significance

1.1.1 Aging Problem in China

This study focuses on factors influencing health care utilization among middle- aged and elderly people in China. The impact of China's 36-year, one-child policy, combined with significant advances in health care, have contributed to increase in life expectancy and decrease in China's birth rate. During the years that the one-child policy was in effect, the health status of the Chinese population achieved considerable improvement, with life expectancy at birth increasing from 35 years in 1949 to 76 years in 2016, and is expected to be around 80 years by 2050. According to the China statistical year book of 2016, the fertility rate is 12.07 per 1,000 population. At the same time, the overall mortality rate is 7.11 per 1,000 population. As a result, China's population has been aging rapidly. The proportion of the elderly in China will continue to grow rapidly, increasing the burden on an already troubled health care system.

Society is defined as an aging society when the aging population over 60 years old or over 65 years old account for more than 10 percent or 7 percent of the total population, respectively. In the next 25 years, the percentage of people in China aged 60 years old or over is expected to more than double, from 12.4% (168 million people) in 2010 to 28% (402 million) in 2040 (United Nations, 2013). In contrast, it took France 115 years, Sweden 85 years and the United States of America 69 years for the proportion of the population aged over 60 years to double from 7% to 14%. Moreover, in the near future, a person who reaches age 60 in China can expect to live longer than his or her ancestors did. In 2013, there were 22.6 million people aged 80 years or over in the country, and by 2050 this number is expected to increase fourfold to 90.4 million – representing the world's largest population of this most elderly age group (United Nations, 2013). In China today, there are roughly 7.6 workers for every one retiree. But in 2050, according to the United Nation's demographic forecast, each retiree will be supported by only 2.1 people in the workforce. Combined with the market-driven reform of social services and rapid erosion of family support, the

provision of affordable and accessible social care services to older people has already become an urgent issue for the Chinese government to address.

China's looming demographic shift presents considerable social and economic challenges. The rapid increase of an aging population can bring great challenges to the existing health care systems in China. In particular, there is a growing gap between rising demand for medical care due to the aging population and the limited supply of health care provision in China.

In 2013, of the 202 million older people in China, more than 100 million had at least one chronic non-communicable disease (Wang et al., 2017). Many elderly people have multiple chronic diseases at the same time. As the population ages further, age-dependent chronic (non-communicable) diseases, such as ischemic heart disease, cancer, stroke, arthritis and dementia are likely to increase in terms of the absolute number of people affected (Prince et al., 2015). This health transition is gathering pace: in 2012, nearly 80% of deaths among people aged 60 years or older in China was attributable to non-communicable diseases (World health organization, 2015). According to the current projections, China's rapidly aging population is expected to be associated with at least a 40% increase in the burden of chronic non-communicable disease by the year 2030 (Wang, Marquez and Langebrunner, 2011). By 2030, there will be three times more people living with at least one chronic disease – both men and women.

In China, the number of people aged over 40 years old who live with at least one non-communicable disease (NCD) will double or even triple in the next two decades. About 50% of the NCD burden occurs in people aged over 65 years old in China. While heart disease and cancer are the main contributors to mortality, much of the burden comes from years lived with disability due to other chronic diseases (stroke, dementia and mental disorders). Therefore, one major problem for this aging population is functional dependence resulting in these impairments. Preventing and postponing the functional limitations will benefit individual older people as well as benefiting society. However, this will require effective and timely interventions through accessible and affordable public health systems.

At present, the health system response to the needs of older people in China is inadequate. A key challenge for China will be to develop widespread accessible and

equitable preventive and supportive health systems that meet the needs of the rapidly expanding older population, which will enable these older people and their children to continue to contribute to China's economy and society. How China meets this challenge will influence global health, because innovations and strategies developed in this region – which is home to one fifth of the world's population – will provide useful insights for other countries (World health organization, 2015)

Obviously, the existing health system in China is fragmented and poorly equipped for addressing the health care needs of the growing population of older people. The prevalence of health care needs has grown among both rural and urban residents. But it is well known that resources are limited, and health resources are no exception. For this reason, knowing which factors influence health care utilization will have a significant impact on the allocation of health resources. Therefore, it is important to discover factors that influence health care utilization to provide constructive advice to policymakers, as well as to improve the quality of health service providers such as hospitals.

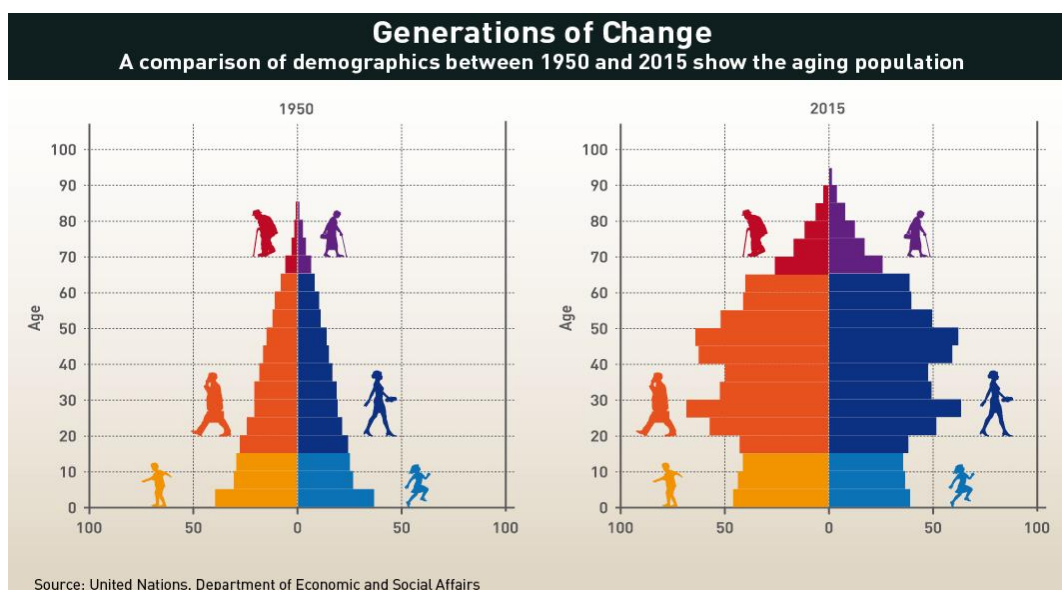


Figure 1: A comparison of demographics between 1950 and 2015 show the aging population

Source: United Nations, Department of Economic and Social Affairs

1.1.2 Health System in China

In China, the central government has overall responsibility for national health legislation, policy, and administration. It is guided by the principle that every citizen is entitled to receive basic health care services, with local governments—provinces, prefectures, cities, counties, and towns—responsible for providing them according to local circumstances. Health authorities include the National Health and Family Planning Commission and the local Health and Family Planning Commissions (or Bureaus of Health, if they have not been merged with local Family Planning Commissions), which have primary responsibility for organizing and delivering health care and supervising providers (mainly hospitals). Health authorities at the prefectures/city, county, and town levels have limited flexibility in carrying out provincial health policies.

Hospitals can be public or private, non-profit or for-profit. Most township hospitals and community hospitals are public, but both public and private secondary and tertiary hospitals exist in urban areas. Rural township hospitals and urban community hospitals are often regarded as primary care facilities, similar to village clinics rather than ‘true’ hospitals. In 2013, there were 13,396 public hospitals and 11,313 private

hospitals (excluding township hospitals and community hospitals), of which 17,269 were not-for-profit, and 7,440 were for-profit (National Health and Family Planning Commission, 2014). In 2013, there were 487,802 public primary care facilities and 427,566 private village clinics (National Health and Family Planning Commission, 2014).

According to the China Statistical Yearbook of 2016, in 2015, the number of medical technical personnel in total was 5.80 per 1,000 persons. In the urban area there were 10.20 per 1,000 persons, but in the rural area there were 3.90 per 1,000 persons. Licensed doctors in total were 2.20 per 1,000 persons. In the urban area there were 3.70 per 1,000 persons, and in the rural area there were 1.60 per 1,000 persons. The registered nurses in total were 2.40 per 1,000 persons. In the urban area there were 4.60 per 1,000 persons, and in the rural area there were 1.40 per 1,000 persons. It is clear that with the rapid aging of the population, health care needs dramatically increase, and the existing shortage of health resources will be worse with the growing health needs.

Health Insurance in China

As a result of sharp increases in health-care costs and widespread lack of insurance, it has become increasingly difficult for an increasing segment of people to get adequate medical care. For example, the 2003 National Health Survey shows that 46% of the rural residents who were ill did not seek health care and 40% of them claimed cost as the main reason (Yip et al., 2009). In response to the public discontent with unaffordable access, the Chinese government has initiated several public health insurance programs in past several years, which try to cover different segments of the population.

Generally speaking, health insurance is publicly financed and provided by local governments. In 2013, China spent approximately 5.6 percent of its gross domestic product (CNY 3,187 billion, or USD 871B)¹ on health care, with 30 percent financed by local governments and 36 percent by publicly financed health insurance, private health insurance, or social health donations (National Health and Family Planning

¹ Please note that, throughout this profile, all figures in USD were converted from CNY at a rate of about CNY3.66 per USD, the purchasing power parity conversion rate for GDP in 2014 reported by OECD (2015) for China.

Commission, 2014). There were three main types of publicly financed insurance: 1) urban employment-based basic insurance (launched in 1998); 2) urban resident basic insurance (launched in 2009); and 3) the new cooperative medical scheme for rural residents (launched in 2003) (World health organization, 2015). These three types of health insurance are targeting different population groups, aiming to provide universal coverage of health services with a focus on equity in health and health care utilization. Urban employment-based basic insurance is mainly financed by employee and employer payroll taxes, with minimal government funding. Participation is mandatory for employees in urban areas; the insured population was 274.2 million in 2013 (National Health and Family Planning Commission, 2014). Employees' non-employed family members are not covered. Urban resident basic insurance, which is voluntary at the household level, covered 299 million self-employed individuals, children, students, and elderly adults in 2013. Both urban employment-based and urban resident insurance are administered by the Ministry of Human Resources and Social Security and run by local authorities. The new cooperative medical scheme, mainly administered by the National Health and Family Planning Commission and run by local authorities, is also voluntary at the household level and covered a rural population of 802 million in 2013, representing a coverage rate of 98.7 percent (World health organization, 2015).

Urban resident basic insurance and the new cooperative medical scheme are mainly government financed. In regions where the economy is less developed, the central government provides the largest share of subsidies, with provincial and prefectural governments providing the rest. In more-developed provinces, most government subsidies are locally provided (mainly provincial). Coverage of publicly financed health insurance is near-universal—exceeding 95 percent of the population since 2011 (Elwell-Sutton et al., 2013). The few permanent foreign residents are entitled to the same coverage benefits as citizens. Undocumented immigrants (there are very few) and visitors are not covered by publicly financed health insurance (World health organization, 2015).

In addition to public health insurance, there also exists private health insurance. Complementary private health insurance is purchased to cover deductibles, co-payments, and other cost-sharing, as well as coverage gaps, in publicly financed

health insurance, which serves as the primary coverage source for most people. Private coverage is provided mainly by for-profit companies. In 2014, total premiums collected amounted to CNY 158.7 Billion (USD 43.4 Billion), an increase of 45 percent compared to the prior year, and represents approximately 10 percent of total (public and private) health insurance spending (Hu et al., 2013) (Liu, 2016).

Private insurance is mainly purchased by higher-income individuals and by employers for their staffs. Private insurance often enables people to receive better quality of care and higher reimbursement, as some health services are very expensive or not covered by public insurance. There are currently no statistics on the percentage of the population with private insurance coverage, but the Chinese government is encouraging development of the private insurance market. Private insurance coverage is growing very fast, and some foreign insurance companies have recently entered the market.

Description abbreviations:

UEBMI: Urban Employee Basic Medical Insurance

URBMI: Urban Resident Basic Medical Insurance

NCMC: New Rural Cooperative Basic Medical Insurance

Table 1: Summary of China's Three Public Insurance Programs in 2010

Insurance type	UEBMI	URBMI	NCBMC
Target population	Formal sector urban worker	Children, students, elderly people without previous employment and migrants(in some cities)	Rural residents
Rick-pooling unit	City	City	County
Enrollment, %	92.4%	92.9%	96.6%
Total premium per person(¥)	1559	138	157
Government subsidy per person	0	120 (200 in 2011)	120 (200 in 2011)
Central government contribution	0	60 (100 in 2011)	60 (100 in 2011)

Individual contribution	2-3% of salary	20-170 in central and western provinces; 40-250 in eastern provinces	20-30 in central and western provinces; 30-50 in eastern provinces
Employer contribution	6-8% of salary	0	0
Benefit design			
Inpatient reimbursement rate, %	68.2%	47.9%	43.9%
% of counties or cities covering general outpatient care	Savings accounts	57.5%	78.8%
% of counties or cities covering outpatient care for major and chronic disease	Savings accounts	82.7%	89.4%
Total reimbursement ceiling	Six-times average wage of employee in the city	Six-times disposable income of local residents	Six-times income of local farmers

China has a large population of elderly people over 60 years of age, whose health is of great concern to the Chinese health care system. However, few studies have been conducted to analyze the factors associated with middle-aged and elderly people's health care utilization in China. The objective of this study is to measure the influence of the predisposing factors, enabling factors and need factors on the health care utilization.

Nowadays, the topic of health care utilization has become popular in the whole world, which explains the importance of the issue. Especially in China, it is important to know what factors affect health care utilization. The Andersen health care utilization model will be employed in this study, and will provide the evidence that factors can affect people's health care-seeking behaviors, which in turn influence their final health care utilization. The influencing factors can be assigned into predisposing, enabling and need factors according to the Andersen healthcare utilization model. Predisposing factors include demographic factors like age, gender, education level, occupation, ethnicity, marital statuses and social factors like living arrangement.

Enabling factors include household gross-income, distance to hospital, time spent reaching the nearest health facility, and health insurance scheme. Need factors consist of perceived illness severity and self-reported symptoms (Andersen, 1995).

1.1.3 Health Care Utilization in China

As a net result of demographic and epidemiological transitions, China is expecting a marked increase in the number of elderly people who need health care services. According to the 2016 China statistical year book, in 2005, the total number of health care institutions was 882,206, and the number increased to 983,528 in 2015, as shown in Figure 2.

The number of medical personnel increased from 6,447,246 to 10,693,881 between 2005 and 2015. Medical technical personnel in health care institutions was 5.8 per 1,000 persons in 2015. However, the number was 3.5 per 1,000 persons in 2005. There were 1.56 licensed (assistant) doctors per 1,000 persons in 2005, increasing to 2.2 per 1,000 persons in 2015. Registered nurses increased from 1.03 per 1,000 population to 2.4 nurses per 1,000 population. Figure 3 shows the growth of the number of medical personnel.

The number of outpatient care and inpatient care visits was 23.05 hundred million person-times and 7.184 hundred million persons in 2005, respectively. These number increases to 76.99 hundred million person-times and 21.054 hundred million persons in 2015. The increasing trend of health care utilization can be found in Figure 4 and Figure 5.

Total health expenditure was 865,991 million yuan in 2005 and 4,097,464 million yuan in 2015. Health expenditure as a percentage of GDP (%) was 4.62% in 2005 and 5.98% in 2015. Out of pocket (OOP) health expenditure was 52.21% in 2005 and 29.27% in 2015. Despite these general numbers, China's health care spending, at an estimated 5.548 percent of gross domestic product (GDP) in 2014, is still much lower as compared to the world's average level of 9.892 percent of gross domestic product (GDP) in 2014.

In 2012, there were 1.6 doctors per 1,000 people (2.2 doctors per 1000 population in 2015), and China's per capita health care workers (physicians) were much lower than the OECD average of 3.2 physicians per 1,000 people. The number of nurses per capita in China (1.8 nurses per 1,000 people in 2012) was also much lower than the

OECD average (8.8 nurses per 1,000 people). The average number of medical consultations for each person in 2012 was five in China, slightly lower than the OECD's average annual of six to seven consultations per person (Organization for Economic Co-operation and Development, 2014).

All in all, China has a huge demand gap in health care due to the aging of the population, the growing process of urbanization, the popularization of lifestyle diseases, the rapid growth of consumer wealth and the development of universal health insurance. All of these factors are driving the expansion of the overall health care market. Without a lot of investment and the strong support of the Chinese government, development of health care cannot be sustained.

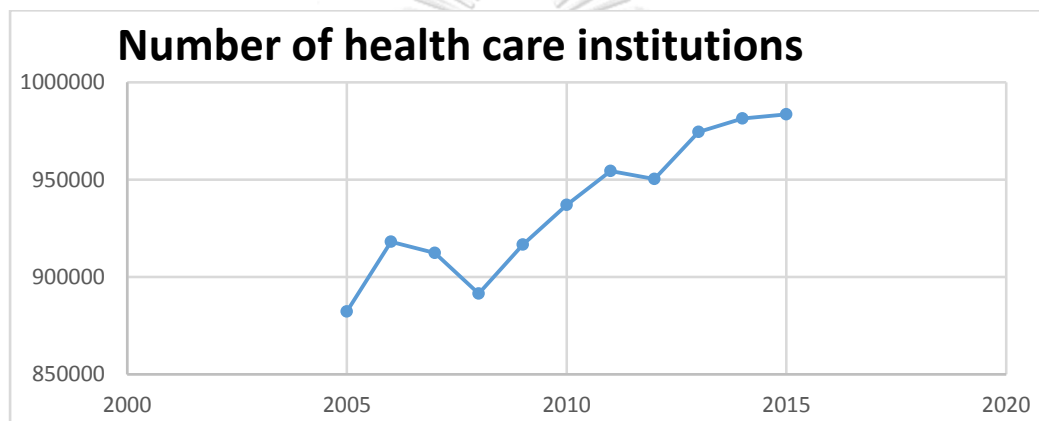


Figure 2: Number of Health Care Institutions from 2005 to 2015

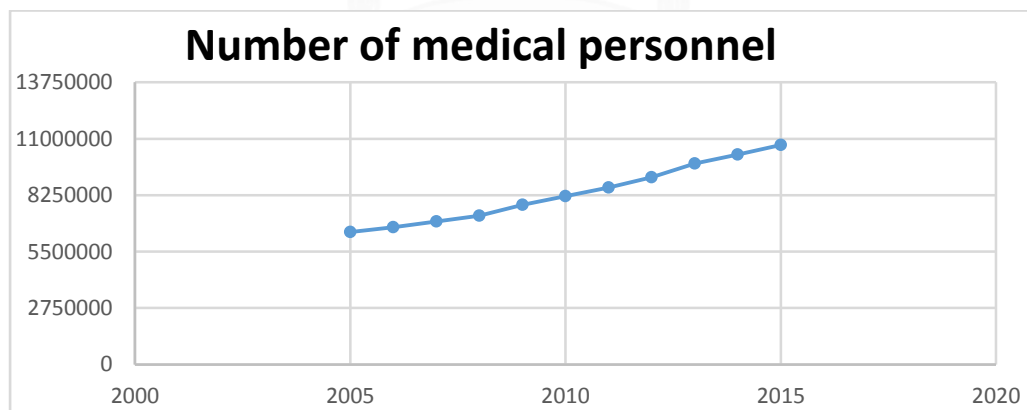


Figure 3: Number of Medical Personnel from 2005 to 2015

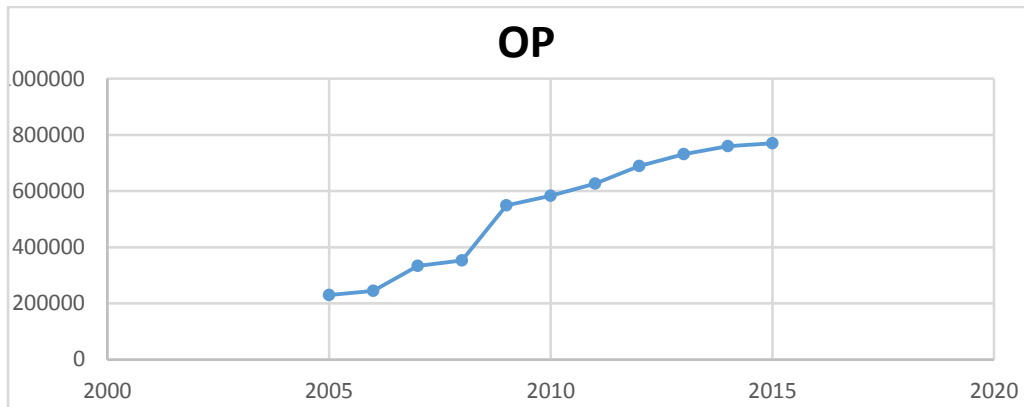


Figure 4: Outpatient Care Utilization from 2005 to 2015

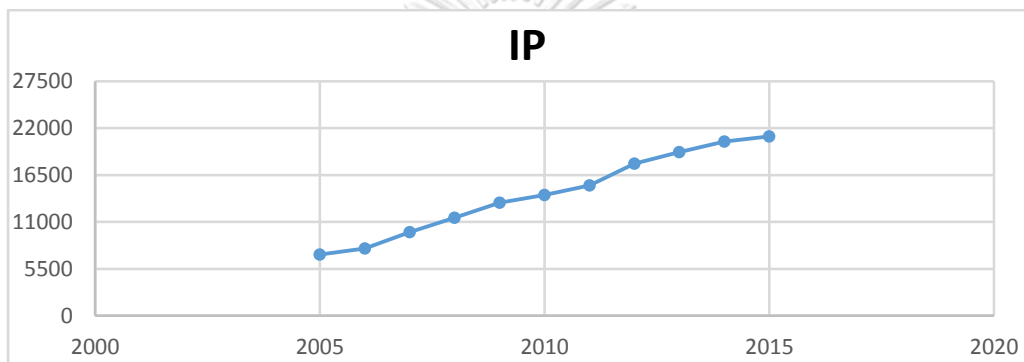


Figure 5: Inpatient Care Utilization from 2005 to 2015

1.1.4 Dental Care Utilization in China

Health is a universal human need for all cultural groups and is central to human happiness and well-being. General health cannot be attained or maintained without oral health. Oral diseases are considered as major public health problems owing to their high prevalence and incidence in all regions of the world, and the greatest burden of oral diseases is on disadvantaged and socially marginalized populations. The severe impact regarding pain and suffering, impairment of function, and effect on quality of life are also tremendous. Therefore, currently, because of the importance of oral health, dental care is becoming more and more important.

For a long period, oral health care was not perceived as important in Mainland China. The situation began to change in the 1980s with economic development, increase in international relations and increasing demand for oral health care. However, dental care has remained a relatively independent and distinct segment of the mainland China healthcare system. Unlike other specialties, dental care services in China are

provided by both hospitals and stand-alone clinics. The majority of tertiary and secondary general hospitals provide dental services through their stomatology departments, while each major city is also equipped with a dental hospital, usually affiliated with a local dental school. Leading dental schools have developed strong stomatology hospitals in their regions, providing complex and comprehensive treatments. However, similar to many other countries, private sector dental clinics started to boom and have now earned a significant market share.

Oral health is fundamental to general health, functioning and well-being. The 2010 Global Burden of Disease Study estimated that oral conditions (untreated caries, severe periodontitis and severe tooth loss) accounted for almost 2% of all years lived with disability. Disability adjusted life-years (DALYs) due to oral conditions increased by 20.8% between 1990 and 2010, largely due to population growth and aging.

In 2009 the proportion of Chinese dentists to the population was 1:10,000, well below the developed countries. The uneven distribution of labor in dental services is still inadequate for such a large population. Although the demand for dental treatment is considered high, the real demand for dental care services in China is relatively low and is not considered essential. This situation clearly does not reflect the real situation of oral disease. China has several basic social health insurance systems that cover most of the population's medical needs, but rarely involve dental treatment (Liu, 2016).

Scientific and technological developments in oral health treatments and improved hygiene have helped to prevent and control diseases of the mouth, yet advances in oral health science have largely benefited more advantaged populations in high-income countries. The most common oral conditions among older people are tooth loss, dental caries, periodontitis, dry mouth and oral pre-cancer or cancer. These all can compromise older people's quality of life.

1.2 Data Source

In this study, I used secondary data from the China Health and Retirement Longitudinal Study (CHARLS) 2013 wave survey and the binary logit model to explain what factors influence health care utilization in China.

The China Health and Retirement Longitudinal Study (CHARLS) aims to collect a high quality, nationally representative sample of Chinese residents ages 45 and older to serve the needs of scientific research on the elderly. The baseline national wave of CHARLS was fielded in 2011 and included about 10,000 households and 17,500 individuals in 150 counties/districts and 450 villages/resident committees. The individuals will be followed up every two years. The wave in the 2013 survey covered a total of 18246 respondents aged 45 and older. CHARLS has received critical support from Peking University, the National Natural Science Foundation of China, the Behavioral and Social Research Division of the National Institute on Aging and the World Bank.

The CHARLS questionnaire includes the following modules: demographics, family structure/transfer, health status and functioning, biomarkers, health care use and insurance, work, retirement and pension, income and consumption, assets (individual and household), and community level information.

1.3 Research Questions

What are the factors that influence health care utilization among middle-aged and elderly people in China? What is the magnitude of the impact of each influencing factor on health care utilization?

1.4 Objectives

The main objective:

To analyze the factors influencing health care utilization among middle-aged and elderly people in China.

The specific objectives are:

To measure the influence of the predisposing, enabling and need factors (according to the Andersen health care utilization model) on outpatient care utilization, inpatient care utilization, physical examination utilization and dental care utilization among middle-aged and elderly people in China.

To estimate the influence of the predisposing, enabling and need factors on outpatient care utilization and inpatient care utilization in public versus private facility.

To assess the influence of health insurance on different health care utilization, and make a comparison of the impact among the three types of insurance, respectively.

This study used secondary data that is a national sample representative of the population aged 45 or above in mainland China, and did analysis on factors influencing health care utilization among middle-aged and elderly people in China. The data comes from The China Health and Retirement Longitudinal Study (CHARLS) 2013 survey conducted by the China Centre for Economic Research of Peking University. Face-to-face interviews in respondents' homes collected detailed information on their demographic characteristics, socio-economic status, health-related behaviors and lifestyles, health status including health conditions, health insurance and health services use. In the 2013 wave, a total of 18,246 respondents aged 45 and older were followed up and surveyed. Therefore, this study is a nationally representative study.

This study mainly focuses on the predisposing, enabling and need factors (according to the Andersen health care utilization model) and how they influence health care utilization among middle-aged and elderly people in China. In this study, health care utilization will be measured by utilization of outpatient care, inpatient care, physical examination and dental care. Furthermore, the utilization of outpatient care and inpatient care will be further divided into public and private health care facilities.

1.5 Possible Benefits

With the development of the world economy and the improvement of people's living standards, the life expectancy of people has increased dramatically. As a result of aging population, people's suffering has shifted from acute communicable diseases to chronic non-communicable diseases. Therefore, health services demand has increased in many countries and regions. The shortage of health resources has become one of the urgent problems to be solved. It is undeniable that it is important to understand what factors are influencing the utilization of health services.

Since this research focuses on health care utilization among middle-aged and elderly people in China, the outcome of the study could help to identify the type of factors that influence health care utilization. It can help to inform both policy makers and health care providers about the characteristics of middle-aged and elderly

patients/persons who demand each type of care, whether outpatient, inpatient, physical examination or dental care. This in turn can benefit both policy makers and health care providers in formulating policies and in providing care that is better suited for the demanders. At the same time, health care purchasers should also be interested in the result because it can uncover the factors affecting their beneficiaries' health care-seeking behaviors.

1.6 Hypotheses

- 1) The oldest age group should have more physical examinations and inpatient care. Both physical examinations and inpatient care utilization increase significantly by age.
- 2) The health care utilization for outpatient care and dental care of females is higher when compared to males.
- 3) Elder people with higher education level, urban residents and non-agricultural household registration will be more likely to use physical examinations and inpatient care.
- 4) Having one or more health insurances increases the likelihood of using outpatient services and inpatient services. Elderly people who have government insurance are more likely to use physical examinations and inpatient care. People having urban employee basic medical insurance will be more likely to use outpatient care and dental care (Li et al., 2013).

The four hypotheses are based on the existing studies. Gong finds that both physical examinations and inpatient care utilization increase significantly by age as health deteriorates (Gong et al., 2014). Older people with higher education, those who are communist party members, have urban residence, non-agricultural household registration, and in a better financial situation are more likely to have physical examinations or inpatient care. Heaton et al. (2004) found that females indicated that dental care was more important than males did, and female participants reported more frequent use of dental services. Li and Zhang found that compared with people without health insurance, people with urban employee basic medical insurance and urban residence basic medical insurance are more likely to use outpatient services (Carrin et al., 1999). People with Urban Employee Basic Medical Insurance have less

out-of-pocket payments in Zhejiang province; in Gansu province people with new rural cooperative medical insurance are less likely to have outpatient visits, while people with Urban Employee Basic Medical Insurance are more likely to be hospitalized.



CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Population Aging

The United Nations (1956) gave the first definition of aging population: 1. The percentage of people 65 years old or older is more than 7%; 2. The percentage of people who are under 14 years old is less than 30%; 3. The ratio of the old to the young is more than 30%; 4. The median population age is older than 30 years old. After this, population aging became a worldwide trend with a rapid speed. The boundary age for the old was changed to 60 years old during the United Nations Vienna International Plan of Action on Aging (1982). The international standard of an aging society generally used today is: The percentage of people 65 years old or older is more than 7%, or the percentage of people 60 years old or older is more than 10%.

2.2 Andersen Health Care Utilization Conceptual Model

In this study, the independent variables are chosen based on the Andersen health care utilization conceptual model, which have been commonly used in the literature to explain health outcomes. The models include three types of variables: predisposing, enabling, and need variables.

The Andersen health care utilization model or Andersen behavioral model was developed by Ronald M. Andersen, a health services professor at UCLA, in 1968, which has been applied widely in international and US research on health service. The Andersen health care utilization model is a conceptual model aimed at demonstrating the factors that lead to the use of health services. According to the model, utilization of health services (including inpatient care, physician visits, dental care etc.) is determined by three kinds of factors: predisposing factors, enabling factors, and need. In line with the model, predisposing factors are demographics and social structures. Enabling factors facilitate individuals to use services, for example, availability of resources such as income, access to free services, availability and access to the service. Need factors motivate service use. For example, physical conditions, illness or disease conditions. The model is flexible and provides a robust analytical framework for

discussion. The variables are testable and can be applied in different settings (Azfredrick, 2016).

2.3 Health Status of the Elderly in China

According to previous research about the health status and health care utilization of elderly people in China (World health organization, 2015), Chinese elderly people are suffering from chronic disease because of their own reasons (such as health care service-seeking behavior) and the shortage of medical resources. Many people do not get timely treatment. And the main prevalence of chronic disease and risk factors in older people are as follows: 1. Hypertension - the prevalence of hypertension among people aged 60 and over in China was 66.9%; it was lower in men than in women and increased with age, and there was no notable difference between urban and rural areas. 2. Diabetes - the overall prevalence of diabetes among people aged 60 years and over was 19.6%; it was lower in men than in women (18.3% and 20.8%), and higher in urban (25.0%) than in rural areas (17.0%). 3. Cardiovascular diseases - according to the 2010 national Chronic Disease Risk Factor Surveillance Survey, those who self-reported that myocardial infarction was higher than 60 years old. 4. Arthritis - the prevalence of arthritis was 25% in people aged 60 years and over. 5. Chronic obstructive pulmonary disease - according to the 2010 national survey, the prevalence of COPD was 15.5% in people aged 60 years and over. Prevalence is remarkably higher in older men than women (NCCNDC, 2012). 6. Asthma - overall prevalence of asthma was 3.4% among people aged 60 years and over. 7. Mental disorders and neurological conditions. 8. Falls, unintentional injury - ranked as the fourth most common cause of mortality among older people in China, after cardiovascular diseases, cancer and respiratory diseases (CHSI, 2009). Falls are the major reason for severe injury in older people.

2.4 Factors Influencing Health Care Utilization

This part presents the variables from literature review. It will demonstrate the dependent variables and independent variables each separately. And in this study independent variables were classified into demographic factors, socio-economic factors and other factors presented respectively.

2.4.1 Dependent Variables

Gong uses the Andersen health care utilization conceptual model and looks at predicting factors for health services use among older people in China (Gong et al., 2014). Health care utilization is defined as physical examinations in the last 18 months, inpatient care in the last year, and visiting doctors in the last month. The study found that both physical examinations and inpatient care rates increase significantly by age when health deteriorates. Females are less likely to use inpatient care, and significant socio-economic variations exist in health care utilization.

Li and Zhang use the dependent variables in their analysis to reflect the intensity and out-of-pocket (OOP) expenditure of different health care utilization (Li&Zhang, 2013). They consider the following measures of health service utilization: (a) the probability of outpatient visits one month preceding the survey date; (b) the number of outpatient visits one month preceding the survey date; (c) individual OOP expenditure for the most recent doctor visit; (d) the probability of being hospitalized during the year preceding the survey date. And they found that compared with people without health insurance, people with urban employee basic medical insurance and urban residence basic medical insurance (either always capitalize or never capitalize) are more likely to use outpatient services. People with Urban Employee Basic Medical Insurance have less out of pocket payments in Zhejiang. In Gansu province people with new rural cooperative medical insurance are less likely to have outpatient visits, while people with Urban Employee Basic Medical Insurance are more likely to be hospitalized.

Zhang used the zero-inflated negative binomial model to estimate the association between the enhanced New Rural Cooperative Basic Medical Insurance and health care utilization. They chose four outcome variables to operationalize the construct of health care utilization: (1) whether one skipped or delayed outpatient care when ill, excluding those who reported that they were already under treatment; (2) whether one did not seek inpatient care when recommended by a physician; (3) number of outpatient visits during the previous month; and (4) number of inpatient visits during the last 12 months (Zhang et al., 2016). From the study, they found that the distribution of age, gender, educational attainment, household expenditure per month, and geographic regions were not significantly different between the new rural

cooperative medical insurance beneficiaries and the uninsured, whereas the new rural cooperative medical insurance beneficiaries reported visiting more health clinics in their communities than those uninsured. As expected, the uninsured reported having fewer chronic diseases than New Rural Cooperative Basic Medical Insurance enrollees. At the same time, the most alarming message from this study was that people with certain chronic diseases (i.e. diabetes, cancer, liver disease, kidney disease, and psychiatric problems) did not seek inpatient care even when it was recommended by health care professionals. Those people were particularly vulnerable to the risks associated with skipping care, and skipping care for conditions such as diabetes and kidney disease might very well increase rather than decrease the total health care expenditure in the long run.

Yu and Meng compared health service utilization between New Rural Cooperative Basic Medical Insurance members and non-members within each income group and each province respectively (Yu et al., 2010). Outpatient service utilization rate was defined as the number of interviewees using outpatient services in the last 4 weeks as a percentage of those who reported illness in the same time period. The research also used the inpatient admission rate for last the 12 months and average length of stay (LOS) for inpatients as indicators to measure inpatient service utilization. They show that outpatient service utilization has not significantly changed under New Rural Cooperative Basic Medical Insurance, although utilization of inpatient service in general has increased under New Rural Cooperative Basic Medical Insurance. Furthermore, people with high income tend to benefit more than the low income group.

2.4.2 Independent Variables

(1) Demographic factors

Gong found that utilization rates of inpatient care increase by age. People aged 65 and older have higher usage of physical examination and outpatient care (Gong et al., 2014). There are no major gender differences in physical examination and inpatient care, but outpatient care females are much more likely to report having a poor health condition and seeing a doctor. They also found that Communist party members are more likely to have physical examinations and inpatient care, although a higher

proportion of them have reported good health and no significant difference in outpatient care utilization.

Hibbard (1986) did a study in the United States to compare the difference in health care utilization between older and middle-aged adults. In this study they use regression, and the result indicated that the utilization of primary care has a significant gap between the elderly group and middle-aged group, 2.2 percent and 14.8 percent, respectively. In terms of outpatient care, it was 7.8 percent for middle-aged adults, which was higher than the elderly group with 3 percent.

A study done by Rosenberg (1996) in Canada by using binary logit regression compared the utilization of health care services between income groups, particularly focusing on factors other than income. It was found that age and sex had a positive effect on health care utilization. The study found that people above 65 years have used health care services 1.8 times more than those people between 15 to 64 years. In terms of gender, they found females' health care utilization higher than males.

About the demographic factors effect on dental care utilization, Heaton et al. (2004) found that older participants were more likely to have most recently seen a dentist for emergency reasons: for the fitting or checking of dentures ($r=.23$, $p<.001$) or for a restoration ($r=.14$, $p<.05$). Age was also positively correlated with not previously perceiving a need for dental care ($r=.14$, $p<.05$). Age was negatively correlated with having avoided dental care due to cost ($r=-.15$, $p<.05$). Gender was negatively correlated with perceived importance of dental care ($r=-.21$, $p<.01$), in that females indicated that dental care was more important than did males. Gender was also negatively correlated with self-rated dental health ($r=-.13$, $p<.05$), as females rated their dental health as being better than did males, and dental attendance ($r=-.20$, $p<.01$), with female participants reporting more frequent use of dental services.

(2) Socio-economic factors

Li and Zhang have done a study on the impact of health insurance factors on health care utilization among the older people in China. They found that those who have Urban Employee Basic Medical Insurance or Urban Resident Basic Medical Insurance are more likely to use outpatient care services. People with Urban Employee Basic Medical Insurance have less out of pocket payment in Zhejiang than

in Gansu province. People with New Rural Basic Medical Insurance are less likely to have outpatient visits, while people with Urban Employee Basic Medical Insurance are more likely to be hospitalized (Li&Zhang, 2013).

Ma has done a study on the impact of the New Cooperative Medical Scheme on health care service utilization in rural China. They found that New Rural Basic Medical Insurance did not affect health care service utilization (outpatient and inpatient) of individuals when ill, but it might increase the possibility of receiving a health examination (Ma, 2016).

Liu, in researching the urban-rural disparity in utilization of preventive care services in China, found that rural residents were less likely to utilize preventive care services than urban residents (5.1% vs. 9.2%) (Liu, 2016).

Dou found that outpatient care utilization varied across household wealth groups. Rich patients were more likely to use outpatient care than the poorer ($p < 0.001$) (Dou, 2015). And patients who had insurance were more likely to use outpatient services than those who did not have health insurance (57.0 % versus 41.4 %, $p < 0.001$). Patients in different household wealth groups had similar levels of inpatient care utilization. Patients with health insurance were more likely to use inpatient services than those without health insurance (18.4 % versus 13.4 %, $p = 0.004$).

Al Johara A. Al-Hussyeen (2009) conducted a study to determine factors affecting utilization of dental health services among intermediate female school students in Riyadh, as well as assessing their satisfaction with the dental care received during the last dental visit. The study found that the quality of dental care was the most encouraging factor for utilization of dental services, whereas, far geographic location of the dental clinics was the most discouraging factor. For those who received treatment in the government clinics, the most discouraging factor was post-operative complications ($P < 0.0001$), while the most encouraging factor was the availability of friendly staff ($P < 0.0001$). The high cost of dental care was the most discouraging factor for utilizing the dental services for those who visited private clinics ($P < 0.0001$), while the high quality of dental care was the most encouraging factor ($P < 0.009$).

(3) Other factors

Lu et al. conducted research by using Logistic regression models about what limits the utilization of health service among the China labor force, and found that migrants with more than one or no chronic illnesses are more likely to be two weeks visiting to the clinic than non-migrants; migrants with no chronic illnesses are less likely to be in hospitalization during the past 12 months than non-migrants (Lu et al., 2017).

Gong et al. did a study about factors predicting health services use among older people in China in 2013. They found that multiple chronic diseases and poor perceived health are strong need factors for outpatient care utilization, inpatient care utilization and physical examination (Gong et al., 2014). Those who have depression were more likely to use inpatient care and outpatient care. Those who with ADL limitations or pain increases the probability of seeing a doctor while with functional loss increases the probability of having physical examinations. However, those who with depression, fair or poor memory could be a barrier to having physical examinations or seeing a doctor, which might delay the early diagnose of severe health problems among these groups.

2.4.3 Model and Outcome

Dou et al. used data from the World Health Organization (WHO) Study on Global Aging and Adult Health (SAGE) Wave 1 (Dou, 2015). Chinese people older than 50 years of age with cardiovascular disease were included in their analysis, which was presented and compared outpatient and inpatient care utilization rates by demographic and socioeconomic characteristics. Multivariable logistic regression was used to examine the association between socioeconomic factors and health care utilization. They found that patients tend to use more outpatient care as they become older. As for hospitalization, the most elderly patients who over 80 years of age admit less than 70-79 years old group. Household economic status plays an important role in the use of outpatient care, but is not associated with hospitalization in elderly Chinese patients.

Gong et al. used the nationally representative China Health and Retirement Longitudinal Study 2013 data, applying the Andersen healthcare utilization conceptual model to binary logistic regression multivariate analyses to examine the joint predictors of physical examinations, outpatient care and inpatient care among the middle-aged and elderly in China (Gong et al., 2014). The multivariate analyses found that both inpatient care utilization and physical examinations utilization increase

significantly by age when health deteriorates. About gender, females are less likely to use inpatient care.

Lu et al. used Logistic regression models to study the effects of demographic, socio-economic and health status variables on the utilization of health services (two-week visiting and hospitalization during the past 12 months) (Lu et al., 2017). Their study found that migrants with more than 1 or no chronic illnesses are more likely to use outpatient care than non-migrants; migrants with no chronic illnesses are less likely to use inpatient care when compared to non-migrants. Being female, elderly, non-agricultural household registration, higher education level, higher social class, purchasing more insurance and poorer self-perceived health were influencing factors for more utilization of health service.

Li and Zhang used a two-part model to analyze outpatient care utilization. The first part was a binary equation modeling the probability of any use of outpatient service (Li&Zhang, 2013); For the second part, they used a zero-truncated Poisson model and a generalized linear model with a gamma distribution and a log link to explain the number of outpatient visits and the level of out-of-pocket (OOP) payments conditional on at least one visit to a service provider, respectively. For the inpatient care, the logistic regression was employed to predict the probability of being hospitalized. All analyses are weighted and marginal effects are reported. They found that compared with people without health insurance, people with Urban Employee Basic Medical Insurance and Urban Resident Basic Medical Insurance are more likely to use outpatient services. People with Urban Employee Basic Medical Insurance have less OOP payments in Zhejiang while in Gansu province, and people with New Rural Basic Medical Insurance are less likely to have outpatient visits. However, people with Urban Employee Basic Medical are more likely to be hospitalized.

Ma used the 2000, 2004, and 2006 CHNS longitudinal survey data and econometric methods (random-effect probit regression model and DID methods). This study conducted an empirical analysis to estimate the impact of New Rural Basic Medical Insurance. The study found that New Rural Basic Medical Insurance did not affect the health care utilization in both of the working age group and the elderly group. However, New Rural Basic Medical Insurance positively affects disease prevention

behavior (visiting the hospital to receive a health examination) in the working age group, but the effect did not appear in the elderly group (Ma, 2016).

Zhang in 2016 used a zero-inflated negative binomial model to estimate the association between New Rural Basic Medical Insurance coverage and the number of medical visits (Zhang et al., 2016). Their study shows that the enhanced New Rural Basic Medical Insurance coverage was associated with less delaying or foregoing inpatient care deemed as necessary by health professionals, which is likely to result from improved financial reimbursement of the New Rural Basic Medical Insurance.

Yu and Meng compared health service utilization between New Rural Basic Medical Insurance members and non-members within each income group and each province respectively (Yu et al., 2010). The research used the average length of stay (LOS) to measure outpatient and inpatient service utilization. They showed that outpatient service utilization has not significantly changed under New Rural Basic Medical Insurance, although utilization of inpatient service in general has increased under New Rural Basic Medical Insurance. Similarly, Ma used econometric methods random-effect probit regression model and DID methods to conduct an empirical analysis to estimate the impact of New Rural Basic Medical Insurance (Ma, 2016). The study found that New Rural Basic Medical Insurance did not affect the health care utilization in both of the New Rural Basic Medical Insurance members group and non-members group.

The study done by Dou, Gong and Lu used different econometric models, but all of them got the same result that health care utilization normally increased with age (Dou, 2015).

2.5 Contributions of this Study

This is a nationally representative sample study. In this study, dependent variables for health care utilization are measured by outpatient care, inpatient care, physical examination and dental care visits. For more details, outpatient care and inpatient care are further classified into public and private health care facilities, which provides more information than existing studies. The research also employs a more comprehensive set of variables in the analysis.

The study also uses the Andersen health care utilization conceptual model to investigate the factors influencing the dental care utilization, and this research is becoming more and more important because of the growing awareness of oral health in China.

The outcomes of interest include outpatient and inpatient utilization, physical examination and dental care visits. For outpatient and inpatient utilization, this study is also looking at the choice between public versus private facility. To date, there is no existing research including such kind of utilization together in a sample study.



CHAPTER 3

METHODOLOGY

3.1 Definition of Variables

This part has two tables showing the definition of the dependent variables and independent variables. About the details of dependent variables, there are variables name, variable sign and descriptions. And about the details of independent variables, there are variable name, variable sign, description, expected sign and reason.

3.1.1 Dependent Variables

Table 2 shows the list for name and description of dependent variables. The dependent variable Y1 represents the decision to use outpatient care if a person is sick during one month prior to the survey, where 1 stands for using and 0 if not. For choice of health care facility as represented by Y2 with 1 for public and 0 for private. Variable Y3 represents the decision to use inpatient care on the basis of doctor's recommendation, where 1 stands for admission and 0 if not. And similar to above, for choice of inpatient health care facility as represented by Y4 with 1 for public and 0 for private. Variable Y5 represents utilization of physical examination during the last 2 years prior to the interview, and 1 stands for using, 0 for not. Variable Y6 represents utilization of dental care during the past 1 year prior to the interview, where 1 stands for using and 0 if not.

Table 2: Details of Dependent Variables

Name	Variable	Description
Utilization of outpatient care (op_use)	Y ₁	1 if using outpatient care during the past 1 month prior to the interview; 0 if otherwise
Outpatient utilization of public facility (op_pub)	Y ₂	1 if using the public facility for outpatient care; 0 if otherwise
Utilization inpatient care (ip_use)	Y ₃	1 if using inpatient care during the past 1 year prior to the interview; 0 if otherwise

Inpatient utilization of public facility (ip_pub)	Y ₄	1 if using the public facility for inpatient care; 0 if otherwise
Utilization of physical examination (phyex_use)	Y ₅	1 if using the physical examination during the last 2 years; 0 if otherwise
Utilization of dental care (dent_use)	Y ₆	1 if using dental care during the past 1 year prior to the interview; 0 if otherwise

3.1.2 Independent Variables

Table 3 shows the list of independent variables with their name, description and expected sign and reason on the basis of the existing literature review. The independent variables include a continuous variable for age and number of children, a dummy variable for gender (male and female), belonging to the communist party (yes or no), being a smoker (smoke or not), receiving wage (last year received wage or not) and involved in socio-activity (socialized and doing activity or not). Categorical variables include marital status, ethnic group, education level, household registration type, drinking alcohol, health insurance status, reimbursement way and self-rated health with self-rated living standard.

Table 3: Details of Independent Variables

Name	Variable	Description	Expected Sign	Reason
Age	age	Continuous	(+)	The older the people, the higher the demand for health services
Gender	male	1 for male and 0 for female	(- / +)	Gender could be positive or negative
Marital Status	1. single 2. married 3.sep_di_wid	1 for single this is the reference category and omitted from estimation 1 for married; 0 if otherwise 1 for separated, divorced or widowed; 0 if otherwise	(- / +)	Marital statuses is single or separated, divorced and widowed may more likely to use certain type of health care services utilization compare to the married.

Ethnic group	han	1 for Han; 0 for otherwise	(-/+)	Ethnic group is Han may more likely to use health care services because of the easy accessibility
Communist party member	communist	1 for communist (yes) and 0 for otherwise	(+)	Communist may more likely to use health care services compare to the non-communist because of the social resources.
Education Level	1.under_primary 2.sch_without_degree 3. Coll_ and _above	1 for under primary school this is the reference category and omitted from estimation 1 for school without degree; 0 if otherwise 1 for college and above degree; 0 if otherwise	(+)	Education level has a positive effect on certain health care utilization. People with higher education have higher awareness of own health.
Household Registration	agri	1 for agricultural household registration; 0 if otherwise	(- / +)	Household registration is non-agricultural may more likely to use health care services compare to agricultural one. Because the non-agricultural always lives in urban area.
Smoking	smoker	1 for smoker and 0 for nonsmoker	(+)	Smoking may increase certain health care utilization, like outpatient care.

Drinking	<p>non_drink</p> <p>drink_moreonce_amonth</p> <p>drink_lessonce_amonth</p>	<p>1 for not drinking alcohol this is the reference category and omitted from estimation</p> <p>1 for drinking alcohol more than once per month; 0 if otherwise</p> <p>1 for drinking alcohol less than once per month; 0 if otherwise</p>	(+)	<p>Drinking may increase the certain health care utilization.</p>
Health insurance	<p>NOBMI</p> <p>UEBMI</p> <p>URBMI</p> <p>NCBMI</p> <p>OBMI</p>	<p>1 for no insurance this is the reference category and omitted from estimation</p> <p>1 for urban employee insurance; 0 if otherwise</p> <p>1 for urban resident insurance; 0 if otherwise</p> <p>1 for new rural cooperative insurance; 0 if otherwise</p> <p>1 for other type of insurance; 0 if otherwise</p>	(+)	<p>Insurance may have a positive effect on health care utilization. Those who have health insurance have less proportion of out-of-pocket payment. And those who have urban employee medical insurance more likely to use health care service compare to other type of insurance and no insurance.</p>
Reimbursement way	get_reimb_immed	<p>1 for getting reimbursement immediately; 0 for otherwise</p>	(+ / -)	<p>Getting reimbursement immediately may more likely to use certain type of health care services compare with Pay first and then getting reimbursement.</p>

Socio-activity	dosocio-activity	1 for socialized and do physical activity (yes); 0 for otherwise	(-)	Those who always socialized and do activity may have better health condition, so less likely to use certain type of health care services.
Received wage	Received_wage	1 for received wage last year; 0 for otherwise	(+)	Those who received wage have more disposable income, so more likely to use certain type of health care services.
Self-rated living standard	1.selralive_better 2.selralive_same 3.selralive_worse	1 is Self-rated living standard is compared to county is better, =0 is otherwise 1 is Self-rated living standard is compared to county is same, =0 is otherwise 1 is Self-rated living standard is compared to county is worse, =0 is otherwise, this is the reference category and omitted from estimation	(+ / -)	Those who reported worse living standard may less likely to use certain type of health care services. And those reported better living standard may more likely to use certain type of health care services.
Self-rated health	1.selrated_good 2.selrated_fair 3.selrated_poor	1 for good; 0 if otherwise 1 for fair; 0 if otherwise 1 for poor; 0 if otherwise, it is the reference category and omitted from estimation	(- / +)	Those who reported better health condition may less likely to use certain type of health care services. And those reported poor health condition may more likely to use certain type of health care services.

Number of child	number_child ren	Continuous	(- / +)	Those who have kids may have a better health condition, so less likely to use certain type of health care services. But sometimes, those who have kids may more likely to use, because of their kid's advice.
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3.2 Conceptual Framework

This framework shows the structure of the research with the intent to find the relationship between predisposing factors, enabling factors and need factors with health care utilization among middle-aged and elderly people in China. Individual predisposing factors include age, gender, education level, marital status, household registration (Hukou type). Enabling factors include household gross-income, health insurance scheme, also including risk behaviors like smoking and drinking. Health care need factors come from perceived need for health services, people's view and experience of their general health, functional state and illness symptoms.

In the present study, the dependent variables will be measured by utilization of outpatient services, utilization of inpatient services, utilization of physical examination and utilization of dental care. And according to the Andersen health care utilization conceptual model the independent variables classify into as follows three groups, 1) Predisposing factors: age, gender, ethnic group, communist party membership, education level, marital status, number of child and socio-activity (social interaction and activity) household registration (Hukou type). 2) Enabling factors: smoking, drinking and coverage of health insurance and reimbursement way. 3) Need factors: self-rated health and self-rated living standard.

The specific factors that will be used in this study are shown by the following function.

$$\text{HCU} = f(\text{predisposing factors, enabling factors, need factors})$$

In this study, the binary logit regression model is chosen as the first analysis tool and uses Stata software to run the regression. The regression model should be represented as follows:

$$Y_i^* = \alpha + \beta X_i + \varepsilon_i$$

Where X_i is vector of independent variables, β is a vector of parameters, and Y_i^* is a latent variable, in which the researcher does not observe, and ε is the idiosyncratic error term.

For the data analysis for utilization of outpatient care, outpatient care in public facility, inpatient care, inpatient care in public facility, physical examination and dental care, the model should be represented like this:

$Y_i = 1$ stands for use of certain type of health care services if $Y_i^* > 0$

$Y_i = 0$ stands for not use of certain type of health care services if $Y_i^* \leq 0$

The expressions are:

$$\Pr(Y_i = 1) = \frac{\exp^{\alpha + \beta x}}{1 + \exp^{\alpha + \beta x}}$$

$$\Pr(Y_i = 0) = \frac{1}{1 + \exp^{\alpha + \beta x}}$$

The expression can be put into the likelihood function:

$$L = \prod \left[\frac{\exp^{\alpha + \beta x}}{1 + \exp^{\alpha + \beta x}} \right]^{Y_i} \left[\frac{1}{1 + \exp^{\alpha + \beta x}} \right]^{1 - Y_i}$$

The error term has a logistic distribution with mean 0 and variance $\pi^2/3$.

Six different model specifications were also explored. The likelihood-ratio test was used to identify the model that captured the data the best.

Once the coefficient estimates were obtained and the best specification was chosen, and the magnitude of the impact of each variable on each health care utilization is interpreted by using marginal effects.

Marginal effect is defined as $\partial \Pr (Y = 1) / \partial X$ when X is a continuous variable and $\Pr (Y = 1 | X = 1) - \Pr (Y = 1 | X = 0)$ for X that is a dummy variable.

The study is performed for full sample as well as two sub-samples of the middle-aged group and the elderly groups. The middle-aged group was defined by age less than 60 years old, and the elderly group was defined by equal or greater than 60 years old. Finally, the likelihood ratio test is used to decide whether a full or sub-sample analysis is more appropriate for our data. And the magnitude of the impact of each independent variable on the health care utilization is interpreted by using marginal effects which depend on the sample being picked by likelihood ratio test.

The study included six regressions: outpatient care utilization, inpatient care utilization, public versus private facilities outpatient care utilization, public versus private facilities inpatient care utilization, physical examination utilization and dental care utilization. The independent variables for the six regressions include predisposing factors age, gender, ethnic group, communist party membership, education level, marital status and household registration; enabling factors are smoking, drinking, health insurance scheme and reimbursement way; need factors are self-rated health and self-rated living standard.

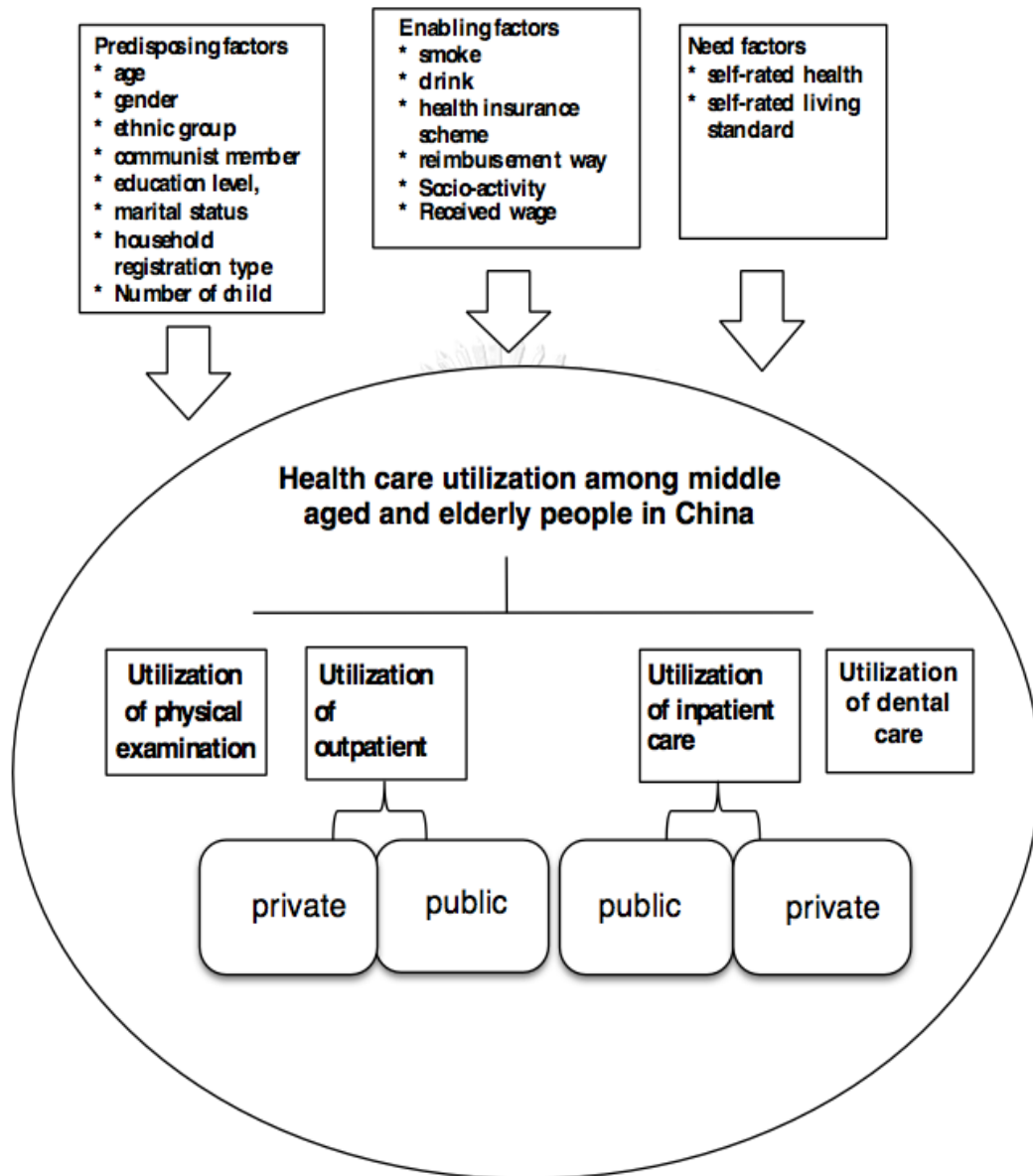


Figure 6: Conceptual Framework

CHAPTER 4

DATA DESCRIPTION

4.1 Overview of the Dataset

As mentioned above, in this research we use secondary data from the China Health and Retirement Longitudinal Study (CHARLS) 2013 wave survey. In this wave, 18,246 respondents aged 45 and above were followed up and surveyed. The sample size of each type of utilization differs slightly, which is around 15,000 observations.

4.2 Summary of the Statistics for the Total Sample

Table 4 shows summary statistics for the outpatient care utilization sample. After organizing the data, outpatient utilization consisting of 15,025 observations, in which 3,292 people used outpatient care services and answered which kind of facility they used.

Among the study population, the average age of the participant is 59.88 years old. There are slightly fewer males than females, of which 47% of them is male. The proportion of majority group Han is 92%, and about one-tenth are Communist party members. The large proportion of observations reported married (88%) and the proportion of separated, divorced or widowed was 12%. About 77% of the sample have agricultural household registration. Education levels are relatively low among elder Chinese, with more than 60% of them under the primary school (under primary school, including illiterate or semi-illiterate, primary or under the primary school and home study) education level, and with only 2% of them having a college and above degree. Of the majority of those covered by New Rural Cooperative Basic Medical Insurance (about 72%), 11% of them are covered by Urban Employee Basic Medical Insurance and 32% of them are reported getting reimbursement immediately. About life style, 58% of them reported they always socialize and do physical activities, 42% of them are current smokers, 27% of them drink more than once per month, 8% of them drink less than once per month and 65% of them do not drink at all. About income, 20% of them received wage last year. 54% of the sample report their living standards are relatively worse, while only 3% of them report better, compared to the

average living standard in their cities or counties. About self-rated health, 24% of them reported good, 50% of them reported fair and 26% of them reported poor health condition. For the number of children, there are on average 2.76 children per household.

Table 4: Summary Statistics for Outpatient Care Utilization

Variable	Obs.	Mean	Std. Dev.	Min	Max
op_use	15,025	0.22	0.41	0	1
op_pub	3,292	0.70	0.46	0	1
age	15,025	59.88	9.53	45	99
male	15,025	0.47	0.50	0	1
han	15,025	0.92	0.27	0	1
communist	15,025	0.11	0.31	0	1
single	15,025	0.00	0.04	0	1
married	15,025	0.88	0.32	0	1
sep_di_wid	15,025	0.12	0.32	0	1
agri	15,025	0.77	0.42	0	1
under_primary	15,025	0.64	0.48	0	1
sch_withoutdegree	15,025	0.31	0.46	0	1
coll_and_above	15,025	0.02	0.14	0	1
UEBMI	15,025	0.11	0.32	0	1
URBMI	15,025	0.05	0.22	0	1
NCBMI	15,025	0.72	0.45	0	1
OBMI	15,025	0.07	0.26	0	1
NOBMI	15,025	0.04	0.19	0	1
get_reimb_immed	15,025	0.32	0.47	0	1
dosocio_activiy	15,025	0.58	0.49	0	1
Received_wage	15,025	0.20	0.40	0	1
smoker	15,025	0.42	0.49	0	1
drink_moroncemonth	15,025	0.27	0.44	0	1
drink_lessoncemonth	15,025	0.08	0.27	0	1
drink_none	15,025	0.65	0.48	0	1

selralive_better	15,025	0.03	0.17	0	1
selralive_same	15,025	0.22	0.41	0	1
selralive_worse	15,025	0.54	0.50	0	1
selfrated_good	15,025	0.24	0.43	0	1
selfrated_fair	15,025	0.50	0.50	0	1
selfrated_poor	15,025	0.26	0.44	0	1
number_child	15,025	2.76	1.41	1	11

Table 5 shows the summary of the statistics for the inpatient care utilization sample. In this study, after organizing the data, there are a total 15,033 observations. 1,503 of them used inpatient care services during the past one year before the interview and answered which kind of facility they used.

The average age of participants is 59.87 years old and 47% of them are male. The proportion of majority group Han is 92% and 11% of them are Communist party members. The majority (88%) of them are married, with about 12% of them separated, divorced and widowed. 77% of them have agricultural household registration. About the education level, 64% of them are under primary school (under primary school, including illiterate or semi-illiterate, primary or under primary school and home study), 31% of them are school without degree (school without degree, including middle school, high school and vocational education) and only 2% of them have college and above degree. The majority of those health insurance types is New Rural Cooperative Basic Medical Insurance which is about 72%. The second largest proportion is Urban Employee Basic Medical Insurance (11%), and 32% of them said getting reimbursement immediately. About life style, 58% of them reported they always socialize and do physical activity, 42% of them are a current smoker, and 27% of them drink more than once per month, 8% of them drinking less than once per month and 65% of not drinking. There were 20% of them that received wage last year, and 54% of them reported a lower self-rated living standard, with only 3% of them reported better. The majority of them reported fair health (50%), 24% of them reported good health, and 26% of them reported poor health condition. There are an average 2.76 kids per household.

Table 5: Summary Statistics for Inpatient Care Utilization

Variable	Obs.	Mean	Std. Dev.	Min	Max
ip_use	15,033	0.13	0.33	0	1
ip_pub	1,503	0.93	0.25	0	1
age	15,033	59.87	9.52	45	99
male	15,033	0.47	0.50	0	1
han	15,033	0.92	0.27	0	1
communist	15,033	0.11	0.31	0	1
single	15,033	0.00	0.04	0	1
married	15,033	0.88	0.32	0	1
sep_di_wid	15,033	0.12	0.32	0	1
agri	15,033	0.77	0.42	0	1
under_primary	15,033	0.64	0.48	0	1
sch_withoutdegree	15,033	0.30	0.46	0	1
coll_and_above	15,033	0.02	0.14	0	1
UEBMI	15,033	0.11	0.32	0	1
URBMI	15,033	0.05	0.22	0	1
NCBMI	15,033	0.72	0.45	0	1
OBMI	15,033	0.07	0.26	0	1
NOBMI	15,033	0.04	0.19	0	1
get_reimb_immed	15,033	0.32	0.47	0	1
dosocio_activiy	15,033	0.58	0.49	0	1
Received_wage	15,033	0.20	0.40	0	1
smoker	15,033	0.42	0.49	0	1
drink_moroncemonth	15,033	0.27	0.44	0	1
drink_lessoncemonth	15,033	0.08	0.27	0	1
drink_none	15,033	0.65	0.48	0	1
selralive_better	15,033	0.03	0.17	0	1
selralive_same	15,033	0.22	0.41	0	1
selralive_worse	15,033	0.54	0.50	0	1
selfrated_good	15,033	0.24	0.43	0	1

selfrated_fair	15,033	0.50	0.50	0	1
selfrated_poor	15,033	0.26	0.44	0	1
number_child	15,033	2.76	1.41	1	11

Table 6 mainly shows the variables name, observation number and mean of physical examination utilization. In this study, the data includes 14,688 observations.

The average participant age is 59.85 years old, in which 47% of them are male. Han is the majority group that accounted for the largest proportion with 92%. 88% of population in the sample were married. About 77% of responders have agricultural household registration type. About the education level, 64% of them are under primary school (under primary school, including illiterate or semi-illiterate, primary or under the primary school and home study), 31% of them have been educated in school but without degree (school without degree, including middle school, high school and vocational education) and only 2% of them have college and above degree. Regarding the type of health insurance, New Rural Cooperative Basic Medical Insurance makes up the highest proportion with 72%, followed by Urban Employee Basic Medical Insurance with 11%. About life style, 58% of them reported always socializing and doing physical activity, 42% of them are a current smoker, and 27% of them drink more than once per month, 8% of them drink less than once per month and 65% of do not drink. 20% of them received wage last year, and the self-rated living standard of better, same and worse is 3%, 22% and 54% respectively. About self-rated health, 24% of them reported good health, 50% of them reported fair, and 26% of them reported poor health condition. For the number of children, the average is 2.76 children per household.

Table 6: Summary Statistics for Physical Examination Utilization

Variable	Obs.	Mean	Std. Dev.	Min	Max
phyex_use	14,688	0.42	0.49	0	1
age	14,688	59.85	9.50	45	99
male	14,688	0.47	0.50	0	1
han	14,688	0.92	0.27	0	1
communist	14,688	0.11	0.31	0	1

single	14,688	0.00	0.04	0	1
married	14,688	0.88	0.32	0	1
sep_di_wid	14,688	0.12	0.32	0	1
agri	14,688	0.77	0.42	0	1
under_primary	14,688	0.64	0.48	0	1
sch_withoutdegree	14,688	0.31	0.46	0	1
coll_and_above	14,688	0.02	0.14	0	1
UEBMI	14,688	0.11	0.32	0	1
URBMI	14,688	0.05	0.22	0	1
NCBMI	14,688	0.72	0.45	0	1
OBMI	14,688	0.07	0.26	0	1
NOBMI	14,688	0.04	0.19	0	1
get_reimb_immed	14,688	0.32	0.47	0	1
dosocio_activiy	14,688	0.58	0.49	0	1
Received_wage	14,688	0.20	0.40	0	1
smoker	14,688	0.42	0.49	0	1
drink_moroncemonth	14,688	0.27	0.44	0	1
drink_lessoncemonth	14,688	0.08	0.27	0	1
drink_none	14,688	0.65	0.48	0	1
selralive_better	14,688	0.03	0.17	0	1
selralive_same	14,688	0.22	0.41	0	1
selralive_worse	14,688	0.54	0.50	0	1
selfrated_good	14,688	0.24	0.43	0	1
selfrated_fair	14,688	0.50	0.50	0	1
selfrated_poor	14,688	0.26	0.44	0	1
number_child	14,688	2.76	1.41	1	11

Table 7 shows the summary of the statistics for the dental care service utilization sample. This study included 15,036 observations. The average age of the participant is 59.88 years old. About 77% of those who using physical examination have agricultural household registration type. About the education level, 64% of them are

under primary school (under primary school, including illiterate or semi-illiterate, primary or under the primary school and home study), 31% of them are school without degree (school without degree, including middle school, high school and vocational education) and only 2% of them have college and above degree. Regarding the type of health insurance, New Rural Cooperative Basic Medical Insurance makes up the highest proportion with 72%, followed by Urban Employee Basic Medical Insurance with 11%. About life style, 58% of them reported socializing and doing physical activity regularly, 42% of them currently smoke, and 27% of them drink more than once per month, 8% of them drink less than once per month and 65% do not drink. Question about income, 20% of them received wage last year, and the self-rated living standard of better, same and worse is 3%, 22% and 54% respectively. About self-rated health, 24% of them reported good health, 50% of them reported fair, and 26% of them reported poor health condition. For the number of children, the average was 2.76 children per household.

Table 7: Summary Statistics for Dental Care Utilization

Variable	Obs.	Mean	Std. Dev.	Min	Max
dent_use	15,036	0.17	0.38	0	1
age	15,036	59.88	9.53	45	99
male	15,036	0.47	0.50	0	1
han	15,036	0.92	0.27	0	1
communist	15,036	0.11	0.31	0	1
single	15,036	0.00	0.04	0	1
married	15,036	0.88	0.32	0	1
sep_di_wid	15,036	0.12	0.32	0	1
agri	15,036	0.77	0.42	0	1
under_primary	15,036	0.64	0.48	0	1
sch_withoutdegree	15,036	0.30	0.46	0	1
coll_and_above	15,036	0.02	0.14	0	1
UEBMI	15,036	0.11	0.32	0	1
URBMI	15,036	0.05	0.22	0	1
NCBMI	15,036	0.72	0.45	0	1

OBMI	15,036	0.07	0.26	0	1
NOBMI	15,036	0.04	0.19	0	1
get_reimb_immed	15,036	0.32	0.47	0	1
dosocio_activiy	15,036	0.58	0.49	0	1
Received_wage	15,036	0.20	0.40	0	1
smoker	15,036	0.42	0.49	0	1
drink_moroncemonth	15,036	0.27	0.44	0	1
drink_lessoncemonth	15,036	0.08	0.27	0	1
drink_none	15,036	0.65	0.48	0	1
selralive_better	15,036	0.03	0.17	0	1
selralive_same	15,036	0.22	0.41	0	1
selralive_worse	15,036	0.54	0.50	0	1
selfrated_good	15,036	0.24	0.43	0	1
selfrated_fair	15,036	0.50	0.50	0	1
selfrated_poor	15,036	0.26	0.44	0	1
number_child	15,036	2.76	1.41	1	11

4.3 Cross-tabulation between Health Care utilization and Certain Independent Variables

Before running a regression, the cross-tabulations of selected independent variables and certain type of health care utilizations are shown in this part. From the cross-tabulation, a preliminary assessment of the relationship between explanatory variables and dependent variables follows.

4.3.1 Cross-tabulation between Outpatient Care Utilization and Certain Independent Variable

Table 8 shows the percentage of outpatient care utilization across gender. For outpatient service utilization, 3,292 of them use outpatient care (21.91%), and 11,733 of them do not use outpatient care (78.09%). As for factors related to gender, 24.55% of female used outpatient care and 18.97% of male used outpatient care last year. Therefore, a higher percentage of female used outpatient care compared to male.

Table 8: Cross-tabulation between Outpatient Care Utilization and Gender

OP utilization	Female	Male	Total
Not use OP	5,978	5,755	11,733
	75.45%	81.03%	78.09%
Use OP	1,945	1,347	3,292
	24.55%	18.97%	21.91%
Total	7,923	7,102	15,025
	100%	100%	100%

Table 9 shows the percentage of outpatient care utilization across ethnic groups. There are 15,025 respondents and 3,292 (21.91%) of them use outpatient care and 11,733 (78.09%) of them do not. The number of Han group is 13,869, while the number of Minority group is 1,156. For the utilization of outpatient care, 22.2% of Han group uses outpatient care, which is more than 18.34% of the minority group who uses outpatient care.

Table 9: Cross-tabulation between Outpatient Care Utilization and Ethnic Group

OP utilization	Minority	Han	Total
Not use OP	944	10,789	11,733
	81.66%	77.79%	78.09%
Use OP	212	3,080	3,292
	18.34%	22.21%	21.91%
Total	1,156	13,869	15,025
	100%	100%	100%

Table 10 shows the percentage of outpatient care utilization across insurance types. There are a total 14,925 respondents, of which 78.08% did not use outpatient care during the past year. For utilization of outpatient care, those who have the Urban Employee Basic Medical Insurance are most likely to use outpatient care (22.92%). While those who have the New Rural Cooperative Basic Medical Insurance are also more likely to use outpatient care (22.30%) compared to those who don't have any health insurance (17.66%).

Table 10: Cross-tabulation between Outpatient Care utilization and Insurance Type

OP utilization	UEBMI	URBMI	NCBMI	OBMI	NOBMI	Total
Not use OP	1,318	602	8,430	861	443	11,654
	77.08%	79.42%	77.70%	80.54%	82.34%	78.08%
Use OP	392	156	2,420	208	95	3,271
	22.92%	20.58%	22.30%	19.46%	17.66%	21.92%
Total	1,710	758	10,850	1,069	538	14,925
	100%	100%	100%	100%	100%	100%

Table 11 shows the percentage of outpatient service use across different levels of self-rated health. There were 14,998 respondents and 21.92% of them used outpatient care, 78.08% of them did not. For outpatient care utilization, those who reported poor health condition were more likely to use outpatient care services compared to those who reported good health condition (35.8% versus 10.8%).

Table 11: Cross-tabulation between Outpatient Care Utilization and Self-rated Health

OP utilization	Self-rated good	Self-rated fair	Self-rated poor	Total
Not use OP	3,188	5,994	2,529	11,711
	89.2%	80.08%	64.2%	78.08%
Use OP	386	1,491	1,410	3,287
	10.8%	19.92%	35.8%	21.92%
Total	3,574	7,485	3,939	14,998
	100%	100%	100%	100%

Table 12 shows the percentage of outpatient service use across marital status. There are 15,025 respondents and 21.91% of them use outpatient care services, 78.09% of them do not use outpatient care services. From the table, the single is more likely to use outpatient care services, but the separated, divorced or widowed are least likely to use outpatient care services.

Table 12: Cross-tabulation between Outpatient Care Utilization and Marital Statuses

OP utilization	Single	Sep_di_wid	Married	Total
Not use OP	19	10,410	1,304	11,733
	70.37%	78.56%	74.64%	78.09%
Use OP	8	2,841	443	3,292
	29.63%	21.44%	25.36%	21.91%
Total	27	13,251	1,747	15,025
	100%	100%	100%	100%

Table 13 shows the percentage of public versus private outpatient care utilization (op public) among gender. From the table, there were 3,292 respondents who used outpatient care during the past one month before the interview, and 69.74% of them used outpatient in public facilities, and 30.26% of them used private health care facilities. About 70% of both genders used public health care facility when seeking outpatient care.

Table 13: Cross-tabulation between Public Versus Private Facilities Outpatient Care Utilization and Gender

OP PUBLIC	Female	Male	Total
private	602	394	996
	30.95%	29.25%	30.26%
Public	1,343	953	2,296
	69.05%	70.75%	69.74%
Total	1,945	1,347	3,292
	100%	100%	100%

Table 14 shows the percentage of public versus private outpatient care utilization among communist party members and non-members. From the table, there were 3,292 respondents, and 69.74% of them used the public facility, 30.26% of them used the private facility. And people belonging to the Communist party are more likely to use outpatient care in public facility than non-communist (79.21% versus 68.6%).

Table 14: Cross-tabulation between Public Versus Private Facilities Outpatient Care Utilization and Communist Party Member

OP PUBLIC	Non-communist	Communist	Total
private	922	74	996
	31.40%	20.79%	30.26%
Public	2,014	282	2,296
	68.60%	79.21%	69.74%
Total	2,936	356	3,292
	100%	100%	100%

Table 15 shows the percentage of public facilities outpatient care utilization among insurance type. From the table, there were 3,271 respondents and 69.67% of them used public facilities, 30.33% of them used private facilities. Those who have Urban Employee Basic Medical Insurance or other type of insurance such as government insurance were most likely to use the public facility, 83.42% and 76.92%, respectively.

Table 15: Cross-tabulation between Public Versus Private Facilities Outpatient Care Utilization and Insurance Type

OP PUBLIC	UEBMI	URBBI	NCBBI	OBMI	NOBBI	Total
private	65	44	797	48	38	992
	16.58%	28.21%	32.93%	23.08%	40%	30.33%
Public	327	112	1,623	160	57	2,279
	83.42%	71.79%	67.07%	76.92%	60%	69.67%
Total	392	156	2,420	208	95	3,271
	100%	100%	100%	100%	100%	100%

Table 16 shows the percentage of public outpatient care utilization among household registration type. From the table, there were 3,292 respondents, and 69.74% of them used public facility, 30.26% of them used the private facility. There were two types of household registration that are Agricultural and Non-agricultural, those who were Non-agricultural household registration type were more likely to use outpatient care in public facility compare to whose household registration type was Agricultural, 77.66% and 67.4% respectively.

Table 16: Cross-tabulation between Public Versus Private Facilities Outpatient Care Utilization and Household Registration Type

OP PUBLIC	Non-agricultural	Agricultural	Total
private	168	828	996
	22.34%	32.60%	30.26%
Public	584	1,712	2,296
	77.66%	67.40%	69.74%
Total	752	2,540	3,292
	100%	100%	100%

4.3.2 Cross-tabulation between Inpatient Care Utilization and Certain Independent Variable

Table 17 shows the percentage of inpatient care utilization and gender. From the table, there were 15,033 respondents, and 12.69% of them used inpatient care services, 87.31% of them not used during the past twelve months before the interview. About factor gender, there was no significant difference between female and male in them of hospital admission (about 12.7%).

Table 17: Cross-tabulation between Inpatient Care Utilization and Gender

IP utilization	Female	Male	Total
Not use IP	6,916	6,209	13,125
	87.24%	87.39%	87.31%
Use IP	1,012	896	1,908
	12.76%	12.61%	12.69%
Total	7,928	71	15,033
	100%	100%	100%

Table 18 shows the percentage of inpatient care utilization across marital statuses. From the table, there were 15,033 respondents, and 12.69% of them used inpatient care services, 87.31% of them not used. Those who are married 15.9% of them used inpatient care in the past year, 14.81% of single was hospitalized, and 12.26% of the separated, divorced, or widow was admitted.

Table 18: Cross-tabulation between Inpatient Care Utilization and Marital Statuses

IP utilization	Single	Sep_di_wid	Married	Total
Not use IP	23	11,632	1,470	13,125
	85.19%	87.74%	84.10%	87.31%
Use IP	4	1,626	278	1,908
	14.81%	12.26%	15.90%	12.69%
Total	27	13,258	1,748	15,033
	100%	100%	100%	100%

Table 19 shows the percentage of inpatient care utilization and insurance type. From the table, there were total 14,932 respondents, and 12.68% of them used inpatient care services, 87.32% of them did not use inpatient care services. Those who have Urban Employee Basic Medical Insurance were most likely to have hospital admission (16.19%), which is the highest rate compared to other insurance scheme. The lowest rate of admission is found for those who do not have insurance (7.81%).

Table 19: Cross-tabulation between Inpatient Utilization Care and Insurance Type

IP utilization	UEBMI	URBMI	NCBMI	OBMI	NOBMI	Total
Not use IP	1,434	677	9,507	925	496	13,039
	83.81%	89.20%	87.59%	86.45%	92.19%	87.32%
Use IP	277	82	1,347	145	42	1,893
	16.19%	10.80%	12.41%	13.55%	7.81%	12.68%
Total	1,711	759	10,854	1,070	538	14,932
	100%	100%	100%	100%	100%	100%

Table 20 shows the percentage of public versus private facilities inpatient care utilization and reimbursement way. From the table, there were total 1,503 respondents, and 93.48% of them used inpatient care services in public facility, 6.52% of them used inpatient care services in private facility. From the result, there was no significant difference with two kinds of reimbursement way on the utilization of inpatient care in public versus private facilities. Approximately, 93% of those who

pay first or getting reimbursement later admitted to public facilities in case of hospitalization.

Table 20: Cross-tabulation between Public Versus Private Inpatient Care Utilization and Reimbursement Way

IP PUBLIC	Pay-first	Get-reimb-immed	Total
private	69	29	98
	6.67%	6.18%	6.52%
Public	965	440	1,405
	93.33%	93.82%	93.48%
Total	1,034	469	1,503
	100%	100%	100%

4.3.3 Cross-tabulation between Physical Examination Utilization and Certain Independent Variable

Table 21 shows the percentage of physical examination utilization across political parties. There were total 14,688 respondents, and 42.4% of them used physical examination in the past two years, 57.6% of them did not. From the table, those who belong to the Communist party were more likely to have physical examination check-up (60.47%) compared to those who are non-communist (40.23%).

Table 21: Cross-tabulation between Physical Examination Utilization and Communist Party Member

PHY-EX	Non-communist	Communist	Total
Not have	7,837	623	8,460
	59.77%	39.53%	57.60%
Have	5,275	953	6,228
	40.23%	60.47%	42.40%
Total	13,112	1,576	14,688
	100%	100%	100%

Table 22 shows the percentage of physical examination utilization between people who report socializing and doing activity with others versus who do not. There were total 14,688 respondents, and 42.4% of them had the physical examination in the past two years, 57.6% of them did not. From the table, those who socialized and did

physical activity in daily life were less likely to undergo the physical examination (36.96%) compared to those who were not socializing and doing activity in daily life (46.31%).

Table 22: Cross-tabulation between Physical Examination Utilization and Socialized and Do Activity

PHY-EX	Do socio-activity	No socio-activity	Total
Not have	3,871	4,589	8,460
	63.04%	53.69%	57.60%
Have	2,270	3,958	6,228
	36.96%	46.31%	42.40%
Total	6,141	8,547	14,688
	100%	100%	100%

Table 23 shows the percentage of physical examination utilization across educational level. There were total 14,237 respondents, and 42.31% of them used physical examination in the past two years, 57.69% of them did not. From the table, those who have higher education level were more likely to use physical examination services. Those who have college and above degree were most likely to use physical examination services (81.91%), followed by people who have the education level of school without the degree (45.94). People whose education level was under primary school (39.31%) utilized physical examination services the least.

Table 23: Cross-tabulation between Physical Examination Utilization and Educational Level

PHY-EX	Under primary	Sch-without-degree	Coll-and-above	Total
Not have	5,728	2,430	55	8,213
	60.69%	54.06%	18.09%	57.69%
Have	3,710	2,065	249	6,024
	39.31%	45.94%	81.91%	42.31
Total	9,438	4,495	304	14,237
	100%	100%	100%	100%

4.3.4 Cross-tabulation between Dental Care Utilization and Certain Independent Variables

Table 24 shows the percentage of dental care utilization across gender. There were total 15,036 respondents, and 17.34% of them used dental care services in the past year, 82.66% of them did not. From the table, 18.88% of female used dental care in the past year, which is higher than the male that reported only 15.62% who used dental care services.

Table 24: Cross-tabulation between Dental Care Utilization Cross Gender

Dental care	Female	Male	Total
Not use	6,434	5,995	12,429
	81.12%	84.38%	82.66%
Use	1,497	1,110	2,607
	18.88%	15.62%	17.34%
Total	7,931	7,105	15,036
	100%	100%	100%

Table 25 shows the percentage of dental care utilization across different levels of education. There were total 14,572 respondents, and 17.28% of them used dental care during the past year, 82.72% of them did not. From the table, similar to the utilization of physical examination, those who have higher education level were more likely to use dental care services. Those who have college and above degree were most likely to use dental care services (25.4%), followed by people who have the education level of school without the degree (20.07%). 15.7% of people whose education level being under primary school utilized physical examination services the least.

Table 25: Cross-tabulation between Dental Care Utilization and Education Level

Dental care	Under primary	Sch-without-degree	Coll-and-above	Total
Not use	8,157	3,665	232	12,054
	84.30%	79.93%	74.60%	82.72%
Use	1,519	920	79	2,518
	15.70%	20.07%	25.40%	17.28%
Total	9,676	4,585	311	14,572
	100%	100%	100%	100%

Table 26 shows the percentage of dental care utilization across different self-rated living standards. There were total 11,882 respondents, and 17.04% of them used dental care during the past year. From the table, those whose living standard is better were more likely to use dental care services compared to those who reported worse living standard. The most likely to use dental care services were those who reported better self-rated living standard, followed by those who reported same living standard. The group that is least likely to use dental care utilization was those who reported worse living standard.

Table 26: Cross-tabulation between Dental Care Utilization and Self-rated Living Standard

Dental care	Selratlive better	Selratlive same	Selratlive worse	Total
Not use	357	2,673	6,827	9,857
	79.16%	80.88%	84.01%	82.96%
Use	94	632	1,299	2,025
	20.84%	19.12%	15.99%	17.04%
Total	451	3,305	8,126	11,882
	100%	100%	100%	100%

Table 27 shows the percentage of dental care utilization across household registration types. There were total 15,036 respondents, and 17.34% of them used dental care during the past year, 82.66% of them did not. From the table, those who have Non-agricultural household registration type were more likely to use dental care compared to those who have Agricultural household registration type (21.9% versus 15.96%).

Table 27: Cross-tabulation between Dental Care Utilization and Household Registration Type

Dental care	Non-agricultural	Agricultural	Total
Not use	2,732	9,697	12,429
	78.10%	84.04%	82.66%
Use	766	1,841	2,607
	21.90%	15.96%	17.34%
Total	3,498	11,538	15,036
	100%	100%	100%



CHAPTER 5

RESULT AND DISCUSSION

5.1 Outcome of Each Regression

In this section, six different binary logit regressions are used for six different health care utilization choices (dependent variables). That is, the choice of whether or not a person uses outpatient care, inpatient care, physical examination and dental care. Furthermore, conditioning on using outpatient care, we also look at the choice of whether a person uses public or private health care facility. Similarly, for inpatient care, we look at whether a person admits to the public or private hospital conditioning on use. And empirical estimation is conducted for a full sample as well as sub-samples of the middle-aged group who are 45 to less than 60 years old, and of older group who are 60 years old or above. Then, likelihood ratio test is employed to decide whether a full or sub-sample analysis is more appropriate for this data. Furthermore, the magnitude of the impact of each variable on the outcome will be interpreted by using marginal effects.

The coefficient estimates demonstrate the direction of effects of each factor on the outcome whether it has a positive or negative effect. The likelihood ratio test (LR) is a statistical test of the goodness-of-fit between the comparison with full sample versus the models with sub-samples. The test picks whether full sample or sub-samples of the middle-aged and the older group fits a particular dataset significantly better. The null hypothesis of likelihood ratio test is that full sample analysis is appropriate for the data.

5.1.1 Outpatient Care Utilization

Table 28 presents the estimated parameters of binary logit regression of outpatient care utilization associated with each independent variable. For the full sample, the factors ethnic group Han, communist party member, getting reimbursement immediately, Urban Employee Basic Medical Insurance and socialized and do activity have positive and significant effects on outpatient care utilization at 5% significant level. The factors smoker, drink more than once per month, good self-rated health and fair self-rated health have and significant negative effects on outpatient care utilization at 5% significant level.

For a sub-sample of the middle-aged group, the factors Urban Employee Basic Medical Insurance, Urban resident Basic Medical Insurance and getting reimbursement immediately have positive and significant effects on outpatient care utilization at 5% significant level. And the factors drink more than once per month, good self-rated health and fair self-rated health have negative and significant effects on outpatient care utilization at 5% significant level.

For a sub-sample older age group, the factors ethnic group Han, getting reimbursement immediately and socialized and do activity have statistically positive effects on outpatient care utilization at 5% significant level. And the factors drink more than once per month, good self-rated health and fair self-rated health have statistically negative effects on outpatient care utilization at the 5% of the significant level.

Table 28: Coefficient Estimate for Outpatient Care Utilization

Variables	Full	middle-aged	Older
age	0.002 [0.003]	-0.009 [0.007]	0.005 [0.005]
male	-0.086 [0.063]	-0.171 [0.096]*	-0.04 [0.084]
han	0.32 [0.081]***	0.127 [0.105]	0.593 [0.130]***
communist	0.182 [0.071]**	0.202 [0.115]*	0.144 [0.092]
married	-0.539 [0.437]	-0.051 [0.683]	-0.994 [0.588]*
sep_di_wid	-0.436 [0.441]	-0.038 [0.694]	-0.858 [0.592]
agri	-0.015 [0.079]	0.117 [0.114]	-0.105 [0.114]
sch_withoutdegree	-0.025	-0.052	0.034

	[0.051]	[0.065]	[0.085]
coll_and_above	0.14	-0.102	0.416
	[0.155]	[0.224]	[0.223]*
UEBMI	0.301	0.53	0.137
	[0.135]**	[0.201]***	[0.185]
URBMI	0.14	0.464	-0.132
	[0.149]	[0.213]**	[0.213]
NCBMI	0.214	0.235	0.198
	[0.111]*	[0.166]	[0.150]
OBMI	0.123	0.019	0.178
	[0.135]	[0.201]	[0.187]
get_reimb_immed	0.159	0.141	0.166
	[0.044]***	[0.063]**	[0.061]***
dosocio_activity	0.182	0.053	0.299
	[0.043]***	[0.061]	[0.060]***
Received_wage	0.008	0.036	0.057
	[0.057]	[0.073]	[0.097]
smoker	-0.14	-0.106	-0.149
	[0.060]**	[0.092]	[0.079]*
drink_moronce_amonth	-0.247	-0.209	-0.259
	[0.056]***	[0.082]**	[0.078]***
drink_lessonce_amonth	-0.009	0.08	-0.114
	[0.078]	[0.105]	[0.117]
selralive_better	0.002	-0.101	0.08
	[0.128]	[0.199]	[0.169]
selralive_same	-0.049	-0.064	-0.035
	[0.051]	[0.074]	[0.071]

selfrated_good	-1.51	-1.62	-1.404
	[0.065]***	[0.094]***	[0.092]***
selfrated_fair	-0.797	-0.808	-0.802
	[0.046]***	[0.066]***	[0.064]***
number_child	-0.002	0.04	-0.018
	[0.017]	[0.031]	[0.021]
_cons	-0.689	-0.549	-0.664
	[0.482]	[0.804]	[0.693]
	15,025	7,774	7,251

LR Chi2 (25) = 48.00 Prob > Chi2 = 0.0037

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Regarding the likelihood ratio test, likelihood ratio test for utilization of outpatient care services shows a rejection of the null hypothesis (Prob > chi2 = 0.0037). This implies that doing a sub-sample analysis of the middle-aged and the older age group separately is more appropriate than conducting a full sample study in this case. Therefore, marginal effects of outpatient care utilization will be interpreted based on the sub-sample of the middle-aged group and older group.

As evident in *Table 29*, marginal effects of outpatient care utilization in middle-aged group (those who are 45 to less than 60 years old) differs significantly by the predisposing factors male and communist party member (at 10% significant level). Males are less likely to use outpatient care compared to females. The probability of outpatient care utilization decreases by 2.6%. The communist party member is more likely to use outpatient care. The probability of outpatient care utilization increases by 3.1% compared to those who are non-communist.

For the enabling factors, Urban Employee Basic Medical Insurance has a statistically significant positive relationship with middle-aged group outpatient care utilization at the 1% level. The probability of outpatient care utilization increases by 8.1% for those who have Urban Employee Basic Medical Insurance compare to those who did not have health insurance. The factor Urban Resident Basic Medical Insurance has a positive relationship with middle-aged group outpatient care utilization at the 5% significant level. The probability of outpatient care utilization increases by 7.1% for

people who have this kind of insurance compared to those who did not have any health insurance. Getting reimbursement immediately increases middle-aged group the probability of outpatient care utilization by 2.1%, compared to those who pay yourself first scheme. Factors regarding life-style include socialized and do activity, smoker and drink less than once per month have no statistically significant relationship with outpatient care utilization. However, drinking more than once per month has a statistically significant negative relationship with outpatient care utilization at the 1% level. The probability of outpatient care utilization decreases by 3.2% for those who drink (alcohol) more than once per month compared to those who did not drink.

1 The need factor including self-rated living standard has no statistically significant relationship with middle-aged group outpatient care utilization at 10% level. Whereas the factors about self-rated health has a strong statistically significant negative relationship with middle-aged group outpatient care utilization at 1% significant level. The probability of outpatient care utilization decreases by 24% when those who reported having good self-rated health. The probability of outpatient care utilization decreases by about 12% when they reported fair self-rated health compared to those who reported poor self-rated health.

Table 29: Marginal Effects of Outpatient Care Utilization in Middle-aged Group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	-0.0013477	0.00109	-1.23	0.217	-0.00349	0.0008
male	-0.0260622	0.01459	-1.79	0.074	-0.05466	0.0025
han	0.0194497	0.01609	1.21	0.227	-0.01210	0.0510
communist	0.0308489	0.01749	1.76	0.078	-0.00342	0.0651
married	-0.0077787	0.10437	-0.07	0.941	-0.21233	0.1968
sep_di_wid	-0.0058095	0.10607	-0.05	0.956	-0.21371	0.2021
agri	0.0179377	0.01747	1.03	0.305	-0.01631	0.0522
sch_withoutdegree	-0.0079221	0.00993	-0.80	0.425	-0.02738	0.0115
coll_and_above	-0.0156120	0.03423	-0.46	0.648	-0.08270	0.0515
UEBMI	0.0809648	0.03073	2.63	0.008	0.02074	0.1412
URBMI	0.0708531	0.03250	2.18	0.029	0.00715	0.1346
NCBMI	0.0359264	0.02540	1.41	0.157	-0.01386	0.0857

OBMI	0.0028946	0.03071	0.09	0.925	-0.05730	0.0631
get_reimb_immed	0.0214943	0.00959	2.24	0.025	0.00270	0.0403
dosocio_activity	0.0081168	0.00932	0.87	0.384	-0.01015	0.0264
Received_wage	0.0054727	0.01114	0.49	0.623	-0.01637	0.0273
smoker	-0.0162261	0.01408	-1.15	0.249	-0.04382	0.0114
drink_moronce_amonth	-0.0318746	0.01245	-2.56	0.01	-0.05627	-0.0075
drink_lessonce_amonth	0.0121515	0.01608	0.76	0.45	-0.01936	0.0437
selralive_better	-0.0154895	0.03041	-0.51	0.61	-0.07509	0.0441
selralive_same	-0.0098179	0.01135	-0.86	0.387	-0.03206	0.0124
selfrated_good	-0.2474551	0.01357	-18.24	0.00	-0.27405	-0.2209
selfrated_fair	-0.1234402	0.01005	-12.29	0.00	-0.14313	-0.1037
number_child	0.0061611	0.00478	1.29	0.197	-0.00321	0.0155

Table 30 shows, marginal effects of outpatient care utilization for the older group (those who are over 60 years old). Based on the marginal effects of outpatient care utilization for older group, the predisposing factors age, gender (male), communist party member, being separate, divorced or widowed (marital status), household registration type and having educational in school but without degree (education level) have no statistically significant relationship with older group outpatient care utilization. However, the predisposing factor ethnic group Han has a statistically significant positive relationship with older group outpatient care utilization at the 1% level. Outpatient care utilization increases by 10.1% for Han compare to those who are the minority group. Being married has a statistically significant negative relationship with older age group outpatient care utilization at the 10% significant level. Outpatient care utilization decreases by about 17% for those who are married compared to those who are single. Having the college degree and above has a positive and significant effect on outpatient care utilization at 10% level. Those who have college and above degree were more 7.1

% likely to use outpatient care utilization compare to those who have under primary school education level.

For enabling factors, health insurance, received wage and drink less than once a month have no a statistically significant relationship with older group's outpatient

care utilization. On the other hand, getting reimbursement immediately has statistically significant positive relationship with older group outpatient care utilization at 1% significant level. Getting reimbursement immediately increases outpatient use by 2.8% compared to pay yourself first scheme. Those who socialized and do activity in daily life were more likely to use outpatient care utilization with an increase of 5.1% in relation to those who did not socialize and do activity at 1% significant level. Smoking decreases outpatient care utilization by 2.5%. Drinking more than once per month decreases outpatient care utilization by 4.4% at 1% significant level.

Looking at the need factors, self-rated living standard have no statistically significant relationship with older group outpatient care utilization. However, self-rated health has strong and statistically significant negative relationship with older group outpatient care utilization. Those who reported good and fair self-rated health have 23.9% and 13.6% less likelihood of using outpatient care utilization compare to those who reported poor self-rated health.

Table 30: Marginal Effects of Outpatient Care Utilization in Older Age Group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	0.000905	0.00086	1.05	0.295	-0.00079	0.00260
male	-0.006754	0.01434	-0.47	0.638	-0.03486	0.02135
han	0.1008779	0.02200	4.59	0.000	0.05777	0.14399
communist	0.0244811	0.01559	1.57	0.116	-0.00608	0.05505
married	-0.1689618	0.10002	-1.69	0.091	-0.36499	0.02707
sep_di_wid	-0.1458941	0.10057	-1.45	0.147	-0.34301	0.05122
agri	-0.0178314	0.01941	-0.92	0.358	-0.05587	0.02021
sch_withoutdegree	0.0057682	0.01452	0.4	0.691	-0.02269	0.03423
coll_and_above	0.0706867	0.03786	1.87	0.062	-0.00351	0.14489
UEBMI	0.0233171	0.03139	0.74	0.458	-0.03821	0.08485
URBMI	-0.0224146	0.03613	-0.62	0.535	-0.09323	0.04841
NCBMI	0.0337322	0.02551	1.32	0.186	-0.01626	0.08372
OBMI	0.0303237	0.03184	0.95	0.341	-0.03209	0.09273
get_reimb_immed	0.0282447	0.01041	2.71	0.007	0.00783	0.04866
dosocio_activity	0.0508733	0.01015	5.01	0.000	0.03099	0.07076
Received_wage	0.0096874	0.01647	0.59	0.556	-0.02260	0.04197

smoker	-0.0252446	0.01337	-1.89	0.059	-0.05146	0.00097
drink_moronce_amonth	-0.0439525	0.01328	-3.31	0.001	-0.06999	-0.01792
drink_lessonce_amonth	-0.019372	0.01988	-0.97	0.33	-0.05833	0.01959
selralive_better	0.0135329	0.02873	0.47	0.638	-0.04278	0.06985
selralive_same	-0.005901	0.01212	-0.49	0.626	-0.02965	0.01785
selfrated_good	-0.2387118	0.01515	-15.76	0.000	-0.26841	-0.20902
selfrated_fair	-0.1363611	0.01077	-12.66	0.000	-0.15746	-0.11526
number_child	-0.0030432	0.00363	-0.84	0.402	-0.01016	0.00407

From the comparison between middle-aged and older groups, factors that have a similar effect on outpatient care utilization across the two age groups are getting reimbursement immediately, drinking alcohol more than once per month, and self-rated health. We also find that there are many factors that are significant in the other group such as gender, ethnic group, political party and marital statuses.

5.1.2 Public versus Private Facility Outpatient Care Utilization

Table 31 shows the estimated parameter associated with each explanatory variable from a binary logit regression for the choice between public versus private facilities outpatient care. For the full sample, the factors age, school without the degree, Urban Employee Basic Medical Insurance and getting reimbursement immediately have positive and significant effects on public outpatient care utilization at 5% significant level. The factors ethnic group Han, smoker, fair self-rated health and the number of the child have negative and significant effects on public outpatient care utilization at the 5% of significant level.

For the middle-age group, the factors male and, getting reimbursement immediately have positive and significant effects on public outpatient care utilization at 5% significant level. The factors ethnic group Han, having the same level of self-rated living standard as others, and the number of child have negative and significant effects on public outpatient care utilization at 5% significant level.

For the older group, the factors school without the degree, Urban Employee Basic Medical Insurance, other type of medical insurance and getting reimbursement immediately have positive and significant effects on public outpatient care utilization at the 5% of significant level. And the factors ethnic group Han and having fair self-

rated health have negative and significant effects on public outpatient care utilization at 5% significant level.

Table 31: Coefficient Estimate for Utilization of Public versus Private Facilities Outpatient Care

Variables	Full	middle-aged	Older
age	0.012 [0.005]**	-0.008 [0.014]	0.013 [0.010]
male	0.228 [0.125]*	0.425 [0.191]**	0.055 [0.172]
han	-0.448 [0.172]***	-0.385 [0.212]*	-0.611 [0.304]**
communist	0.29 [0.149]*	0.239 [0.235]	0.293 [0.196]
married	-0.073 [0.828]	-12.859 [653.668]	0.464 [0.940]
sep_di_wid	-0.146 [0.835]	-12.921 [653.668]	0.362 [0.946]
agri	-0.051 [0.153]	-0.003 [0.221]	0.01 [0.219]
sch_withoutdegree	0.27 [0.101]***	0.191 [0.123]	0.452 [0.187]**
coll_and_above	0.206 [0.362]	0.212 [0.511]	0.121 [0.529]
UEBMI	0.7 [0.268]***	0.539 [0.403]	0.847 [0.368]**
URBMI	0.178 [0.284]	-0.077 [0.406]	0.474 [0.418]
NCBMI	0.11 [0.206]	-0.03 [0.322]	0.192 [0.272]
OBMI	0.432 [0.264]	-0.007 [0.390]	0.843 [0.379]**
get_reimb_immed	0.38 [0.086]***	0.281 [0.122]**	0.485 [0.122]***
dosocio_activity	-0.115	-0.071	-0.165

	[0.081]	[0.116]	[0.115]
Received_wage	-0.126	-0.123	-0.115
	[0.110]	[0.142]	[0.186]
smoker	-0.275	-0.339	-0.21
	[0.120]**	[0.183]*	[0.161]
drink_moronce_amonth	-0.175	-0.255	-0.121
	[0.109]	[0.157]	[0.154]
drink_lessonce_amonth	0.047	0.067	-0.031
	[0.152]	[0.201]	[0.237]
selralive_better	0.055	-0.231	0.201
	[0.265]	[0.386]	[0.376]
selralive_same	-0.092	-0.299	0.141
	[0.099]	[0.140]**	[0.143]
selfrated_good	0.023	-0.076	0.123
	[0.133]	[0.185]	[0.196]
selfrated_fair	-0.186	-0.117	-0.273
	[0.084]**	[0.120]	[0.120]**
number_child	-0.081	-0.143	-0.066
	[0.033]**	[0.059]**	[0.042]
_cons	0.706	14.722	0.039
	[0.911]	[653.669]	[1.173]
	3,292	1,604	1,688
LR Chi2 (25) = 24.51 Prob > Chi2 = 0.4899			

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

According to the likelihood ratio test for public versus private facilities outpatient care utilization shows that the null hypothesis is not rejected (Prob > Ch2 = 0.4899). It implies that doing a full sample analysis is more appropriate than conducting the sub-sample study in this case. Therefore, marginal effects of public versus private facilities outpatient care utilization will be interpreted based on the full sample.

It should be noted that interpretation of the result between public versus private outpatient care use is conditioned on people who have ambulatory care only. From the *Table 32*, predisposing factor age has a statistically significant positive relationship with outpatient care utilization at the public facility at 5% significant level. Those

whose gender is male were 4.7% more likely to use public facility outpatient care utilization compared to females. Han people are 9.3% less likely to use outpatient care at public facility compare to the minority group. The factor the communist party member has statistically significant positive relationship with public facility outpatient care utilization at 10% significant level. The probability of public facility outpatient care utilization increases by 6% if people report being communist party member. Those who have educated in school but without degree are 5.6% more likely to use outpatient care at public facility compare to those who have under primary school education level. It is worth noting that the number of child has a negative effect on public facility outpatient care utilization at 5% significant level.

For the enabling factors, Urban Employee Basis Medical Insurance has statistically significant positive relationship with public facility outpatient care utilization. That is, the probability of utilization increases by 14.5% at 1% significant level when a person has Urban Employee Basic Medical Insurance. The factor getting reimbursement immediately has statistically significant positive relationship with public facility outpatient care utilization, the probability of utilization grows by 7.9% at 1% significant level if a person can get reimbursement immediately. Smoking behavior has negative and significant effects on public facility outpatient care utilization. A smoker has 5.7% less likelihood of using the public facility for outpatient care compared to a non-smoker.

With regard to need factors, only fair self-rated health has statistically significant negative relationship with public facility outpatient care utilization at 5% significant level, the probability of outpatient care utilization decreases by 3.9% for people who reported fair self-rated health.

Table 32: Marginal Effects of Public versus Private Facilities Outpatient Care Utilization in Full Sample

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	0.0025026	0.00112	2.24	0.025	0.00032	0.00469
male	0.0473304	0.02597	1.82	0.068	-0.00358	0.09824
han	-0.0928498	0.03558	-2.61	0.009	-0.16258	-0.02312
communist	0.0601404	0.03092	1.95	0.052	-0.00045	0.12073
married	-0.0151347	0.17176	-0.09	0.93	-0.35177	0.32150

sep_di_wid	-0.0303709	0.17308	-0.18	0.861	-0.36959	0.30885
agri	-0.0106709	0.03165	-0.34	0.736	-0.07270	0.05136
sch_withoutdegree	0.0560073	0.02085	2.69	0.007	0.01514	0.09688
coll_and_above	0.0426787	0.07502	0.57	0.569	-0.10435	0.18971
UEBMI	0.1452112	0.05547	2.62	0.009	0.03650	0.25392
URBMI	0.037	0.05887	0.63	0.53	-0.07838	0.15238
NCBMI	0.0227654	0.04275	0.53	0.594	-0.06102	0.10655
OBMI	0.0896622	0.05471	1.64	0.101	-0.01756	0.19689
get_reimb_immed	0.0789014	0.01769	4.46	0.00	0.04422	0.11358
dosocio_activity	-0.0238273	0.01679	-1.42	0.156	-0.05674	0.00909
Received_wage	-0.0261575	0.02271	-1.15	0.249	-0.07068	0.01836
smoker	-0.0570899	0.02480	-2.3	0.021	-0.10570	-0.00848
drink_moronce_amonth	-0.0362945	0.02250	-1.61	0.107	-0.08039	0.00780
drink_lessonce_amonth	0.0097544	0.03157	0.31	0.757	-0.05212	0.07163
selralive_better	0.0113754	0.05498	0.21	0.836	-0.09638	0.11913
selralive_same	-0.0190824	0.02052	-0.93	0.352	-0.05929	0.02113
selfrated_good	0.0048639	0.02758	0.18	0.86	-0.04919	0.05892
selfrated_fair	-0.0385235	0.01749	-2.2	0.028	-0.07280	-0.00425
number_child	-0.0168054	0.00689	-2.44	0.015	-0.03031	-0.00331

5.1.3 Inpatient Care Utilization

Table 33 presents the estimated parameters of binary logit regression of inpatient care utilization with independent variables. For the full group, the factors ethnic group age, male, communist party member, Urban Employee Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance, another type of health insurance, have positive and significant effects on inpatient care utilization at 5% significant level. The factors received wage, drink more than once per month and drink less than once per month, good self-rated health, fair self-rated health have negative and significant effects on inpatient care utilization at 5% significant level.

For a sub-sample of the middle-age group, the factor communist party member and Urban Employee Basic Medical Insurance have positive and significant effects on inpatient care utilization at 5% significant level. And the factors received wage, drink

more than once per month, good self-rated health and fair self-rated health has negative and significant effects on inpatient care utilization at 5% significant level.

For a sub-sample older age group, the factors age, male, communist party member, Urban Employee Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance and other type of health insurance have positive and significant effects on inpatient care utilization at 5% significant level. And the factors drink more than once per month, good self-rated health and fair self-rated health have negative and significant effects on inpatient care utilization at 5% significant level.

Table 33: Coefficient Estimate for Inpatient Care Utilization

Variables	Full	middle-aged	Older
age	0.016 [0.003]***	0.009 [0.010]	0.015 [0.006]**
male	0.269 [0.076]***	0.169 [0.127]	0.309 [0.097]***
han	-0.03 [0.094]	-0.126 [0.132]	0.064 [0.135]
communist	0.294 [0.083]***	0.333 [0.148]**	0.261 [0.101]***
married	-0.284 [0.557]	-0.335 [0.797]	-0.178 [0.784]
sep_di_wid	-0.198 [0.561]	0.02 [0.810]	-0.15 [0.787]
agri	-0.189 [0.098]*	-0.033 [0.155]	-0.247 [0.131]*
sch_withoutdegree	-0.054 [0.065]	-0.02 [0.088]	-0.078 [0.099]
coll_and_above	0.01 [0.190]	-0.177 [0.308]	0.156 [0.247]
UEBMI	0.807 [0.174]***	0.992 [0.282]***	0.717 [0.224]***
URBMI	0.272 [0.197]	0.517 [0.303]*	0.093 [0.263]
NCBMI	0.482	0.411	0.503

	[0.149]***	[0.242]*	[0.189]***
OBMI	0.637	0.342	0.779
	[0.174]***	[0.284]	[0.224]***
get_reimb_immed	-0.052	-0.025	-0.083
	[0.055]	[0.086]	[0.072]
dosocio_activity	-0.023	0.022	-0.058
	[0.053]	[0.082]	[0.069]
Received_wage	-0.254	-0.236	-0.197
	[0.076]***	[0.104]**	[0.120]
smoker	-0.081	-0.089	-0.067
	[0.072]	[0.123]	[0.090]
drink_moronce_amonth	-0.428	-0.334	-0.479
	[0.071]***	[0.111]***	[0.092]***
drink_lessonce_amonth	-0.245	-0.208	-0.279
	[0.103]**	[0.152]	[0.140]**
selralive_better	0.144	-0.182	0.301
	[0.153]	[0.288]	[0.184]
selralive_same	0.113	0.1	0.125
	[0.063]*	[0.099]	[0.081]
selfrated_good	-1.608	-1.85	-1.426
	[0.083]***	[0.131]***	[0.108]***
selfrated_fair	-1.075	-1.195	-0.985
	[0.056]***	[0.086]***	[0.074]***
number_child	0.016	0.061	0.006
	[0.021]	[0.042]	[0.024]
_cons	-2.168	-1.824	-2.232
	[0.611]***	[0.983]*	[0.889]**
	15,033	7,779	7,254

LR Chi2 (25) = 32.53 Prob > Chi2 = 0.1432

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Regarding the likelihood ratio test inpatient care utilization shows that the null hypothesis is not rejected (Prob > Ch2 = 0.1432). It implies that doing a full sample analysis is more appropriate than conducting the sub-sample study in this case.

Therefore, marginal effects of inpatient care utilization will be interpreted based on the full sample. From *Table 34*, predisposing factor age has a strong and statistically significant positive relationship with inpatient care utilization at 1% significant level. Male is 2.6% more likely to use inpatient care compared to female. The probability of inpatient care utilization increases by 2.8% for people who are communist party member compare to those who were non-communist. Those who have agricultural household registration type were 1.8% less likelihood to have inpatient care.

For enabling factors, those who have Urban Employee Basis Medical Insurance, New Rural Cooperative Basic Medical Insurance or other type of insurance were more likely to use inpatient care utilization at 1% significant level. The probability of inpatient care utilization increases by 7.7%, 4.6% and 6.1%, respectively. Those who received wage has the statistically significant negative relationship with inpatient care utilization. The probability of inpatient care utilization decreases by 2.4% at 1% significant level. Those who are drinking more than once per month and drinking less than once per month have negative and significant effects on inpatient care utilization at 1% and 5% significant level, respectively. The probability of inpatient care utilization decreases by 4.1% and 2.3%, respectively.

With regards to need factors, those who reported same self-rated living standard are 1.1% more likely to use inpatient care utilization at 10% significant level. The factor self-rated health has strong and statistically significant negative relationship with inpatient care utilization at 1% significant level. The probability of inpatient care utilization decreases by 15.4% and 10.3%, respectively.

Table 34: Marginal Effects of Inpatient Care Utilization in Full Sample

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	0.0015111	0.00033	4.58	0.000	0.0009 0.0022
male	0.0256864	0.00728	3.53	0.000	0.0114 0.0399
han	-0.0028494	0.00898	-0.32	0.751	-0.0205 0.0148
communist	0.0280465	0.00793	3.54	0.000	0.0125 0.0436
married	-0.0271667	0.05322	-0.51	0.610	-0.1315 0.0771
sep_di_wid	-0.0189367	0.05361	-0.35	0.724	-0.1240 0.0861
agri	-0.0180865	0.00937	-1.93	0.054	-0.0364 0.0003
sch_withoutdegree	-0.005124	0.00621	-0.82	0.410	-0.0173 0.0071

coll_and_above	0.0009441	0.01814	0.05	0.958	-0.0346	0.0365
UEBMI	0.0770734	0.01658	4.65	0.000	0.0446	0.1096
URBMI	0.0259721	0.01880	1.38	0.167	-0.0109	0.0628
NCBMI	0.0460007	0.01420	3.24	0.001	0.0182	0.0738
OBMI	0.0608262	0.01660	3.66	0.000	0.0283	0.0934
get_reimb_immed	-0.0049844	0.00526	-0.95	0.343	-0.0153	0.0053
dosocio_activity	-0.0021904	0.00503	-0.44	0.663	-0.0120	0.0077
Received_wage	-0.0242967	0.00727	-3.34	0.001	-0.0386	-0.0100
smoker	-0.0077514	0.00690	-1.12	0.261	-0.0213	0.0058
drink_moronce_amonth	-0.0408585	0.00672	-6.08	0.000	-0.0540	-0.0277
drink_lessonce_amonth	-0.0233773	0.00982	-2.38	0.017	-0.0426	-0.0041
selralive_better	0.0137131	0.01460	0.94	0.348	-0.0149	0.0423
selralive_same	0.0107833	0.00599	1.8	0.072	-0.0009	0.0225
selfrated_good	-0.1535579	0.00744	-20.63	0.000	-0.1681	-0.1390
selfrated_fair	-0.10271	0.00528	-19.44	0.000	-0.1131	-0.0924
number_child	0.001491	0.00199	0.75	0.454	-0.0024	0.0054

5.1.4 Public versus Private Facilities Inpatient Care Utilization

Table 35 shows the estimated parameters associated with each explanatory variable from a binary logit regression of public versus private facilities inpatient care. For the full sample, the factors New Rural Cooperative Basic Medical Insurance and other type of health insurance have positive and significant effects on public inpatient care utilization at 5% significant level. The factors agricultural household registration, drink more than once per month and drink less than once per month have negative and significant effects on public inpatient care utilization at 5% significant level.

For the middle-aged group, the factors New Rural Cooperative Basic Medical Insurance and other type of health insurance have positive and significant effects on public inpatient care utilization at 5% significant level. The factor drink less than once per month have negative and significant effects on public inpatient care utilization at 5% significant level.

For the older age group, the factors agricultural household registration, socialized and do activity and drink more than once per month have negative and significant effects on public inpatient care utilization at 5% significant level.

Table 35: Coefficient Estimate for Utilization of Public versus Private Inpatient Care

Variables	Full	middle-aged	Older
age	-0.002 [0.015]	-0.008 [0.041]	-0.009 [0.027]
male	0.018 [0.323]	-0.141 [0.528]	0.171 [0.441]
han	-0.211 [0.421]	0.055 [0.529]	-0.696 [0.763]
communist	0.076 [0.353]	-0.461 [0.527]	0.359 [0.492]
married	-10.817 [376.525]	-10.64 [814.228]	-12.029 [1,379.224]
sep_di_wid	-11.217 [376.525]	-10.499 [814.228]	-12.644 [1,379.224]
agri	-1.467 [0.529]***	-0.878 [0.738]	-2.16 [0.745]***
sch_withoutdegree	-0.187 [0.274]	-0.401 [0.373]	0.029 [0.466]
coll_and_above	-0.04 [0.837]	-0.238 [1.271]	0.257 [1.180]
UEBMI	0.053 [0.654]	1.452 [0.910]	-1.233 [0.977]
URBMI	0.685 [0.797]	2.408 [1.253]*	-0.783 [1.144]
NCBMI	1.346 [0.439]***	2.052 [0.648]***	0.81 [0.701]
OBMI	1.593 [0.674]**	2.151 [0.965]**	1.057 [1.011]
get_reimb_immed	-0.035 [0.242]	0.327 [0.392]	-0.329 [0.320]

dosocio_activity	-0.307 [0.229]	0.389 [0.343]	-0.887 [0.326]***
Received_wage	0.148 [0.333]	0.008 [0.434]	0.354 [0.630]
smoker	0.202 [0.307]	0.422 [0.528]	0.066 [0.409]
drink_moronce_amonth	-0.576 [0.278]**	-0.412 [0.436]	-0.751 [0.373]**
drink_lessonce_amonth	-0.928 [0.363]**	-1.078 [0.522]**	-0.886 [0.530]*
selralive_better	0.924 [1.032]		0.523 [1.061]
selralive_same	-0.109 [0.254]	-0.392 [0.381]	0.069 [0.356]
selfrated_good	0.799 [0.453]*	0.829 [0.667]	0.864 [0.636]
selfrated_fair	-0.054 [0.228]	-0.003 [0.342]	0.078 [0.315]
number_child	0.095 [0.090]	0.064 [0.172]	0.111 [0.115]
o.selralive_better		0 [0.000]	
_cons	13.932 [376.527]	12.25 [814.232]	17.627 [1,379.225]
	1,503	610	881

LR Chi2 (25) = 21.75 Prob > Chi2 = 0.5939

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

According to the likelihood ratio test for public versus private facilities inpatient care utilization shows that the null hypothesis is not rejected (Prob > Ch2 = 0.5939). It shows that doing a full sample analysis is more appropriate than conducting the sub-sample study for this case. Therefore, marginal effects of public versus private facilities inpatient care utilization will be interpreted based on the full sample. It should be noted that the interpretation of the result between public versus private

inpatient care use is conditioning on people who have admitted to hospitalization. From the *Table 36*, obviously, none of the factors significantly influence the choice between public and private inpatient care utilization.

Table 36: Marginal Effects of Public versus Private Inpatient Care Utilization in Full Sample

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	-0.0000873	0.00077	-0.11	0.91	-0.00160 0.00142
male	0.0009205	0.01645	0.06	0.955	-0.03133 0.03317
han	-0.010736	0.02261	-0.47	0.635	-0.05505 0.03357
communist	0.0038691	0.01812	0.21	0.831	-0.03165 0.03939
married	-0.5503322	18.78791	-0.03	0.977	-37.37395 36.27329
sep_di_wid	-0.5707176	18.77424	-0.03	0.976	-37.36755 36.22611
agri	-0.0746195	0.05629	-1.33	0.185	-0.18495 0.03571
sch_withoutdegree	-0.0095098	0.01532	-0.62	0.535	-0.03954 0.02052
coll_and_above	-0.0020502	0.04260	-0.05	0.962	-0.08555 0.08145
UEBMI	0.0026973	0.03333	0.08	0.936	-0.06264 0.06803
URBMI	0.034832	0.04689	0.74	0.458	-0.05706 0.12673
NCBMI	0.0684962	0.05111	1.34	0.18	-0.03168 0.16867
OBMI	0.0810649	0.06407	1.27	0.206	-0.04452 0.20665
get_reimb_immed	-0.0017865	0.01239	-0.14	0.885	-0.02607 0.02249
dosocio_activity	-0.0156148	0.01562	-1	0.317	-0.04623 0.01500
Received_wage	0.0075146	0.01765	0.43	0.67	-0.02709 0.04212
smoker	0.0102628	0.01703	0.6	0.547	-0.02312 0.04365
drink_moronce_amonth	-0.0293124	0.02411	-1.22	0.224	-0.07657 0.01795
drink_lessonce_amonth	-0.0472282	0.03658	-1.29	0.197	-0.11893 0.02447
selralive_better	0.0470347	0.06089	0.77	0.44	-0.07230 0.16637
selralive_same	-0.005547	0.01346	-0.41	0.68	-0.03192 0.02083
selfrated_good	0.0406422	0.03543	1.15	0.251	-0.02880 0.11009
selfrated_fair	-0.0027457	0.01174	-0.23	0.815	-0.02576 0.02027
number_child	0.0048231	0.00561	0.86	0.39	-0.00618 0.01582

5.1.5 Physical Examination Utilization

Table 37 presents the estimated parameters of binary logit regression of physical examination utilization associated with each independent variable. From the table 37,

for the full sample, the factors age, ethnic group Han, communist party member, being educated in school but without degree, college degree or above, Urban Employee Basic Medical Insurance, Urban Resident Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance, other type of health insurance, getting reimbursement immediately, socialized and do activity, received wage, better self-rated living standard and same self-rated living standard have positive and significant effects on physical examination utilization at 5% significant level. The factors agricultural household registration, smoker, drink more than once per month, good self-rated health and fair self-rated health, the number of child have negative and significant effects on physical examination utilization at 5% significant level.

For the middle-aged sample, the factors age, communist party member, school without degree, college degree or above, Urban Employee Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance, other type of health insurance, getting reimbursement immediately, socialized and do activity, received wage, better self-rated living standard and same self-rated living standard have positive and significant effects on physical examination utilization at 5% significant level. And the factors married, separate, divorced or widowed, agricultural household registration, smoker, good self-rated health and fair self-rated health, the number of child have negative and significant effects on physical examination utilization at 5% significant level.

For the older group, the factors age, ethnic group Han, communist party member, school without degree, college degree or above, Urban Employee Basic Medical Insurance, Urban Resident Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance, other type of health insurance, getting reimbursement immediately, socialized and do activity and received wage have positive and significant effects on physical examination utilization at 5% significant level. And the factors agricultural household registration, good self-rated health and the number of child have negative effects on physical examination utilization at 5% significant level.

Table 37: Coefficient Estimate for Physical Examination Utilization

Variables	Full	middle-aged	Older
age	0.035 [0.002]***	0.016 [0.006]***	0.025 [0.004]***

male	-0.088 [0.054]	-0.115 [0.082]	-0.05 [0.073]
han	0.268 [0.068]***	0.099 [0.092]	0.45 [0.100]***
communist	0.381 [0.061]***	0.489 [0.095]***	0.299 [0.080]***
married	-0.728 [0.405]*	-1.438 [0.616]**	-0.126 [0.587]
sep_di_wid	-0.718 [0.408]*	-1.425 [0.626]**	-0.09 [0.590]
agri	-0.411 [0.065]***	-0.343 [0.090]***	-0.492 [0.096]***
sch_withoutdegree	0.149 [0.043]***	0.168 [0.055]***	0.186 [0.072]***
coll_and_above	1.011 [0.162]***	0.914 [0.204]***	1.069 [0.276]***
UEBMI	0.919 [0.114]***	0.916 [0.165]***	0.824 [0.159]***
URBMI	0.26 [0.124]**	0.057 [0.176]	0.427 [0.177]**
NCBMI	0.462 [0.095]***	0.315 [0.139]**	0.577 [0.131]***
OBMI	0.824 [0.114]***	0.743 [0.161]***	0.827 [0.162]***
get_reimb_immed	0.207 [0.038]***	0.217 [0.054]***	0.203 [0.053]***
dosocio_activity	0.264 [0.036]***	0.287 [0.053]***	0.239 [0.051]***
Received_wage	0.353 [0.047]***	0.437 [0.060]***	0.193 [0.082]**
smoker	-0.147 [0.051]***	-0.223 [0.078]***	-0.083 [0.067]
drink_moronce_amonth	-0.094	-0.117	-0.075

	[0.046]**	[0.068]*	[0.064]
drink_lessonce_amonth	0.007	-0.097	0.119
	[0.067]	[0.093]	[0.100]
selralive_better	0.275	0.427	0.166
	[0.106]***	[0.152]***	[0.147]
selralive_same	0.127	0.188	0.078
	[0.043]***	[0.061]***	[0.060]
selfrated_good	-0.186	-0.188	-0.206
	[0.051]***	[0.074]**	[0.071]***
selfrated_fair	-0.181	-0.265	-0.108
	[0.043]***	[0.064]***	[0.058]*
number_child	-0.055	-0.082	-0.046
	[0.015]***	[0.028]***	[0.018]**
_cons	-2.12	-0.202	-2.275
	[0.440]***	[0.717]	[0.667]***
	14,674	7,607	7,067

LR Chi2 (25) = 73.12 Prob > Chi2 = 0.0000

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Regarding the likelihood ratio test, likelihood ratio test for utilization of physical examination shows a rejection of the null hypothesis (Prob > chi2 = 0.0000). This implies that doing a sub-sample analysis of the middle-aged and the older age group separately is more appropriate than conducting a full sample study in this data set. Therefore, marginal effects of physical examination utilization will be interpreted based on the sub-sample of the middle-aged group and older group.

From the *Table 38*, predisposing factor age has a strong and statistically significant positive relationship with middle-aged group physical examination utilization at 1% significant level. The probability of physical examination utilization increases by 11.4% if people report being a communist party member. Those who married or separated, divorced or widowed have a statistically significant negative relationship with middle-aged group physical examination utilization at 5% significant level. The agricultural household registration type also has a negative relationship with middle-aged group physical examination utilization at 1% significant level. The probability of utilization decreases by 7.9% compared to those who have non-agricultural household

registration type. The factors about education level school without degree and college and above degree have statistically significant positive relationship with middle-aged group physical examination utilization at 1% significant level, and the probability of utilization grows 3.9% and 21.1%, respectively. And the factor the number of child has a negative and significant effect on middle-aged group physical examination utilization.

For the enabling factors, those who have Urban Employee Basic Medical Insurance, New Rural Cooperative Basic Medical Insurance and other type of health insurance have positive and significant effects on middle-aged group physical examination utilization at 5% significant level. The probability of physical examination utilization increases 21.2%, 7.3% and 17.1%, respectively. The factors getting reimbursement immediately and received wage also have positive relationship with middle-aged group physical examination utilization. And the factors about life-style socialized and do activity in daily life has a positive and significant effect (the probability of physical examination utilization increases by 6.7%). Those who are smoker or drink more than once per month (statistically significant at 10% significant level) less likely to use physical examination, and the probability of physical examination utilization decreases by 5.1% and 2.7%, respectively.

For the need factors, those who reported better and same self-rated living standard were 9.9% and 4.4% more likely to use physical examination compare to those reported worse, respectively. As like expected, the good and fair self-rated health have negative and significant effects on physical examination use compare to those reported poor health.

Table 38: Marginal Effects of Physical Examination Utilization in Middle-aged group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	0.0037611	0.00143	2.63	0.009	0.00096 0.00656
male	-0.0263729	0.01896	-1.39	0.164	-0.06353 0.01078
han	0.0229062	0.02121	1.08	0.280	-0.01867 0.06448
communist	0.1136438	0.02201	5.16	0.000	0.07051 0.15677
married	-0.3324195	0.14251	-2.33	0.020	-0.61174 -0.05310
sep_di_wid	-0.3291671	0.14473	-2.27	0.023	-0.61284 -0.04549
agri	-0.078841	0.02081	-3.79	0.000	-0.11963 -0.03806

sch_withoutdegree	0.0388469	0.01271	3.06	0.002	0.01393	0.06377
coll_and_above	0.2109069	0.04734	4.46	0.000	0.11812	0.30369
UEBMI	0.2122931	0.03812	5.57	0.000	0.13759	0.28700
URBMI	0.0133497	0.04057	0.33	0.742	-0.06617	0.09286
NCBMI	0.0726218	0.03207	2.26	0.024	0.00977	0.13547
OBMI	0.1708402	0.03707	4.61	0.000	0.09818	0.24350
get_reimb_immed	0.0499277	0.01257	3.97	0.000	0.02530	0.07456
dosocio_activity	0.0668	0.01224	5.46	0.000	0.04281	0.09079
Received_wage	0.1012572	0.01374	7.37	0.000	0.07433	0.12818
smoker	-0.0513173	0.01810	-2.84	0.005	-0.08678	-0.01585
drink_moronce_amonth	-0.0269591	0.01561	-1.73	0.084	-0.05756	0.00364
drink_lessonce_amonth	-0.0231636	0.02149	-1.08	0.281	-0.06529	0.01896
selralive_better	0.0988807	0.03524	2.81	0.005	0.02981	0.16796
selralive_same	0.0441075	0.01416	3.12	0.002	0.01636	0.07186
selfrated_good	-0.0435503	0.01703	-2.56	0.011	-0.07693	-0.01017
selfrated_fair	-0.0611802	0.01477	-4.14	0.000	-0.09013	-0.03223
number_child	-0.0187218	0.00643	-2.91	0.004	-0.03133	-0.00611

Table 39 shows, predisposing factor age has a strong and statistically significant positive relationship with older group physical examination utilization at 1% significant level. Han people are 11.2% more likely to use physical examination compared to the minority group. The communist party member is 7.5% more likely to use physical examination compared to those who are the non-communist party member. The agricultural household registration type has a negative relationship with older group physical examination utilization. The probability of utilization decreases by 12.3% compared to those who have non-agricultural household registration type. The factors about education level school without degree or college degree and above degree have statistically significant positive relationship with older group physical examination utilization at 1% significant level. The probability of utilization grows 4.6% and 26.7%, respectively.

About the enabling factors, those who have certain type of insurance are more likely to use physical examination. The factors getting reimbursement immediately also has a positive and significant effect on physical examination use. The probability of

utilization increases by 5.1% compared to pay yourself first scheme. Those who have received wage were more likely to have physical examination compared to those who did not received wage. And those who have socialized and do activity in daily life are 6% more likely to have physical examination.

About the need factors, self-rated living standard has no statistically significant relationship with older group physical examination utilization. However, the good and fair self-rated health have negative effects at the 1% significant level. The probability of utilization decreases by 5.1% and 2.7% compare to those reported poor health, respectively.

Table 39: Marginal Effects of Physical Examination Utilization in Older Age Group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	0.0062396	0.00111	5.63	0.000	0.0041 0.0084
male	-0.0117618	0.01810	-0.65	0.516	-0.0472 0.0237
han	0.1120539	0.02508	4.47	0.000	0.0629 0.1612
communist	0.0751551	0.01994	3.77	0.000	0.0361 0.1142
married	-0.0318444	0.14669	-0.22	0.828	-0.3193 0.2557
sep_di_wid	-0.0227401	0.14737	-0.15	0.877	-0.3116 0.2661
agri	-0.1231205	0.02408	-5.11	0.000	-0.1703 -0.0759
sch_withoutdegree	0.0464618	0.01802	2.58	0.010	0.0111 0.0818
coll_and_above	0.2674964	0.06888	3.88	0.000	0.1325 0.4025
UEBMI	0.2043953	0.03982	5.13	0.000	0.1263 0.2824
URBMI	0.1047622	0.04406	2.38	0.017	0.0184 0.1911
NCBMI	0.1440678	0.03281	4.39	0.000	0.0798 0.2084
OBMI	0.2050456	0.04052	5.06	0.000	0.1256 0.2845
get_reimb_immed	0.0510379	0.01326	3.85	0.000	0.0250 0.0770
dosocio_activity	0.0602383	0.01265	4.76	0.000	0.0355 0.0850
Received_wage	0.0477423	0.02038	2.34	0.019	0.0078 0.0877
smoker	-0.020839	0.01683	-1.24	0.216	-0.0538 0.0121
drink_moronce_amonth	-0.0195188	0.01601	-1.22	0.223	-0.0509 0.0119
drink_lessonce_amonth	0.0285184	0.02494	1.14	0.253	-0.0204 0.0774
selralive_better	0.0419985	0.03666	1.15	0.252	-0.0298 0.1138
selralive_same	0.0200674	0.01505	1.33	0.182	-0.0094 0.0496
selfrated_good	-0.0514794	0.01783	-2.89	0.004	-0.0864 -0.0165

selfrated_fair	-0.0265019	0.01454	-1.82	0.068	-0.0550	0.0020
number_child	-0.0116449	0.00458	-2.54	0.011	-0.0206	-0.0027

For comparison between middle-aged and older age groups, factors that have the different effect on utilization of physical examination. For example, ethnic group Han and Urban Resident Basic Medical Insurance have a positive effect on older age group physical examination utilization. On the other hand, there are some factors that are significant in one sub-sample but not in the other group. For example, marital statuses, smoker and the self-rated living standard statistically significant in the middle-aged group but not significant in the older age group.

5.1.6 Dental Care Utilization

Table 40 shows the estimated parameters of binary logit regression of dental care utilization with each independent variable. From the table 40, for the full sample, the factors ethnic group Han, school without degree, college degree and above, socialized and do activity, drink less than once per month, having same level of self-rated living standard have positive and significant effects on dental care utilization at 5% significant level. The factors male and good self-rated health have negative and significant effects on dental care utilization at 5% significant level.

For the middle-aged group, the factors school without degree, Urban Employee Basic Medical Insurance, socialized and do activity, drink less than once per month have positive and significant effects on dental care utilization at 5% significant level. And the factors male, drink more than once per month and good self-rated health has a negative and significant effects on dental care utilization at 5% significant level.

For the older age group, the factors ethnic group Han, school without degree and college and above, socialized and do activity have positive and significant effects on dental care utilization at 5% significant level. And the factors age, male, getting reimbursement immediately and good self-rated health have negative and significant effects on dental care utilization at 5% significant level.

Table 40: Coefficient Estimate for Dental Care Utilization

Variables	Full	middle-aged	Older
age	0.002 [0.003]	0.012 [0.008]	-0.02 [0.006]***

male	-0.305 [0.068]***	-0.291 [0.100]***	-0.322 [0.094]***
han	0.2 [0.088]**	0.066 [0.112]	0.393 [0.143]***
communist	0.101 [0.073]	0.013 [0.116]	0.125 [0.097]
married	1.531 [1.022]	0.817 [1.044]	13.827 [652.972]
sep_di_wid	1.403 [1.024]	0.693 [1.053]	13.771 [652.972]
agri	-0.144 [0.081]*	-0.091 [0.111]	-0.173 [0.121]
sch_withoutdegree	0.204 [0.053]***	0.152 [0.067]**	0.36 [0.086]***
coll_and_above	0.294 [0.148]**	0.104 [0.205]	0.666 [0.219]***
UEBMI	0.236 [0.137]*	0.392 [0.198]**	0.055 [0.194]
URBMI	0.122 [0.151]	0.214 [0.213]	0.05 [0.217]
NCBMI	0.089 [0.117]	0.144 [0.169]	0.004 [0.163]
OBMI	0.196 [0.138]	0.184 [0.198]	0.18 [0.197]
get_reimb_immed	-0.06 [0.048]	0.039 [0.066]	-0.163 [0.069]**
dosocio_activity	0.252 [0.046]***	0.143 [0.065]**	0.377 [0.067]***
Received_wage	0.042 [0.058]	0.07 [0.074]	0.139 [0.101]
smoker	0.023 [0.064]	0.002 [0.096]	0.038 [0.087]
drink_moronce_amonth	-0.097	-0.166	-0.023

	[0.059]	[0.084]**	[0.083]
drink_lessonce_amonth	0.295	0.383	0.172
	[0.077]***	[0.101]***	[0.118]
selralive_better	0.198	0.078	0.308
	[0.122]	[0.185]	[0.165]*
selralive_same	0.103	0.133	0.056
	[0.052]**	[0.073]*	[0.076]
selfrated_good	-0.263	-0.228	-0.276
	[0.066]***	[0.092]**	[0.095]***
selfrated_fair	-0.013	0.008	-0.039
	[0.053]	[0.077]	[0.074]
number_child	-0.027	-0.003	-0.022
	[0.019]	[0.033]	[0.024]
_cons	-3.39	-3.191	-14.324
	[1.045]***	[1.136]***	[652.973]
	15,036	7,778	7,258
LR Chi2 (25) = 64.29 Prob > Chi2 = 0.0000			

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Based on the likelihood ratio test, likelihood ratio test for utilization of dental care shows a rejection of the null hypothesis (Prob > chi2 = 0.0000). This implies that doing a sub-sample analysis of the middle-aged and the older age group separately is more appropriate than conducting a full sample study in this case. Therefore, marginal effects of dental care utilization will be interpreted based on the sub-sample of the middle-aged group and older group.

From the *Table 41*, predisposing factor gender has a strong and statistically significant negative relationship with middle-aged group dental care utilization at 1% significant level. Male is 4.1% less likely to use dental care compare to female. Those who has educated in school but without degree are 2.1% more likely to use dental care compare to those who have under primary school education level.

For the enabling factors, those who have Urban Employee Basic Insurance are 5.5% more likely to use dental care compared to those who do not have insurance. The factors getting reimbursement rete immediately and received wage has no statistically significant relationship with middle-aged group dental care utilization. Those who

have socialized and do activity in daily life are 2% more likely to use dental care compared to those who did not socialize and do activity in daily life. Those who drink more than once per month are 2.3% less likely to use dental care. However, drink less than per month has a positive effect (about 5.4%) compared to those who were not drinking alcohol.

About the need factors, those who reported same self-rated living standard were 1.9% more likely to use dental care compared to those who reported worse at 10% significant level. On the contrary, those who reported good self-rated health were 3.2% less likely to use dental care compared to those who reported poor health condition.

Table 41: Marginal Effects of Dental Care Utilization in Middle-aged Group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
age	0.001648	0.0010518	1.57	0.117	-0.00041 0.00371
male	-0.040769	0.0140286	-2.91	0.004	-0.06826 -0.01327
han	0.009291	0.0157062	0.59	0.554	-0.02149 0.04007
communist	0.001854	0.0162173	0.11	0.909	-0.02993 0.03364
married	0.114595	0.1463627	0.78	0.434	-0.17227 0.40146
sep_di_wid	0.097200	0.1476261	0.66	0.510	-0.19214 0.38654
agri	-0.012815	0.0156249	-0.82	0.412	-0.04344 0.01781
sch_withoutdegree	0.021315	0.0094442	2.26	0.024	0.00280 0.03983
coll_and_above	0.014649	0.0287051	0.51	0.610	-0.04161 0.07091
UEBMI	0.054926	0.027748	1.98	0.048	0.00054 0.10931
URBMI	0.030000	0.0298814	1.00	0.315	-0.02857 0.08857
NCBMI	0.020250	0.0237502	0.85	0.394	-0.02630 0.06680
OBMI	0.025819	0.0277042	0.93	0.351	-0.02848 0.08012
get_reimb_immed	0.005519	0.0092628	0.60	0.551	-0.01264 0.02367
dosocio_activity	0.020085	0.0090987	2.21	0.027	0.00225 0.03792
Received_wage	0.009867	0.0103676	0.95	0.341	-0.01045 0.03019
smoker	0.000294	0.0134768	0.02	0.983	-0.02612 0.02671
drink_moronce_amonth	-0.023238	0.0118302	-1.96	0.050	-0.04642 -0.00005
drink_lessonce_amonth	0.053673	0.0141672	3.79	0.000	0.02591 0.08144
selralive_better	0.010879	0.0258842	0.42	0.674	-0.03985 0.06161
selralive_same	0.018588	0.0102616	1.81	0.070	-0.00152 0.03870
selfrated_good	-0.031961	0.0128862	-2.48	0.013	-0.05722 -0.00670

selfrated_fair	0.001113	0.0108041	0.10	0.918	-0.02006	0.02229
number_child	-0.000472	0.0046961	-0.10	0.920	-0.00968	0.00873

Table 42 shows the marginal effects of older age group dental care utilization. From the table, there is no any factor has a statistically significant relationship with older age group dental care utilization.

Table 42: Marginal Effects of Dental Care Utilization in Older Age Group

Variables	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	-0.002724	0.00245	-1.11	0.266	-0.00753	0.00208
male	-0.043729	0.03933	-1.11	0.266	-0.12082	0.03336
han	0.053427	0.04940	1.08	0.279	-0.04340	0.15025
communist	0.016925	0.01950	0.87	0.386	-0.02130	0.05515
married	1.879263	87.15013	0.02	0.983	-168.93190	172.69040
sep_di_wid	1.871686	87.15658	0.02	0.983	-168.95210	172.69540
agri	-0.023541	0.02591	-0.91	0.363	-0.07431	0.02723
sch_withoutdegree	0.048948	0.04326	1.13	0.258	-0.03584	0.13374
coll_and_above	0.090458	0.08251	1.10	0.273	-0.07125	0.25216
UEBMI	0.007442	0.02716	0.27	0.784	-0.04579	0.06067
URBMI	0.006797	0.03010	0.23	0.821	-0.05219	0.06579
NCBMI	0.000514	0.02213	0.02	0.981	-0.04285	0.04388
OBMI	0.024527	0.03399	0.72	0.470	-0.04208	0.09114
get_reimb_immed	-0.022192	0.02108	-1.05	0.292	-0.06351	0.01913
dosocio_activity	0.051230	0.04451	1.15	0.250	-0.03601	0.13847
Received_wage	0.018849	0.02108	0.89	0.371	-0.02247	0.06017
smoker	0.005230	0.01260	0.42	0.678	-0.01947	0.02993
drink_moronce_amonth	-0.003104	0.01165	-0.27	0.790	-0.02594	0.01973
drink_lessonce_amonth	0.023410	0.02560	0.91	0.360	-0.02676	0.07358
selralive_better	0.041895	0.04210	1.00	0.320	-0.04062	0.12441
selralive_same	0.007575	0.01212	0.62	0.532	-0.01618	0.03133
selfrated_good	-0.037496	0.03439	-1.09	0.276	-0.10489	0.02990
selfrated_fair	-0.005358	0.01107	-0.48	0.628	-0.02705	0.01633
number_child	-0.002994	0.00417	-0.72	0.473	-0.01117	0.00518

From comparison between middle-aged and older age groups, we find that there are many factors that are significant in middle-aged group but not statistically significant in the older age group.



CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study is comprehensively applying the Andersen health care utilization conceptual model and uses the binary logit model to analyze the national data of CHARLS 2013.

Using binary logit regressions to estimate the relationship between dependent variables outpatient care utilization, public versus private facilities outpatient care utilization, inpatient care utilization, public versus private facilities inpatient care utilization, physical examination utilization and dental care utilization with independent variables of predisposing factors, enabling factors and need factors. In each regression, we include the predisposing factors age, gender, ethnic group, communist party member, marital statuses, household registration type, education level and the number of child, as well as include enabling factors health insurance type, reimbursement way, received wage and lifestyle factors including being socialized and doing activity in daily life and smoking and drinking and need factors such as self-rated living standard and self-rated health.

6.1.1 Positive Effects

Table 43 indicates the top three positive and negative marginal effects for each type of utilization. The summary of result is also given on the basis of the result of the likelihood ratio test for each type of utilization (i.e. full sample for public versus private outpatient and inpatient care use as well as the decision to use inpatient care in general). Among middle-aged group's outpatient care utilization, the top three positive effects factors were Urban Employee Basic Medical Insurance, Urban Resident Basic Medical Insurance and being a communist party member (8%, 7% and 3% respectively). And for older group outpatient care utilization, factors Han, having college degree and above and being socialized and do activity have the largest positive effects (10%, 7% and 5% respectively).

About inpatient care utilization, from table 43, those who have Urban Employee Basic Medical Insurance, Urban Employee Basic Medical Insurance and other type of medical insurance were more likely to use inpatient care. Therefore, health insurance

scheme has the largest significant effect on inpatient care utilization. However, none of the factors significantly influences the choice between public and private inpatient care utilization. There are significant socio-economic differences in the use of health care.

From table 43, in middle-aged group, those who have Urban Employee Basic Medical Insurance, having college degree and above degree were more likely to use physical examination. In older group, the factors college and above degree, other type of health insurance and New Rural Cooperative Medical Insurance significantly associated with physical examination.

From table 43, dental care utilization among middle-aged group have been influenced by factors Urban Employee Basic Medical Insurance, drink more than once per month and school without degree (5%, 5% and 2% respectively). There were no significant factors effecting on older age group's dental care utilization.

6.1.2 Negative Effects

From table 43, the factors self-rated good health, self-rated fair health and drink more than once per month have the largest magnitude of the negative effect for middle-aged group's outpatient care utilization (i.e. 25%, 12% and 3%, respectively). However, for older group outpatient care utilization, those who reported good self-rated health, married or fair self-rated health were less likely to use outpatient care. The factors Han, being a smoker or having fair self-rated health have the largest negative effects on public facility outpatient's health care utilization.

For inpatient care utilization, the highest ranking's negative effect factors were good self-rated health, fair self-rated health and drinking more than once per month (15%, 10% and 4% respectively).

Those who are not single or have non-agricultural household registration are less likely to use physical examination among the middle-aged group. Utilization of physical examination among the older group was negatively influenced by factors agricultural household registration, good self-rated health and fair self-rated health.

Male are less likely to use dental care compare to female. And those who reported good self-rated health were less likely to use dental care. Factor drinking more than once per month increases the rate of having dental care.

Table 43: Ranking of the Largest Three Effects for Chosen Marginal Effects

Y	op_use		op_pub	ip_use	ip_pub	phy_ex		dent_use	
Sample	M	O	F	F	F	M	O	M	O
Ranking of the largest positive effects									
1	UEBMI 0.08	Han 0.1	UEBMI 0.15	UEBMI 0.08	.	UEBMI 0.21	Colabov 0.27	UEBMI 0.05	.
2	URBMI 0.07	Colabov 0.07	Get-reim-im 0.08	OBMI 0.06	.	Colabov 0.21	OBMI 0.21	Drink-less 0.05	.
3	Communist 0.03	Do-socio-ac 0.05	Sch-w-d 0.06	NCBMI 0.05	.	OBMI 0.17	NCBMI 0.14	Sch-w-d 0.02	.
Ranking of the largest negative effects									
1	Selrah-good -0.25	Selrah-good -0.24	Han -0.09	Selrah-good -0.15	.	Married -0.33	Agri -0.12	Male -0.04	.
2	Selrah-fair -0.12	Married -0.17*	smoker -0.06	Selrah-fair -0.1	.	Sep-di-wed -0.33	Selrah-good 0.05	Selrah-good -0.03*	.
3	Drink-more -0.03	Selrah-fair -0.14	Selrah-fair -0.04	Drink-more -0.04	.	Agri -0.08	Selrah-fair 0.03*	Drink-more -0.02	.

*Summary of analysis result see in appendix part.

6.1.3 Comparing the Result with Main Hypotheses of the Study

The findings from the binary logit regression indicate that the older people are more likely to use inpatient care and physical examination. This result is consistent with the first hypothesis that both physical examination and inpatient care utilization increases significantly by age.

From the study result, males are more likely to use outpatient care and inpatient care compares to females, which does not match the first part of second hypothesis that females are more likely to use outpatient care. On the other hand, we find that females are more likely to use dental care compare to males, which is reflecting the part of second hypothesis that females use dental care more than males.

As stated in the third hypothesis, those who are highly educated and who have non-agricultural household registration are more likely to use inpatient care and physical examination. The study result shows that those who have agricultural household registration are less likely to have inpatient care and physical examination compared to those who have non-agricultural household registration. We also find that higher education level increases the likelihood of using physical examination but has no significant effect on inpatient care utilization, which does not conform with the third hypothesis.

Health insurance improves the accessibility of health care services by reducing the out-of-pocket expenses. Therefore, health insurance has a positive and significant effect on health care utilization, which has been proven by the present study. And this finding is consistent with the fourth hypothesis.

The aging population in China increases the demand of current health care system that already has severe shortage in term of supply. This study estimates the factors that influence different kinds of utilization and provides magnitudes of the impact. The result can present the influencing factors of health care utilization for a middle income country. It can inform policymakers' action to be undertaken in order to solve shortage of health care resources by dealing with both demand and supply sides. Through intervening in demand and supply sides, we can cope with the inadequacy problem of health care services.

6.2 Recommendations

This finding has shown the utilization of health services and the influencing factors of the aging population. The results of this study will strengthen the community's concerns about aging and promote the health of the elderly. Based on the findings, there are two sets of policy recommendations to address the problem of inadequate medical services and the low accessibility of health services for those in need caused by aging population. Recommendations are divided into two parts, the first part is to

limit demand of medical care in order to cope with the problem of supply shortage, the second part is to improve access to health care services for those in need to address the low accessibility of health services.

6.2.1 Recommendations to Limit Demand in Order to Cope with Supply Shortage

- 1) Governments and communities should introduce policies to encourage people to socialize and do physical exercise in order to improve the health condition of populations and reduce the demand of health services. Such as organizing community activities on a regular basis and improving the physical exercise facilities.
- 2) The government ought to provide free physical examinations services. To some extent physical examination can promote health, make people aware of their health condition and possibly reduce health care utilization.

6.2.2 Recommendations for Improve Access to Health Services for Those in Need

- 1) From the result, those who have agricultural household registration are less likely to have access to health care services. Therefore, the government should rearrange health care resources to achieve equal access to health care for all especially for those in the agricultural area.
- 2) In order to promote health, the government should encourage the masses to use more physical examination services and dental care services. The results show that higher education level has a positive and significant effect on utilization of physical care and dental care. Thus, government should promote the development of education that will eventually lead to better access to health care.
- 3) Policy makers should be committed to ameliorating the health insurance system and reimbursement scheme to improve access to care for those in need.

6.3 Limitations

CHARLS is a comprehensive longitudinal survey data in China. However, there are certain limitations which should be noted. First, present study only used the cross sectional data from 2013 wave to estimate the factors influencing healthcare utilization instead of panel data. Second, CHARLS uses self-reported measures of relative living standard and health status which are more prone to measurement error than clinical or performance assessments. Third, because of the dataset, there was no variable about living arrangement, which according to previous research has a strong

relationship with health care utilization. Fourth, for inpatient care utilization between public and private facilities, by doing variance decomposition method, the condition number is equal to 35.76 for those who use inpatient care. Thus, there is evidence of severe multicollinearity (if condition number >10 there is multicollinearity, and if condition number >30 there is severe multicollinearity). Future study needs to investigate further into the problem. Fifth, the effects of several variables (i.e. drinking and smoking) are not logical. Such as those who drink and smoke are less likely to use health services. Future study could further explore the structural characteristics of China's health care system both from the supply and demand sides. It is important to take into account subdivision and constraints, such as urban and rural residence, socioeconomic status, health insurance plans and out-of-pocket expenses.



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APPENDIX



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

APPENDIX 1

Coefficient Estimate Outcome of Each Health Care Utilization

Indep V	OP-use			OP-pub			IP-use			IP-pub			Phyex			Dent-use		
	F	M	O	F	M	O	F	M	O	F	M	O	F	M	O	F	M	O
age	.	.	.	+	.	.	+	.	+	.	.	.	+	+	+	.	.	-
male	.	.	.	+	+	.	+	.	+	-	-	-
han	+	+	+	-	-	-	+	.	+	+	.	+
communist	+	+	.	+	.	.	+	+	+	.	.	.	+	+	+	.	.	.
married	.	.	-*	-*	-
sep_di_wed	-*	-	.	.	+	.
agri	-*	.	-*	-	.	-	-	-	-	-	*	.
sch_withoutdegree	.	.	.	+	.	+	+	+	+	+	.	+
Coll-and-above	.	.	+*	+	+	+	+	*	+
UEBMI	+	+	.	+	+	+	+	+	+	.	.	.	+	+	+	+	+	*
URBMI	+	*	.	.	+	*	.	+	.	+	.
NCBMI	+*	+*	+	+	+	+	+	.	+	+	+	.	.	.
OBMI	+	+	.	+	+	+	.	+	+	+	.	.	.
get_reim-immed	+	+	+	+	+	+	+	+	+	.	.	-
dosocio_activity	+	+	+	-	+	+	+	+	+
Received-wage	-	-	+	+	+	.	.	.
smoker	-	-	-*	-	-	*	-	-
drink_moronce_amonth	-	-	-	.	.	.	-	-	-	-	.	-	-	-	*	.	.	-
drink_lessonce_amonth	-	.	-	-	-	-	*	.	.	.	+	+
selralive-better	+	+	.	.	.	+*

F: Full sample M: Middle-aged group O: Older group
 +: positive effect on 1% or 5% level +*: positive effect on 10% level
 -: negative effect on 1% or 5% level -*: negative effect on 10% level
 . : There is no significant effect

APPENDIX 2

Marginal Effects Outcome of Each Health Care Utilization

Indep V	OP-use		OP-pub	IP-use	IP-pub	Phy-use		Dent-use	
	M	O	F	F	F	M	O	M	O
age	.	.	0.003	0.002	.	0.004	0.006	.	.
male	-0.03	.	0.05*	0.03	.	.	.	-0.04	.
han	.	0.1	-0.09	.	.	.	0.11	.	.
communist	0.03	.	0.06*	0.03	.	0.11	0.08	.	.
married	.	-0.17*	.	.	.	-0.33	.	.	.
sch_withoutdegree	.	.	.	.	.	-0.33	.	.	.
agri	.	.	.	-0.02*	.	-0.08	-0.12	.	.
Sch-w-d	.	.	0.06	.	.	0.04	0.05	0.02	.
Coll-and-above	.	0.07	.	.	.	0.21	0.27	.	.
UEBMI	0.08	.	0.15	0.08	.	0.21	0.2	0.05	.
URBMI	0.07	.	.	.	.	.	0.1	.	.
NCBMI	.	.	.	0.05	.	0.07	0.14	.	.
OBMI	.	.	.	0.06	.	0.17	0.21	.	.
get_reim-immed	0.02	0.03	0.08	.	.	0.05	0.05	.	.
dosocio_activity	.	0.05	.	.	.	0.07	0.06	0.02	.
Received-wage	.	.	.	-0.02	.	0.1	0.05	.	.
smoker	.	-0.03*	-0.06	.	.	-0.05	.	.	.
drink_moronce_amonth	-0.03	-0.04	.	-0.04	.	-0.03*	.	-0.02	.
drink_lessonce_amonth	.	.	.	-0.02	.	.	.	0.05	.
selralive-better	.	.	.	.	.	0.1	.	.	.
seralive-same	.	.	.	0.01	.	0.04	.	0.02	.
selrated-good	-0.25	-0.24	.	-0.15	.	-0.04	-0.05	-0.03*	.
selrated-fair	-0.12	-0.14	-0.04	-0.1	.	-0.06	-0.03*	.	.
number-child	.	.	.	.	.	-0.02	-0.01	.	.

F: Full sample M: Middle-aged group O: Older group
 +: positive effect on 1% or 5% level +*: positive effect on 10% level
 -: negative effect on 1% or 5% level -*: negative effect on 10% level
 . : There is no significant effect

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