FACTORS AFFECTING HEALTH CARE UTILIZATION AMONG ELDERLY

PEOPLE IN RURAL AREAS IN BAYANNAOER CITY, INNER MONGOLIA,

CHINA

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ปัจจัยที่มีผลต่อการใช้บริการสาธารณสุขของผู้สูงอายุในเขตชนบท เมืองบายันนอเออร์
อินเนอร์มองโกเลีย ประเทศจีน

นายยู โชว

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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Thesis Title	FACTORS AFFECTING HEALTH CARE UTILIZATION AMONG ELDERLY PEOPLE IN RURAL AREAS IN BAYANNAOER CITY, INNER MONGOLIA, CHINA
By	Mr. Yu Zhou
Field of Study	Health Economics and Health Care Management
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ยู โชว : ปัจจัยที่มีผลต่อการใช้บริการสาธารณสุขของผู้สูงอายุในเขตชนบท เมืองบายันนอเออร์ อินเนอร์มองโกเลีย ประเทศจีน (FACTORS AFFECTING HEALTH CARE UTILIZATION AMONG ELDERLY PEOPLE IN RURAL AREAS IN BAYANNAOER CITY, INNER MONGOLIA, CHINA) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร.ชันทาล แฮร์เบอร์โฮลส์, 114 หน้า.

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อการใช้บริการสาธารณสุขของผู้สูงอายุในเขตชนบท เมืองบายันนอเออร์ อินเนอร์มองโกเลีย

การศึกษานี้ใช้ข้อมูลจากการสำรวจแบบตัดขวางโดยกองทุน China Medical Board ของ Inner Mongolia Medical University ในปี ค.ศ. 2014 ในผู้สูงอายุจำนวน 1,233 ราย จาก 766 ครัวเรือน โดยศึกษาความสัมพันธ์ระหว่างปัจจัยพื้นฐาน ความสามารถ และความต้องการ กับการใช้บริการสาธารณสุขของผู้สูงอายุในเขตชนบท ด้วยแบบจำลอง zero-truncated Poisson regression และ zero-inflated Poisson regression สำหรับตัวแปรตาม คือ การใช้บริการผู้ป่วยนอกและผู้ป่วยในตามลำดับ โดยการใช้บริการผู้ป่วยนอกจะรวมถึงการใช้บริการทางด้านสาธารณสุขที่ระดับคลินิกในหมู่บ้าน ในเมือง และระดับโรงพยาบาลจังหวัด จากข้อมูลในผู้สูงอายุพบว่า การใช้บริการผู้ป่วยนอกที่สูงมีความสัมพันธ์กับเพศชาย สถานะแต่งงาน ระดับการศึกษา การสูบบุหรี่ การเสียค่ารักษาพยาบาลด้วยตนเองต่ำ และการมีความตระหนักถึงการดูแลสุขภาพต่ำ ในขณะที่การศึกษานี้กลับพบว่า การใช้บริการผู้ป่วยในไม่มีความสัมพันธ์กับเพศ อายุ ระดับการศึกษา และรายได้รวมของครัวเรือน ส่วนการสูบบุหรี่อาจจะทำให้มีการใช้บริการผู้ป่วยในที่สูงขึ้น

ดังนั้น รัฐบาลควรจะเพิ่มการจ่ายเงินคืน ให้เงินทดแทน และก่อตั้งกองทุนสำหรับผู้ป่วยที่ยากจนหรือสูงอายุ รวมถึงให้การศึกษาแก่ผู้สูงอายุอย่างต่อเนื่อง ซึ่งจะมีผลดีต่อการใช้บริการสาธารณสุข

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5785633329 : MAJOR HEALTH ECONOMICS AND HEALTH CARE MANAGEMENT

KEYWORDS: ELDERLY PEOPLE / HEALTH CARE UTILIZATION / PREDISPOSING FACTORS / ENABLING FACTORS / NEED FACTORS

YU ZHOU: FACTORS AFFECTING HEALTH CARE UTILIZATION AMONG ELDERLY PEOPLE IN RURAL AREAS IN BAYANNAOER CITY, INNER MONGOLIA, CHINA. ADVISOR: ASST. PROF.CHANTAL HERBERHOLZ, Ph.D., 114 pp.

The research topic focuses on factors affecting health care utilization among elderly people in the rural areas of one prefecture level city in Inner Mongolia Autonomous Region, namely Bayannaoer City.

This study uses data from a cross sectional survey, conducted by the China Medical Board, Inner Mongolia Medical University, in 2014. 1233 elderly people from 766 households were included, association between predisposing, enabling, and need factors and rural elderly people's health care utilization, was analyzed using zero-truncated Poisson regression and zero-inflated Poisson regression model with OPD services utilization and IPD services utilization as dependent variable respectively. OPD services utilization includes the use of health care services at village clinics, township clinics and county hospitals.

Among elderly people, higher outpatient services utilization is associated with being male, married, educated, smoking, lower out-of-pocket expenditure, and poor perceived physical condition. Inpatient services utilization is not associated with gender, age, education, total household gross-income in this study. Smoking may cause higher IPD services utilization. Government should increase reimbursement rate, provide medical subsidy and set up funding for poor or elderly people, creating a continuum of quit educational among elderly is better for elderly people's health care utilization.

Field of Study:	Health Economics and	Student's Signature	....
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LIST OF ABBREVIATIONS

CBHI   Community-based Health Insurance

CHNS   China Health and Nutrition Survey

CMB   China Medical Board

IPD   In-Patient Department

IMF   International Monetary Fund

MFA   Medical Financial Assistance

NBS   National Bureau of Statistics

NCD   Non-Communicable Diseases

NRCM   New Rural Cooperative Medical scheme

OOP   Out-Of-Pocket expenditure

OPD   Out Patient Department

PPP   Purchasing Power Parity

PHI   Private Health Insurance

PRC   People's Republic of China

SHI   Social Health Insurance

UEBMI   Urban Employee-Basic Medical Insurance

URBMI   Urban Residents-Basic Medical Insurance

WHO   World Health Organization

CHAPTER I

INTRODUCTION

1.1. Problem and significance

The research topic focuses on factors affecting health care utilization among elderly people in the rural areas of one prefecture level city in Inner Mongolia Autonomous Region, namely Bayannaoer City. Baynanaoer City is chosen because among the permanent population in that place, growing percentage of elder people facing a serious of health problems. Wuyuan is one of the counties in Bayannaoer, it was identified as a comprehensive reform of primary health care experimental contact point in Inner Mongolia. Early in May 2011, Wuyuan County began implementing the "appropriate mode to build and evaluate integrated management of rural health services, improve the capacity of health services and pastoral areas in Inner Mongolia" Project (CMB project). 19 township clinics and 98 village clinics make contract on "Rural health services integrated management agreement", and 191 rural doctors signed on "Integrated management of the employment contract". Assessment work focus on quality of service, the number of services population and the evaluation of service satisfaction, finally, comprehensive evaluation index defined as good, qualified, unqualified (HAFP, 2012). The study in that area can demonstrate the rural elderly people's health care services using situation, and give the example to primary health care reform in other places in Inner Mongolia.

Topic of health care utilization becomes popularized all over the world. Elderly

people in rural areas need policy support and policy makers focus, especially on the

perspective of health care. A society is defined to be aging society when aging

population over 60 years old up to 10 percent, or over 65 years old reach to 7 percent.

Aging population is happening in nearly all the countries of the world, aging society

in certain perspective results from decreasing mortality, and fertility decline. The

global elderly people (aged 60 years and above) increased from 9.2% in 1990 to 11.7%

in 2013 and will continue to grow for higher proportion by 2050, reaching to 21.1%

(UNNY, 2013). China also entered into aging society in 2000, when over 60 years old

and over 65 years old among total population reached 10.5% and 7.0% respectively

(Wang, 2009). By the end of 2013, the proportion of Chinese aged 65 years old and

above had reached 9.7% of the total population, increased from 7.0% in 2000 to 9.7%

in 2013 (NBS, 2013). According to demographic forecasts, this proportion is expected

to rise to 30% by 2030 (UNNY, 2009). Total population aged 65 years old and above

reached 7.56% in 2010. Bayannaoer city is one prefecture-level city of Inner

Mongolia, population around 1.67 million, and population aged 65 years old and

above reached 7.70%, rose 2.53 percent when compared to the fifth population census

in 2000 (NBS, 2010).

As a result of demographic changes, there did existed health care demand

outstripping supply, and it is the main constrain for health care services use among

elderly people in China. There are 62 million elderly experiencing body pain and 100 million having hypertension, lacking of communicate centers, palliative care and long-term care facilities for health care services provide. Shortage of nurses, physiotherapists, and social workers make lower services accessibility (Yates, 2014).

According to the data provided by Inner Mongolia Autonomous Region Bureau of Statistics in 2010, residents in rural areas is around 10.99 million, 1.16 billion rural population was classified as minimum standard of living residents (NBS, 2010). As a result of family planning program carried out in 1970s, the fertility declined, and now, children constitute a very smaller proportion of total population, aging population growing in absolute share of the population (Rosenberg, 2010).

The elderly are not a homogenous group whose status, access to services and need are similar (Kim, 1995), therefor it is not enough to look at old versus young. But instead different age groups of elderly should be considered. Chronic diseases are now among the most common and costly health problems worldwide including China (WHO, 2014). An estimated 66% of the total Chinese health burden is expected to be in older Chinese adults by 2030 (Suzman, 2008).

Inner Mongolia, especially in Bayanaoer, elderly people facing the problem that demand outstripping supply, weak management in referral system caused that low health care utilization at primary level health facilities (NBS, 2010). This study will include predisposing factors, enabling factors and need factors to analysis the effect of

elderly people's health care utilization. Health care utilization usually to use medical administrative data banks to analyze health services utilization. Measures always associated with health services utilization have often been expressed by outcomes and volume of health services. Yet, utilization is a multidimensional process (Donabedian, 1973). For example, to measure continuity health care services providing, use the number of visits to a physician per patient during a certain period of time. To measure productivity of services delivery, can use number of patient visits, number of visits in private clinics or patient billing, number of acts, number of patient or income, income per hour and so on (Tousignant, 2011).

Health care utilization theories and models having a long evolution story start from the first theory outlined by Parsons in 1951. Andersen's model for health care utilization refers to this study, and he provide the evidence that factors can determine or influence people's health care seeking behaviors, so it can influence the health care utilization in the end. The determinants of health care utilization mentioned above can be assigned into predisposing, enabling and need factors. Predisposing factors include demographic factors like age, gender, education, occupation, ethnicity, marital status and social factors like living arrangement. Enabling factors like household gross-income, distance to hospitals, time spending for reach to nearest health facility, health insurance scheme. Need factors like perceived illness severity, self-reported symptom (Andersen, 1995).

Social factors such as living arrangement can be included in elderly support mechanism, it can be made up of three parts, self-saving, family support, and government support (Ho, 2008). One related factors from government responsibility are New Rural Cooperative Medical scheme, NRCM is a scheme provides voluntary health insurance to who participate in this program against major illness by partially reimbursing health care expenditure. The elderly support ratios such like number of working-age adults per older person in the population are already at a low level in most countries; live alone or with their spouse only significantly increasing in most countries (UNNY, 2013). Trend of household saving rates in rural China is goes up in general. Elderly people live with adult child rate decrease year by year. Rate of live with spouse increase smoothly. The reason for elderly support from family members declined not only elderly people live with adult child rate decrease but also self-saving rate increase (Wang, 2009). One study conducted that elderly people live alone had a statistically positive association with mortality, living alone were more likely to die, have high possibility to get illness than normal living arrangement person (Ho, 2008). Elderly people can support themselves with their own labor income or self-saving (UNNY, 2013). In contrast, poverty in a number of developing countries, especially in remote part of one specific country, as we mentioned above, Inner Mongolia is not a highly developed area in China. Many studies conducted that economic factor significantly effect on elderly people's health care utilization. Higher

income increases the probability of visiting private doctors (Melnick, 2011), having an income in 2nd quartile was associated with 17% lower risk of visit to emergency department, income in the 3rd and 4rd quartiles meant a 19-21% lower risk of being hospitalized (Hailing, 2013).

There need more studies based on the previous studies among factors affecting elderly people's health care utilization. Evidence mixed on how individuals who seek health care chooses specific health care facility for treatment, shows people's preferences are variety. For example, a study finds that distance is a deterrent in the hospital choice of elderly Americans (Robbins, 1991), while another study finds that Dutch patients prefer larger hospitals regardless of location (Geest, 2007). Next, While (Robbins, 1991) also observe that patients with severe illness prefer treatment in regional hospitals, find that household income and treatment cost have stronger effects on hospital choice than the severity of illness or hospital quality in Nepal. They further find that sensitivity to costs and income is lower for men than women (Mills, 2003).

According to local context in Bayanaoer, there have several contributions for this study. First one is elderly people who lived alone was more likely to die, because lack in family members support, they may not be able to take care of themselves, when they get illness or feel uncomfortable, may not be able to reach to health care facility immediately. There have no study conducted rate of permanent residents may increase

or decrease the use of health care services, an elderly person living together with family members is better for their health, but the number of hospitalized is more or less than those who are living alone need to be conducted in this study. Second one is New rural cooperative medical scheme implement in rural China are varies and depend on local government policy, there have no study can provide evidence that how out-of-pocket under NRCM scheme in rural China influence people's health care utilization. The third one is this study will compare the use of health care services between older elderly with younger elderly.

1.2. Research questions

What are the factors affecting health care utilization among elderly people in rural areas in Bayannaoer City, Inner Mongolia, China?

1.3. Research objectives

The main research objective of this study is to analyze the factors affecting health care utilization among elderly people in rural areas in Baynanaoer City, Inner Mongolia, China.

The specific objectives are:

To examine the association between predisposing, enabling, and need factors and health care utilization of the elderly population and subgroups thereof in rural areas of Bayannaoer City.

To investigate factors affecting health care utilization at different types of health

facilities.

1.4. Scope of the study

This study doing analysis on factors affecting health care utilization among elderly people, and the household survey data was collected in January 2014. The household survey was conducted in Wuyuan county and Wulate county in Bayannaoer City, Inner Mongolia Autonomous Region, China. This secondary data set was provided by Inner Mongolia Health Policy Institute. The sample contains 1995 households, and 3837 respondents, of which 1233 are elderly. There 1233 elderly people are from 766 households. This study randomly selected one elderly person from each household, resulting in 766 elderly. This survey only collected data from permanent population who live in that place over six months.

1.5. Possible benefits

Because my topic focuses on health care utilization in rural China, so, it could be help to policy maker for policy formulation and implication. It provide operational foundation to whom decide to apply intervention in improve health care utilization. Policy makers may use the results of the study to reallocation health care resources in rural areas, to improve health care service accessibility. The study may help policy makers to adjust elderly support policies for insure people gain health care services when necessary.

1.6. Hypotheses

Higher out-of-pocket rate have lower OPD services utilization at village clinics.

Higher rate of permanent residents in household have higher OPD services utilization at village clinics.

Younger elderly people have higher OPD services utilization than older elderly people.

CHAPTER II

BACKGROUND

2.1. General information about China, Inner Mongolia and Bayannaoer

China, officially the People's Republic of China (PRC), is a sovereign state located in East Asia. It is the world's most populous country, with a population of over 1.35 billion. The national census of 2010 recorded the population of the People's Republic of China as approximately 1,370,536,875. About 16.60% of the populations were 14 years old or younger, 70.14% were between 15 and 59 years old, and 13.26% were over 60 years old. The population growth rate for 2013 is estimated to be 0.46% (NBS, 2010).

As of 2013, China has the world's second-largest economy in terms of nominal GDP, totaling approximately 9.469 trillion USD according to the International Monetary Fund. If purchasing power parity (PPP) is taken into account, China's economy is again second only to the United States, with a 2013 PPP GDP of 16.149 trillion USD. In 2013, its PPP GDP per capital was 11,868 USD, while its nominal GDP per capital was 6,959 USD. Both cases put China behind around ninety countries (out of 183 countries on the International Monetary Fund list) in global GDP per capital rankings (IMF, 2015).

Figure 1 China and other developing economies by (PPP)
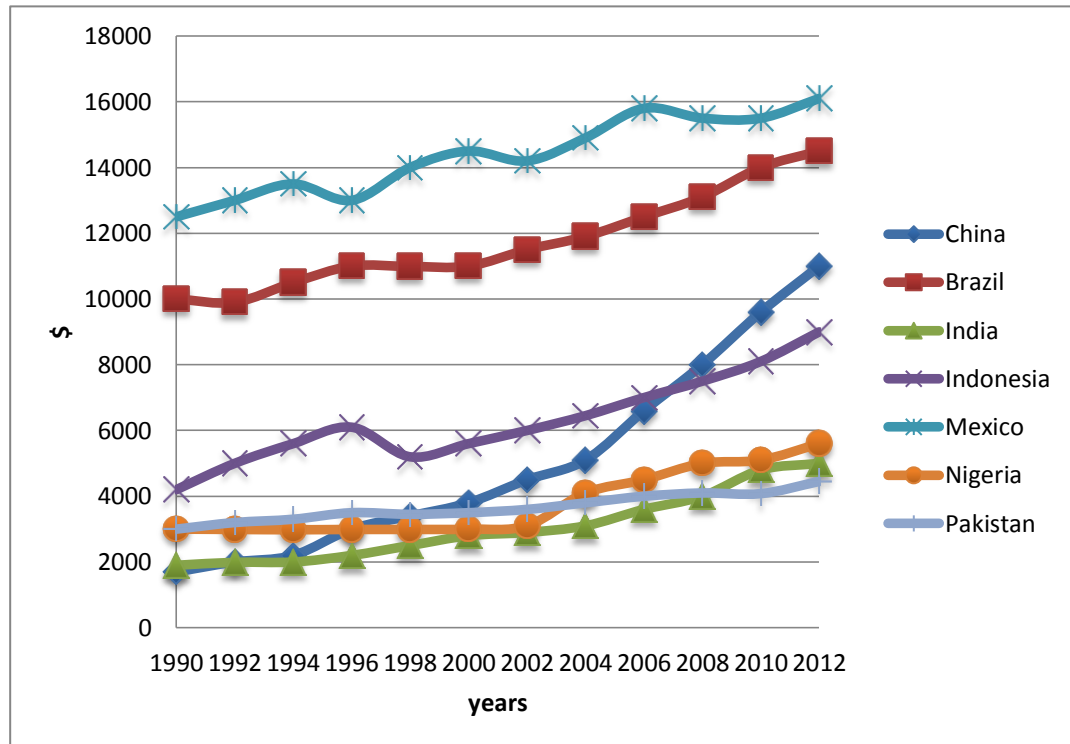
Source: World Bank, 2013

Inner Mongolia Autonomous region locate in northern part of China. The national census of 2010 recorded the population of Inner Mongolia as approximately 24,706,321. About 14.10% of the populations were 14 years old or younger, 78.34% were between 15 and 59 years old, and 7.56% were over 65 years old. 79.54% of total population is Han nationality, 17.11% are Mongolian nationality, and other national minorities are 3.36%. Bayannaoer city is one prefecture-level city of Inner Mongolia, population around 1.67 million in 2010, and compare to the fifth national census in 2010 decreased 2.56%, equal to 43885 people within 10 years (NBS, 2010).

2.2. Demographic transition in China, Inner Mongolia and Bayannaoer

As shown in figure 2, there have some data lost in the past 50 years, after 1990, the government did national census every 10 years. China became the ranks of aging societies in 2000, when the over 60 years old and over 65 years old among total population reached 10.5 percent and 7.0 percent, respectively. Both over-60 and over-65 were increased rapidly from 1990 to 2005. In Inner Mongolia, over 65 years old population was 7.56% in 2010 (NBS, 2010).

Figure 2 Trend of aging population in china, 1953-2005
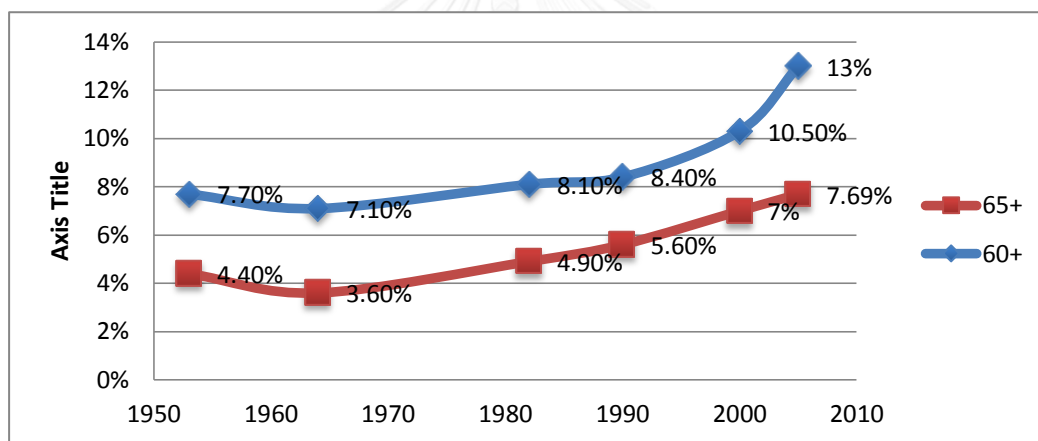
Source: National Bureau of Statistic 2010

When compares trend of aging population in rural areas and urban areas, aging phenomenon in rural areas went up more faster than urban areas, total aging population in rural areas is higher than urban areas and the gap between rural areas and urban areas is very large. The risk of chronic disease increases, and the burden of chronic disease among the aging people estimated to increase by 40% by 2030 (Wang, 2009).

Figure 3 Comparison of 65+ years and above aged population proportions in Inner Mongolia and the whole of China
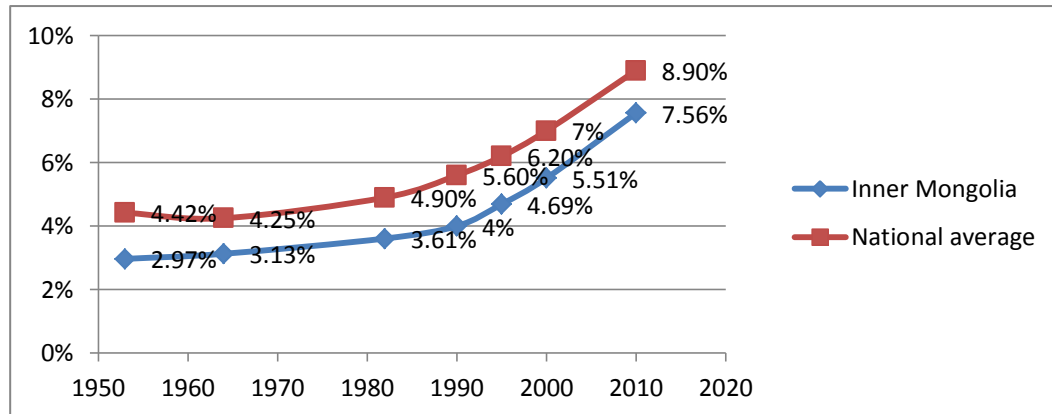
Source: NBS 2008, 2007b, 2001; Yao and Yin 1994.

As the figure shows, in 1953, 65 years old and above aged population proportion in Inner Mongolia was 2.97%, national average was 4.42%, it was 1.45% higher than previous figure. The blue line always lower than red line, it shows that Inner Mongolia aging of the population is a little bit slighter than national average level. But from year 1990, especially year 2000, compared the speed of aging population increase rate, Inner Mongolia was increasing faster than speed of national average (NBS, 2010). According to the data from National Bureau Statistics in 2013, natural growth rate in China is 4.92‰, result from 12.08‰ fertility rate and 7.16‰ mortality rate. Natural growth rate in Inner Mongolia equals to 3.36‰, calculated by 8.89‰ fertility rate and 5.62‰ mortality rate. In addition, Inner Mongolia Autonomous Region 65 years old and above total population increased 2.21%, 0-14 years old total population decreased 7.18% when compare to the fifth nation population census (NBS, 2010).

Figure 4 Forecast population proportion of China
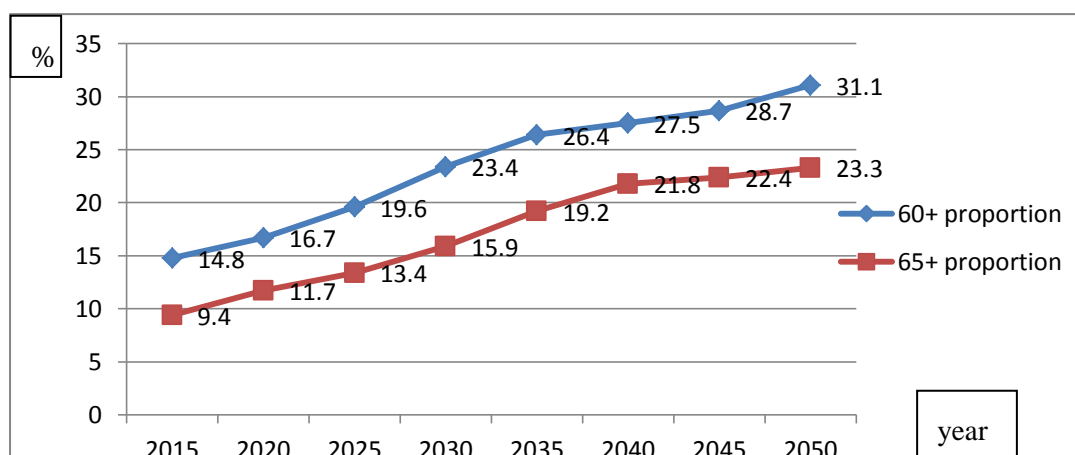
Table 1 Forecast population proportion

	60+ total	60+ proportion	65+ total	65+ proportion
2015	20657.3	14.8%	13190.1	9.4%
2020	23940.4	16.7%	16685.1	11.7%
2025	28498.4	19.6%	19418.6	13.4%
2030	34232.3	23.4%	23265.8	15.9%
2035	38639.8	26.4%	28132.5	19.2%
2040	40006.5	27.5%	31662.7	21.8%
2045	40006.5	28.7%	32320.2	22.4%
2050	44043.9	31.1%	33057.9	23.3%

Total aging population estimated continually increase in the following years. Proportion of Age interval in both 60 above and 65 above have significant increase year by year. As this study defined for aging population, the figure will reach to 31.1% in year 2050 (WPP, 2013).

Bayannaoer also facing aging society problems, over 60 years old population was 11.4% among total population, and over 65 years old population was 7.7% in 2010, increased 2.53% compared to year 2000. To be specific, 0.82 million from urban areas and 0.85 from rural areas among 1.67 million total population (NBS, 2010).

2.3 Inner Mongolia basic statistic on social security

Table 2 Inner Mongolia basic statistics on social security

Item	2009	2010
Total population (10,000 persons)	2458.2	2472.2
Total population in rural area (10,000 persons)	1145.5	1099.3
Total population in urban area (10,000 persons)	1312.7	1372.9
Minimum standard of living for residents		
Residents in rural area (10,000 persons)	121.08	115.57
Residents in urban area (10,000 persons)	87.47	85.37
Social security		
Basic pension insurance, person joined (10,000 persons)	411	431
Expense of insurance fund (100 million Yuan)	208.00	232.33
Unemployment insurance, persons joined (10,000 persons)	230	231
Beneficiaries (10,000 persons)	6.08	6
Expense of insurance fund (100 million Yuan)	8.31	7.21
Basic medical insurance, persons joined (10,000 persons)	805	886
Contributors of comprehensive arrangement for serious disease (10,000 persons)	330	353
Expense of insurance fund (100 million Yuan)	42.24	59.06
NRCM, persons joined (10,000 persons)	1202	1215
Revenue of medical insurance in rural (100 million Yuan)	12.90	19.14
Expense of medical insurance in rural (100 million Yuan)	13.39	18.66
Rate of medical insurance in rural (%)	97.36	92.76

Revenue of pension, unemployment, medical, work injury, maternity insurance fund (100 million Yuan)	344.91	387.64
Expense of pension, unemployment, medical, work injury, maternity insurance fund (100 million Yuan)	262.82	306.43
Balance of pension, unemployment, medical, work injury, maternity insurance fund (100 million Yuan)	309.8	387.6

Source: Inner Mongolia Autonomous Region Bureau of Statistics

Around 1,155,700 rural populations in Inner Mongolia being minimum standard of living residents and this value in urban area was 449,700 persons in 2010. Basic pension insurance covered the town of all kinds enterprise worker, private or individual-owned business, flexible employment personnel. Basic pension insurance, basic medical insurance, unemployment insurance, work injury insurance, and maternity insurance constitute the modern social insurance system. The balance of pension, unemployment, medical, work injury, maternity insurance total fund is positive in year 2009 and 2010 (NBS, 2010).

2.4. Health insurance scheme

China has three kinds of basic health insurance schemes in China. New rural cooperative medical system (NRCM) is a scheme provides voluntary health insurance to who participate in this program for against major illness by partially reimbursing、health care expenditure. Urban employee basic medical insurance is a mandatory health insurance to urban employee. Urban residents basic medical insurance is a voluntary health insurance as well, it provides insurance to children, students, elderly,

disabled, and other non-working urban residents. When compared the fraction of

coverage, NRCM is highest scheme among the three basic health insurance schemes

in China (Yao, 2010).

Table 3 Overview of the three main health insurance programs in China

Characteristic	New Rural Cooperative Medical Scheme(NRCM)	Urban Employee-Basic Medical Insurance (UEBMI)	Urban Residents-Basic Medical Insurance(URBMI)
Administration	County level(2176 countries)	Municipal level	Municipal level
Local government authority	Counties determines the deductible, ceiling, reimbursement, ratio, medical savings account. Same reimbursement rate for elderly people.	Wide variations across municipalities in eligibility, financing, benefits packages	Wide variations across municipalities in eligibility, financing, benefits packages
Date started	2003(Old rural cooperative medical scheme at village in place since 1950s	1998	2007 (79 pilot cities) 2010 target-all cities
Participation	Voluntary at household	Mandatory for individuals	Voluntary at household
Populations	Rural residents	Urban employed	Children, students, elderly, disabled, other non-working urban residents
Target	Est. 840 million	Est. 300 million	Est. 200 million
Current coverage	94.2% (2009)	67% (200million,end 2008)	60.4% (118 million, end 2008)
Revenues (billion RMB)	94.435 million RMB (13.9 billion USD) (2009)	270.9 billion RMB (39.8 billion USD)	15.4 billion RMB (2.3 billion USD)
Expenditures (Billion RMB)	92.292 billion RMB (13.6 billion	201.6 billion RMB (39.8 billion USD)	6.7 billion RMB (985 million USD)

USD)(2009)

Source of revenues in year 2009	100 RMB/year (2009) For western areas, the contribution is 40 RMB each from local and central government, and 20 from individuals, The central contribution to eastern provinces tends to be lower, compensated by higher provincial or municipal contribution	8% of employee wages:"6+2": 6% payroll tax on employers (ranging from 4 to 1% by municipality) and 2% employee contribution Medical savings accounts generally cover OP expenses, medicines (employer contribution + 30% of employee contribution)	Average 245 RMB for adults, 113 RMB for minors (pilots 2008). In 2008, the government contribution was at least 80 RMB/person, with a central level contribution to west and central areas of 40 RMB/person. Provincial contribution varies. The poor and disabled receive an additional 60 RMB per year (50% from central)

Source: World Health Report (2010) Background Paper, No 37 Sarah L Barber and Yao Lan

94% of rural residents had insurance coverage: 90% from NRCM and 4% from other social health insurance schemes. NRCM premium payment have subsidy from both local and central government. In 2003, total annual premium per person was 30 RMB, and 10 RMB from central government, 10 RMB from local government, and 10 RMB from registered residents. Along with the increase in coverage rate, the annual premium increased to 120 RMB, both central and local government charge 50 RMB for each individual registered residents and people who join NRCM only need to pay 20 RMB by their own. In the remote areas like western regions, the local government subsidy a higher proportion of premium. Poor households have support from the Medical Financial Assistance (MFA) program.

Table 4 Inner Mongolia NRCM scheme basic information introduction

	New Rural Cooperative Medical Scheme		
Premium	Financing standard: In total no less than 450 RMB/person/year, in addition, central government subsidy 252 RMB/person/year, autonomous region financial aid 54 RMB/person/year, local government assistance fund no less than 27 RMB/person/year, self-paying no less than 90RMB/person/year.		
Compensate	Registered people for second hospitalized within one year in the same level heath facility can have 50% decline of deductible.		
Deductible & Reimbursement rate	Types of health facility	Deductible （RMB）	Reimbursement rate （%）
	Township level health facility	150	90
	Second-class hospital and below in county	400	80
	Third-class hospital in county	600	75
	Second class hospital and below in prefecture city	600	70
	Third-class hospital in prefecture city	1000	60
	Autonomous region level tertiary hospital	1500	60
	Hospital in outside Inner Mongolia	2000	55
Ceiling	Comprehensive arrangement for serious disease up to 120000 RMB		
OPD	Outpatient service unified planning, implement globe budget. Registered people can have no less than 50% reimbursement rate in township level health facility, village clinics, and community health center.		

Source: Inner Mongolia department of health and family planning commission

New rural cooperative medical scheme implement in rural China are varies and

depend on local government policy. NRCM scheme covered over 90 percent of rural

aging populations in Bayannaoer city in Inner Mongolia. Elderly people have the same premium with others, in total no less than 450 RMB per person per year, central government, autonomous region and local government share the premium together, self-paying no less than 90 RMB per person per year. Reimburse ceiling for inpatient up to 120 thousand RMB. Deductibles in Third-class hospital in prefecture city is 1000 RMB, in autonomous region level tertiary hospital is 15000 RMB, and for hospital in outside Inner Mongolia need reach to 2000 RMB. Reimbursement rate in township level health facility increase to 90%, reach to 80% in second-class hospital and below which located in county areas, 75% for third-class hospital in county, 70% for second-class hospital and below in prefecture city, 60% for third-class hospital in prefecture city and autonomous region level tertiary hospital, and 55% for hospital in outside Inner Mongolia (Bai, 2013).

2.5. Health care resource in Inner Mongolia and the whole of China

By end of 2013, number of health technical personnel up to 7.211 million, including 2.795 million assistant practicing doctors, 2.783 million registered nurses and 1.633 relative health personnel. In 2013, medical technical personnel per thousand populations were 5.27 among all over the nation, but the figure in Inner Mongolia was 6.01. Licensed (assistant) doctors per thousand populations were 2.04; this value in Inner Mongolia was 2.52. Registered Nurses per thousand populations were 2.04; this value in Inner Mongolia was 2.12. All the figures in Inner Mongolia

were higher than nation data, but there have a significant gap when compared rural areas and city areas, health care resource distribution were not in balance (CSP, 2010).

Figure 5 The national health and technical personnel (unit 10000)
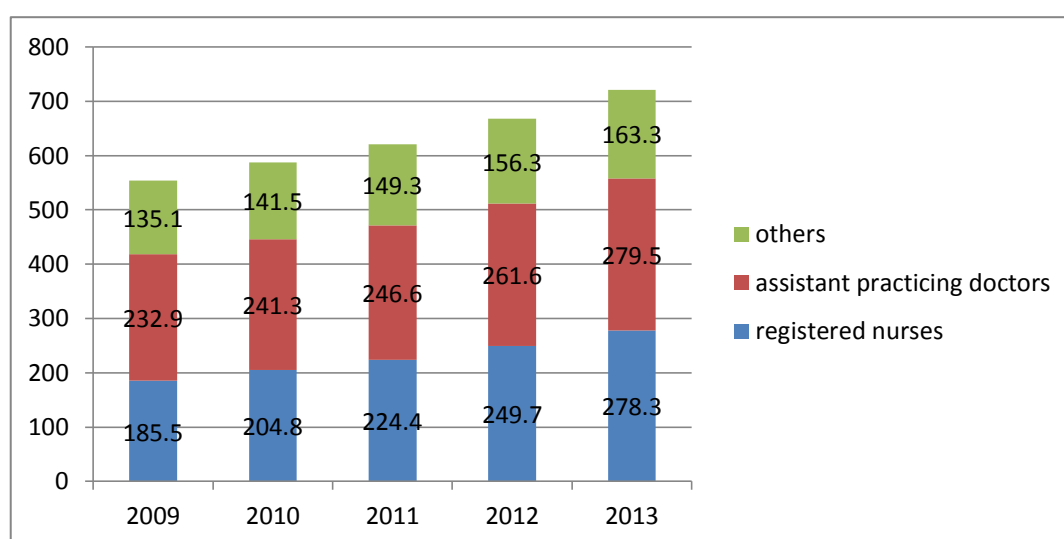
Source: The national health and family planning commission

Table 5 Medical technical personnel per 1000 persons

	Medical Technical Personnel (person)			Licensed (Assistant) Doctors (person)			Registered Nurses (person)		
	Total	City	Rural	Total	City	Rural	Total	City	Rural
Nation	5.27	9.18	3.64	2.04	3.39	1.48	2.04	4.00	1.22
Inner Mongolia	6.01	11.74	4.08	2.52	4.59	1.82	2.12	4.91	1.19

Source: The national health and family planning commission

2.6. Elderly support mechanism and relevant policy

In general, elderly people have three kind of support for their daily life. From family support, government support and self-saving way to take care themselves. Pensions are the most significant source of support for the urban elderly, but in rural areas, only a tiny part of residents are civil servants, soldiers, teachers, and village cadres. In contrast, labor income is more significant source of old age support in rural areas. Family support is a very important factor for both rural and urban elderly support source. China also have Dibao for residents, Dibao means minimum living allowance (Wang, 2009).

Table 6 Primary source of support for China's elderly (2005, %)

Source of support	Urban			Rural		
	Average	Male	Female	Average	Male	Female
Labor income	13.0	18.4	7.9	37.9	48.5	27.5
Pensions	45.4	56.9	34.6	4.6	8.1	1.3
Dibao	2.4	1.8	2.9	1.3	1.8	0.9
Insurance and subsidy	0.3	0.3	0.2	0.1	0.2	0.1
Property income	0.5	0.5	0.5	0.2	0.2	0.1
Family support	37.0	20.7	52.3	54.1	39.3	68.5
Other	1.5	1.4	1.6	1.8	2.0	1.7

Source: NBS 2006.

Number of urban residents receiving minimum living allowances around 20.6 million, number of rural residents receiving minimum living allowances around 53.9 million, around 784,000 Inner Mongolia urban residents receiving minimum living

allowances, around 1,253,000 Inner Mongolia rural residents receiving minimum living allowances in year 2013. Insurance and subsidy, property income also are the resource of elderly support. Bayannaoer focus on construct the system of social old-age service, according the data provided in 2011. There had 37 pension institutions and 5,197 beds in total, 2,733 adoption elderly people was only 47.15% compared to the number of elderly people should adopted in. And only 8 pension institutions located in countryside (NBS, 2010).

People's thinking way had changed year by year, because of the single child policy came up with in China, bring up sons to support parents in their old age is not a popular way at all. Elderly people try to find another way to reimburse themselves in now a day. Saving money for live out their life in retirement is a better way than depend on their children. As figure 6 shows, we can find that saving rate both in rural areas and urban areas have a rise trend in the past 30 years between 1978 and 2008, and the rural household saving rate was higher in most years than the urban rate, rising from 13.1 percent to 23.1 percent over the period and peaking at 28.6 percent in 1999. (Wang, 2009)

Figure 6 Trends of Household Saving Rates in Rural and Urban China
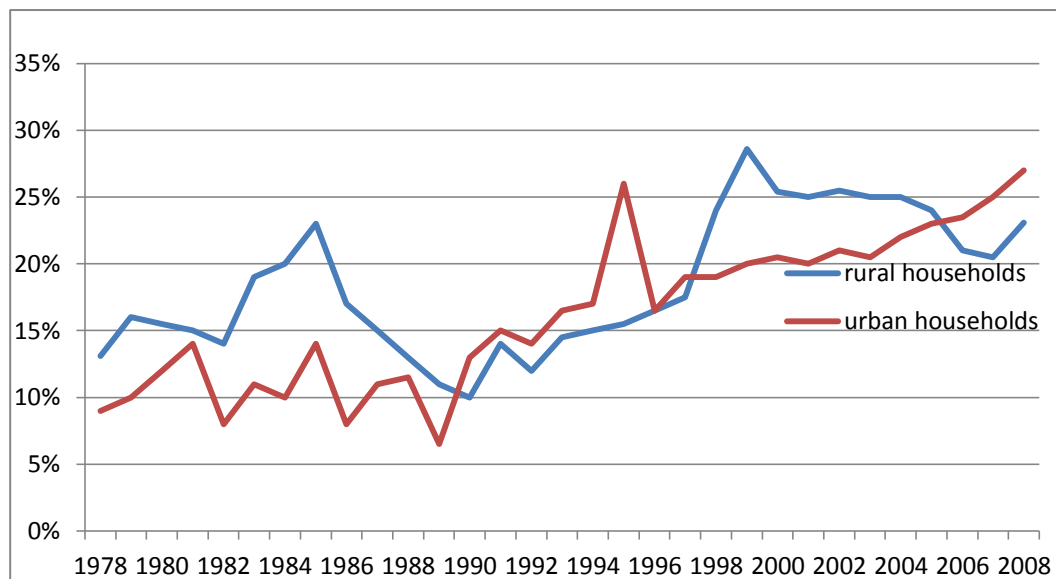
Source: NBS 2005a, 2009.

Note: saving = disposable income (or net income) – consumption expenditure

There have a big difference saving behavior between rural residents covered and not covered by social insurance, and residents have social insurance have lower saving rates than residents without social insurance. Figure 7 shows the saving rates of rural residents with and without social insurance from 2003 to 2006. The provision of social insurance can make individuals and household feel more comfort and secure about spending, which helps reduce household savings. Therefore, it is not surprising that rural households receiving social insurance benefits have a lower saving rate compared with those without benefits. (Wang, 2009)

Figure 7 Saving Rates of Rural Households with and without Social Insurance
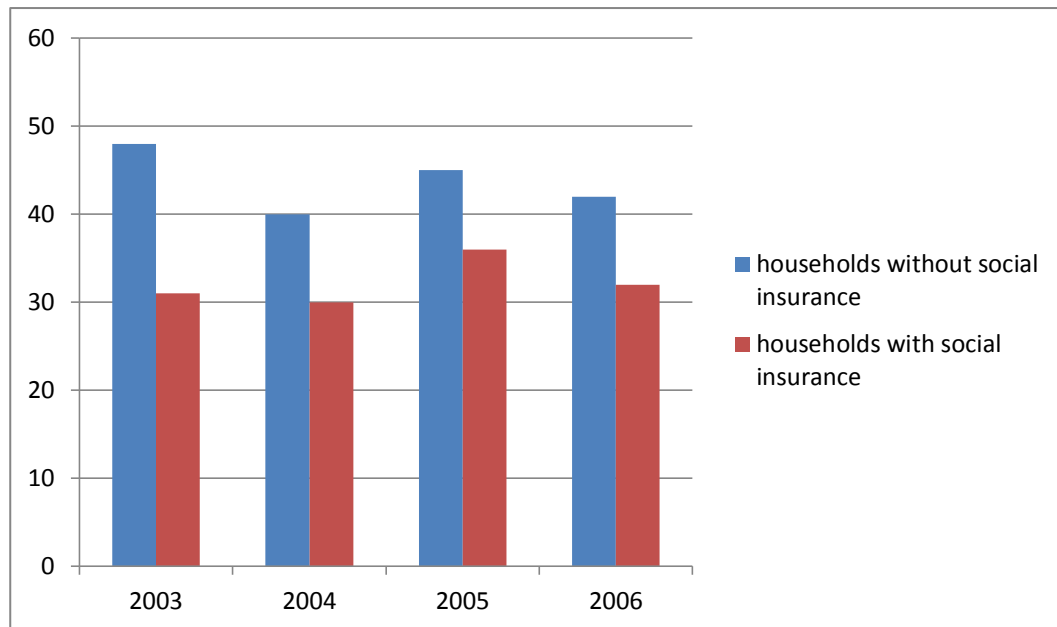
Source: RCRE, MOA, Repeated Household Data, estimated by Cai, Giles, and Wang 2009.

Living arrangements trend is another way to analysis elderly people's support situation. The proportion of elderly people in rural areas living with their children has declined rapidly, both in the long-term and in recent years. Figure 8 shows that in the China Health and Nutrition Survey (CHNS) from 1991 to 2006, nearly 70 percent of elderly in rural areas lived with an adult child in 1991, but by 2006 this share had fallen to just over 40 percent. (Wang, 2009)

Figure 8 Living arrangements of China's rural elderly
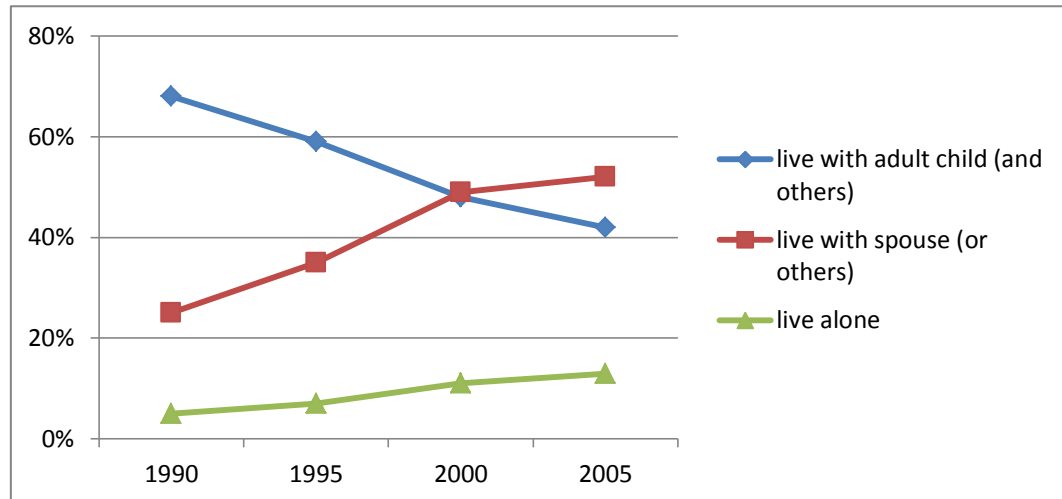
Source: China Health and Nutrition Survey (CHMS), various years

As figure 9 shows, although co-residence with adult children was less than 60 percent during the 2003 reference period among those 60 to 70 years of age, more than half the elderly living alone or with a spouse in this age range had at least one adult child living in the village. (Wang, 2009)

Figure 9 Living arrangements of China's rural elderly by age
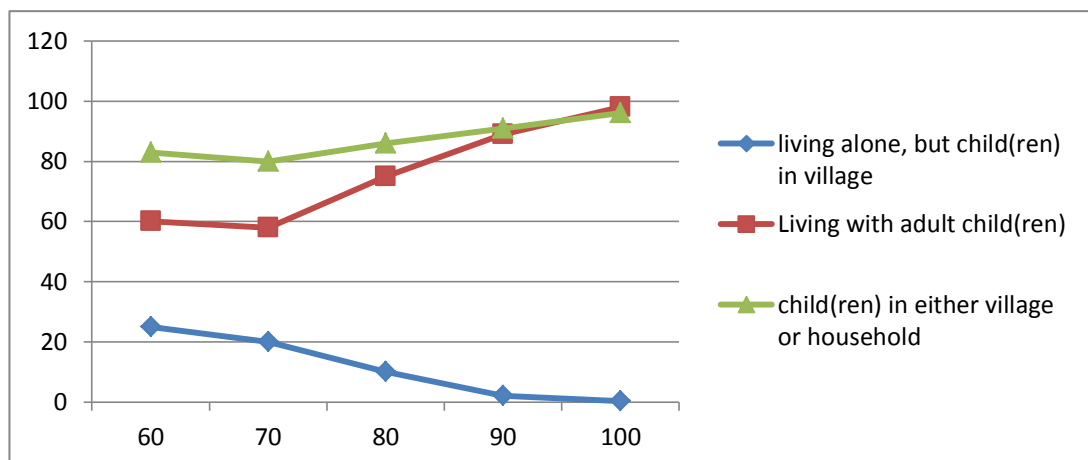
Source: RCRE 2004.

2.7. Major causes of death

Stroke was the main causes of death on Chinese in 2012, there have 23.7 percent death caused by stroke, and killing 2331.3 thousand people in that year. Ischemic heart disease is second main cause of death, 1505.3 thousand people killed by it. People killed by chronic obstructive pulmonary disease occupied 10.3% of total number of death. Trachea, bronchus and lung cancers, liver cancer, stomach cancer, road injury, hypertensive heart disease, diabetes mellitus and lower respiratory infections ranking from 4 to 10. Cause of death by ischemic heart disease and liver cancer increased their rank position when compared with 2000 data (WHO, 2014).
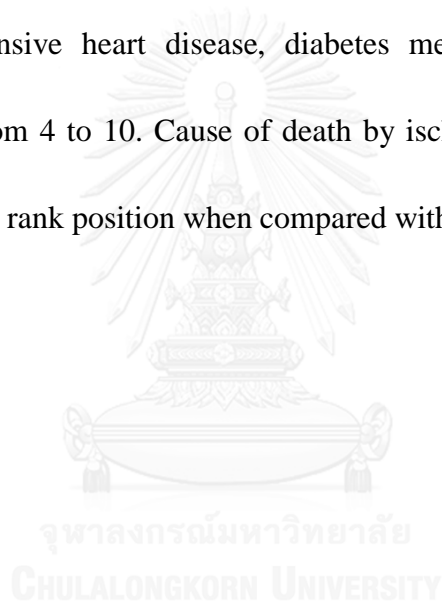
Table 7 Top 10 causes of death in China (2012)

	No of deaths (1000)	Crude death rate 2000-2012	Change in rank 2000-2012
Stroke (23.7%)	2331.3		◆
Ischemic heart disease (15.3%)	1505.3		▲
Chronic obstructive pulmonary disease (10.3%)	1012.9		▼
Trachea, bronchus, lung cancers (6.1%)	595.8		◆
Liver cancer (3.9%)	380.7		▲
Stomach cancer (3.3%)	324.4		▲
Road injury (2.8%)	279.2		▲
Hypertensive heart disease (2.5%)	248.2		◆
Diabetes mellitus (2.3%)	226.6		▲
Lower respiratory infections (2.1%)	207.9		▼
Rank decreased ▼ increased ▲ no change ◆			

Source: world health organization.

Table 8 Death rate of major disease in rural China (2013)

Category of disease	Crude mortality rate (1/100000)			Percentage (%)			Rank		
	T	M	F	T	M	F	T	M	F
Cerebrovascular disease	150.2	166.9	132.7	22.9	22.1	24.2	1	2	2
Malignant tumor	146.7	189.2	102.3	22.4	25.0	18.6	2	1	3
Heart disease	143.5	149.4	137.4	21.9	19.7	25.0	3	3	1
Disease of the respiratory system	75.3	82.4	68.0	11.5	10.9	12.4	4	4	4
Eternal causes of injury and poison	57.1	78.2	35.1	8.7	10.3	6.4	5	5	5
Disease of the digestive system	15.2	19.7	10.5	2.3	2.6	1.91	6	6	7
Endocrine, Nutritional & Metabolic disease	11.8	10.5	13.1	1.8	1.4	2.4	7	8	6
Infectious disease(not including respiratory tuberculosis)	7.94	10.8	4.9	1.2	1.4	0.9	8	10	7
Disease of the genitourinary system	6.96	8.18	5.68	1.06	1.08	1.03	9	9	9
Disease of the nervous system	6.81	6.98	6.62	1.04	0.92	1.21	10	1	0 8

Source: NBS 2013

Table 9 Death rate of major disease in Linhe district of Bayannaoer (2013)

Diseases	Male			Female			Total		
	deaths	Mortality rate	ratio deaths		Mortality rate	ratio	deaths	Mortality rate	ratio
Circulatory system diseases	879	331.1	45.9	39	155.0	48.7	1268	245.5	46.8
Malignant	314	118.3	16.4	14	57.4	18.0	458	88.7	16.9
Respiratory diseases	276	104.0	14.4	11	46.2	14.5	392	75.91	14.5
External causes of injury and poisoning	251	94.55	13.1	52	20.7	6.5	303	58.67	11.2
Endocrine, nutritional and other metabolic diseases	37	13.9	1.9	27	10.8	3.4	64	12.4	2.4
Genitourinary system diseases	28	10.6	1.5	26	10.4	3.3	54	10.5	2.0
Infectious and parasitic diseases	31	11.7	1.6	12	4.8	1.5	43	8.3	1.6
Digestive diseases	36	13.6	1.9	3	1.2	0.4	39	7.6	1.4
Musculoskeletal and connective tissue disorders	617	6.4	0.9	15	6.0	1.9	32	6.2	1.2
Nervous system diseases	19	7.2	1.0	6	2.4	0.8	25	4.8	0.9

Source: Centers for Disease Control

CHAPTER III

LITERATURE REVIEW

Literature review is aims to define the key words from former research which relevant to my study. To know the exactly meaning of health care utilization, support mechanism, and chronic disease. This part also shows the theoretical framework about health care utilization. Make conclusion from other research's work to see the effects on elderly people's health care utilization in terms of health determinants (risk behaviors factors), socio-demographic factors, economic factors, health insurance related factors, elderly support mechanism (living arrangement),etc. It also studies from previous papers research on factors affecting health care utilization; find the methodology they used to analyze this topic.

3.1 Definition of relevant key words

3.1.1 Definition of health care utilization

In recent years, many books and papers published research topics relative to health care utilization. Utilization is defined as the health care system's outcome of the interaction between health care workers and patients (Donabedian, 1973). In economic terms, it same to the production of health services and, more specifically in one study on economics of health and health care, to the production of health services by physician (Stano, 2006). It is usually to use medical administrative data banks to

analyze health services utilization. Measures always associated with health services utilization have often been expressed by outcomes and volume of health services. Yet, utilization is a multidimensional process (Donabedian, 1973).

Several studies showed differences perspectives on services utilization. In most cases, it can be assessed from two perspectives, which are patient's and the physician's perspectives. The patient's perspective based on patients reported services. Physician's perspective is more objective, it depends on how much medical services offered by physicians to patients and recorded in databases (Tousignant, 2011).

3.1.2 Definition of support mechanism

Support mechanism is a psychological term for something which you depend on to keep you healthy and sane in your day to day life. Support mechanisms can provide stability, or act as outlets for pent up emotions. The relationship between internal participants should be stable as well. If any of them becomes more and more important, others will lose the proportion for their responsibility. Some policy will lean to disadvantaged groups if they lack of family members support (Chang, 2009).

There exist major differences in primary sources of support for old age in rural and urban China. Pensions are the most important component source of support for the urban elderly residents, but have small proportion for rural elderly resource of support, because of the occupation component in rural areas is quite different from urban areas. Majority residents in rural areas working as farmers, small part of them

are civil servants, village carders, soldiers, teachers, etc. In contrast, labor income is much more significant source of support for rural elderly, 37.9% of total support resource from labor income in year 2005. Family support, property income, minimum living allowance, rural households with centralized livelihood guaranteed in five aspects also the kind of support mechanism (Wang, 2009).

3.1.3 Definition of chronic disease

It is defined by World Health Organization that non-communicable diseases (NCD), also named chronic diseases, this kind of disease are not passed from person to person. They are long-term survived by people who got the disease and generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (like stroke and heart attacks), chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma), cancers and diabetes. (WHO, 2014)

3.2 Theoretical framework

Figure 10 Andersen and Newman framework of health care services utilization

ENVIRONMENT POPULATION CHARACTERISTICS HEALTH BEHAVIOR OUTCOME

ENVIRONMENT	POPULATION CHARACTERISTICS	HEALTH BEHAVIOR	OUTCOME
Health care system ↕ External Environment	Predisposing characteristic: Demographic factors like age, gender, social structure measured by education, employment, ethnicity, and health beliefs. Enabling resource: income, health insurance status, access to source of health care, personal health care expenditure Need factors: causes of health care services use (perceived health condition)	Personal Health Practices ↕ Use of Health Services	Perceived Health Status ↕ Evaluated Health Status ↕ Consumer Satisfaction

Source: Ronald M. Andersen, 1995

This framework is to discover conditions that have either positive or negative function on health care utilization. When thinking about whole health care services utilization, it should be depends both on health care system and external environment. When thinking about an individual patients to seek or access and use of health care services is considered to be a function of three characteristics. Those are predisposing characteristics, enabling resources, and need factors. Among the predisposing characteristics, demographic factors such as age and gender, social structure measured

by education, employment, and ethnicity, health beliefs are attitude, values and knowledge about health care services. Enabling factors to show health care service's accessibility and availability, measured by income, health insurance status, and access to health care, travel, extent and quality of social relationship, waiting time and so on. Need factors means the causes of health care services use. Those factors can determine or influence people's health care seeking behaviors, so it can influence the health care utilization in the end. Perceived means how people view their own general health and functional state, as well as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to seek professional help. Evaluated represents professional judgment about people's health status and their need for medical care (Andersen, 1995).

Health care utilization theories and models having a long evolution story start from the first theory outlined by Parsons in 1951, second is Mechanic's general theory of help seeking takes psychological approach to health care utilization in 1965, third one is Schuman's stages of illness and medical care in 1978, fourth is the health belief model from Rosenstock, Stretcher, and Becker in 1994, discusses the individual's action to treat and prevent disease (Rebhan, 2008).

In 1968, Andersen developed a model of health care utilization which looks at three kinds of categories of determinants, predisposing characteristics, enabling

characteristics, and need based characteristics. In 1970, he put health care system into

the model and during 1980's-1990's; Andersen's model was again reversed to include

health behaviors in to a linear relationship graph. Health outcomes include perceived

health status, evaluated health status, and consumer satisfaction (Rebhan, 2008).

This framework shows people's health seeking behavior, in terms of type of

health care facilities, it is good for understand how does people seek health care

(Simpson, 2006).

3.3 Health care utilization and predisposing factors

This section will find the disposing factors affecting health care utilization from

previous study, including age, gender, education, occupation, ethnicity, health belief.

Identify what disposing factors significantly effect on people's health care utilization,

data used for analysis and what kind of methodology can be used for this topic.

Demographic factors influence outpatient health services conducted in many

countries already. A population based study identifies factors that lead people to see a

doctor in Brazil and assess differences between socioeconomic groups. They chose

measured within two months of the day of the interview as health care utilization

outcome. Socioeconomic variables included education years, and unemployment.

Demographic variables were age, gender, race and marital status. For social support, it

includes friends and relative support (Barros, 2003). Nsowah-Nuamah did one study

in 2015 on impact of socioeconomic status on health and healthcare utilization,

applied logistic regression to estimate for perceived health status, and binary logistic for functional limitation and health care utilization. As a result of aged women experience worse health than men, women have significantly higher rates of hospitalization and outpatient encounters. This study using data from the World Health Organization global Aging and Adult Health (SAGE) conducted during 2007-2008 and included 4,770 respondents aged 50 above and 803 respondents aged 18-49 in Ghana (Nuamah, 2015).

One study conducted among European elderly in 2014, use data from the Survey of Health, Ageing and Retirement in Europe, collected among 22,000 Continental Europeans aged 50 years old and above. Found that reduced cognitive capacity can cause barriers in services access; high education gradients among Austrian men have low levels of health care demand, but in Swedish, only small positive education gradients for most levels of health care (Maurer, 2006).

One community based cross-sectional study focus on health care utilization on maternity and child. They use regression model to assess the influence of social-demographic characteristics on MCH service utilization. Education level, income, age is main factor effect on people's health care utilization. Women with secondary education and above, women in households earning more than 1 US Dollar in a day and women in employment or operating a business were more likely to utilize MCH services. The study was conducted in Handignur Primary Health Centre (PHC)

from June 2008 to December 2008 in India (Mallapur, 2014).

According one register-based study conducted in Swedish for distance to hospital and socioeconomic status influence secondary health care use. It was found out a higher number of emergency department visits, secondary health care costs, and numbers of hospitalization days were all associated with higher age, shorter distance to hospitals, female gender. The population of this study consisted of people over age 19 living in Östergötland County, which had about 400,000 inhabitants in 2006. Data were obtained from the Care Data warehouse in Östergötland. Independent variables were comorbidity, gender, age, distance to hospital, educational level, and disposable income. Individual with education level 4 had 12% higher odds of incurring secondary health care costs. The use of secondary health care services for people who living over 40 km from hospital incurred 9% lower secondary health costs and number of hospitalization days compared with those living closest to hospital (Hailing, 2013).

In one study, Ho did in 2008 on living arrangements and health care utilization in Taiwan, a joint survey conducted by the Bureau of Health Promotion, Department of Health and the Population Studies center, University of Michigan. A panel data design was applied and the study conducted from year 1996 to 2003, contained 2,462 respondents from 331 cities, townships and rural areas, who were 50 years old and above. This paper using multiple stepwise regression conducted that living

arrangement variable (living alone) had a statistically positive association with mortality, living alone were more likely to die, followed by those living with children only and those living with a spouse only (Ho, 2008).

One study conducted by Azari in 2006 on the influence of alcohol abuse, and smoking on utilization of health care services, included 509 new adult patients from primary care residents at the University of California, Davis Medical Center Ambulatory Care Center, regression analysis used in this study and found that obesity have significant effect on the utilization of primary care, alcohol abuse predicted the number of visits to the emergency department (p=0.0428), smoking also significantly related to health care utilization (Azari, 2006).

We can conclusion that women have significantly higher rates of hospitalization and outpatient encounters, but aged women performed worse health care service utilize than men. Women with secondary education and above, women in employment or operating a business were more likely to utilize health care services, and higher number of emergency department visits, secondary health care costs, and numbers of hospitalization days were all associated with higher age, shorter distance to hospitals, female gender. Obesity, smoking, alcohol have significant effect on the utilization of primary care, and emergency health services. Living alone was more likely to die, but have no study conducted number of permanent residents may increase or decrease the use of health care services. And focus on elderly people, no evidence showed older

elderly and younger elderly health care utilization's comparison.

3.4 Health care utilization and enabling factors

This section will find the enabling factors affecting health care utilization from previous study, including income, health insurance status, and access to source of health care, personal health care expenditure. Identify what enabling factors significantly effect on people's health care utilization, data used for analysis and what kind of methodology can be used for this topic.

In terms of economics factors, it can be measured by gross-income, total expenditure or self-assessment economic level. Majority researchers classify the population into different quintile groups.

According to Zielinski's study in 2013, having an income in the 2nd quartile was associated with 17% lower risk of visit to emergency department. Income in the 3rd and 4th quartiles meant a 19-21% lower risk of being hospitalized (Hailing, 2013).

According to Melnick's study in 2011, expanding health insurance to increase health care utilization, it used the data from the third wave of the Indonesia family life survey (IFLS3), collected by the RAND corporation together with various Indonesian agencies in 2000. Income index instead by per person per month total consumption expenditure. The study found that higher income increases the probability of visiting private doctors, but it have no effect on other health care services' utilization (Melnick, 2011).

One study used a two-part model to analyze outpatient care. The first part is a binary equation modeling the probability of any use of outpatient service; For the second part, 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 is employed to predict the probability of being hospitalized. All analyses are weighted and marginal effects are reported (Simpson, 2006).

Out-of-pocket payment after being given full information about the differential between co-payments across different medical tiers by the group facilitator, participants who usually visit physician clinics regarded their out-of-pocket payment as cheap, and most participants who did not visit medical centers thought out-of-pocket payments at medical centers were expensive. Despite being expensive, some participants visiting regional hospitals and medical centers thought the out-of pocket payments they paid were still acceptable. Hypertensive patients from different tiers of medical facilities in the monitoring sites were invited to do the survey in focus groups from October 2008 to January 2009. 40 Participants were separated into 9 groups. The physicians' reputation, tiers of medical facility, and the convenience of transport and registration are the three major reasons why patients accessed health care services. OOP proportion not as important as the main reason for patients make

decision, all participants thought their current out-of-pocket payments were affordable (Wu, 2012).

There have a systematic review of studies on the impact of Social Health Insurance (SHI), Private Health Insurance (PHI), and Community-based Health Insurance (CBHI) in Africa and Asia that were published before end of 2011. The reviewers extracted data from Africa (ES and NT) and Asia (JM and FM). The data collection including health insurance scheme such like type of scheme, starting year and target group. It shows improves resource mobilization for health and local health insurance scheme improve health service utilization and provide financial protection for registered person in terms of reducing their OOP expenditure (Baltussen, 2012).

Another paper using household survey, carried out within the Mfantseman Municipality, sample size was 384 and equally separated into insured and uninsured households for compare. It found evidence that National Health Insurance Scheme (NHIS) is an effective tool for increasing utilization of modern healthcare services particularly outpatient care and that NHIS membership can protect households from the potentially catastrophic healthcare expenditures. But it cannot conclude from this paper that NHIS registered members have better utilization. There is a significant difference between levels of outpatient OOP expenditures for members and non-members (Domanban, 2012).

NRCM is a scheme provides voluntary health insurance as mentioned before, it was conducted that NRCM have influence on health care seeking behaviors, moreover, it is a main factor which affecting people's health care utilization. There have one study do analysis on health care utilization and health status of NRCM elderly enrollees in China. He found that reimbursement method may effect on people's health care utilization, immediate reimbursement make expectation of medical cost lower than normal reimbursement method, and who received immediate reimbursement may save considerable time and transaction costs. Late reimbursement cause hesitates when people making decision, and the longer waiting time have negative effect on patient's health care utilization. But immediate reimbursement method may not have significant effect for elderly people in rural China who living in bottom income quartile or minimum living allowance family (Zhong, 2011) .

For low income family, high deductibles and coinsurance rates in county level hospitals, as a result of large proportion of out-of –pocket, immediate reimbursement method may have tiny effect on those people's health care utilization. Compared to the uninsured, people who registered in UEBMI scheme had a huge increased in OPD visits. The effect of URBMI was limited, both insured and uninsured associated with health care utilization are not statistically significant. It was also found that compared with the uninsured, basic medical insurance participants were more likely to purchase inpatient treatments in lower levels of hospitals (Chen, 2014).

There has a paper analysis the effect of the New Cooperative Medical Scheme (NRCM), using a longitudinal sample drawn from the China Health and Nutrition Survey (CHNS). They found that people who participate in the NCMS definitely decreases the use of traditional Chinese folk doctors and increases the utilization of preventive care, particularly general physical examinations. Ordinary Least-squared estimation (OLS) used in this study, However, in terms of out-of-pocket, it have not conduct by this paper that NCMS decreases the proportion of out-of-pocket. In terms of formal medical service, no evidence can prove that NRCM increase its utilization (Lin, 2009).

Another study focuses on basic health insurance in China as well. This study uses data collected by China Health and Retirement Longitudinal Study (CHARLS Pilot) from July to September in 2008. Zhejiang and Gansu province as survey places for health care utilization research, target on aging population. When compared with people who without the any kind of health insurance, people who insured are more likely to have a visit in OPD, and people with Urban Employee Basic Medical Insurance (UEBMI) have less out-of-pocket payments in Zhejiang while in Gansu province, people with NRCM are less likely to have outpatient visits, while people with UEBMI are more likely to have a treatment in IPD. In addition, among those who have at least one outpatient visit in past 12 months, different insurance types do not make much difference in terms of the number of outpatient visits both in Zhejiang

and Gansu province. In conclusion, this study demonstrates that although the health insurance schemes have some positive impacts on the health care utilization, these impacts are still limited (Zhang, 2013).

We can conclusion that higher income increases the probability of visiting private doctors and decreases the probability of visiting inpatient department in public hospitals, lower income may decreases the use of emergency services. People with health insurance may increases the use of health care services and immediate reimbursement method, low deductible may have tiny effect on people's health care utilization who are living in rural China. There have no study can identify how out-of-pocket effect on elderly health care utilization.

3.5 Health care utilization and need factors

Many studies conducted that need factors significant effect on health care utilization. There have one study Siem did in Norway in 1984 on factors affecting primary health care utilization. 5,806 people interviewed about illness, uses of medicine, self-treatment and the number of visits to the doctors in the past two weeks. The most significant variables influence on the percentage of people consult with doctor was the need for medical care. If there exist barrier for patients get health care services obviously reduced the number of consultations for non-chronic diseases (Siem, 1984).

Another study Kyriopoulos did in 2007 on determinants of healthcare utilization

in Greece aimed to explore factors influencing the utilization of primary and secondary healthcare in Greece. Data collected from November 2001 to March 2002, and 1819 valid data remained in the end. Utilization of primary healthcare services increased among elderly people had moderate and poor perceived health status (Kyriopoulos, 2007).

3.6 conclusions and the gap in literature

From literature review, there have several core variables can determine health care utilization. Among the predisposing factors, age, gender, living arrangement, occupation, marital status, education level, unemployed; enabling factors like family income, distance to hospitals, health insurance scheme like deductible, reimbursement rate; health care need factors, health determinants for risk behaviors take smoking and drinking as examples have performed robustly in the literature. People with NRCM are less likely to have outpatient visits, while people with UEBMI are more likely to have a treatment in IPD. Insurance reimbursement rate can conduct people's health care utilization.

From literature review, there exists a gap in the literature. Most of the studies on health care utilization in China focus on certain fields in health sector like preventive service utilization, dental service, diabetes, catastrophic diseases, measured by number of visits, and also have studies focus on independent variables,

socio-economics like age, gender, education, and geographic factors affect access to health facilities.

Inner Mongolia is lower intermediate economic level among all over the nation, disposable personal income in Bayannaoer city was 20311 RMB, per capital net income of rural households was 12077 RMB in 2013 (Meng, 2013). This paper tries to conduct a study in which we examine the factors affecting elderly people health care utilization in terms of predisposing factors, enabling factors and need factors. How living arrangement for rural residents in Bayannaoer effect people's health care utilization, the difference effect between older elderly compares to younger elderly and how NRCM reimbursement rate effect on health care utilization will be conducted in this study.

Shu-His Ho did similar study of living arrangement and health care utilization in Taiwan province in 2008, according to local context in Bayanaoer, there have different local context, elderly support mechanism policies and implement are not same in this period, no evidence can identify effect of living arrangement on elderly people's health care utilization. This study also do sub-sample analysis, and distribute age into different groups and using regression analysis to find health determinants for each group.

There also need provide the evidence that an elderly person living together with family members is better for their health, the number of hospitalized is lower than

those who are living alone. A lower permanent residents rate in family would be causes more hospitalized number, people belong in this household but long time living outside, cannot provide support to elderly people.

CHAPTER IV

RESEARCH METHODOLOGY

4.1. Conceptual framework

This framework is to show the structure of the study, aims to link between predisposing factors, enabling factors, and need factors with health care utilization, find out which factors influencing elderly people's health care utilization. Individual predisposing factors include age, gender, education, occupation, ethnicity, marital status, social support (e.g., living arrangement), and living arrangement measured by rate of permanent residents in one family, there have some certain gap between those two values, because a few people also registered in this household, but they migrant to urban areas for better education or do their business outside, this study want to find the effect of both two variables' on elderly people's health care utilization, smoking and drinking factors as risk behaviors also included in enabling factors, alcohol abuse may cause people's health condition change, it can conduct the need for health care services, the utilization among frequent drinking people may different from barely drinking people or people who never drink alcohols; enabling factors like household gross-income, distance to hospitals, time spending for reach to the nearest health facility, health insurance scheme such as NRCM reimbursement rate, (this study defined out-of-pocket expenditure equal to total direct medical cost minus NRCM scheme total reimbursement); health care need factors come from perceived need for

health services, people's view and experience their own general health, functional state and illness symptoms (Lengerke, 2012).

This study focuses on predisposing, enabling, and need factors. The specific factors would be used in this study showed in the following function model.

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

Health care utilization outcome measured by (ⅰ) number of visits for OPD services in village clinics in past 12 months, (ⅱ) number of visits for OPD services in township hospitals in past 12 months, (ⅲ) number of visits for OPD services in county hospitals in past 12 months, (ⅳ) number of hospitalization in IPD in past 12 months. Choose number of visits for OPD services at village clinics, township clinics, and county hospitals individually can know factors affecting the utilization of various health care services; the results may vary across different health facility. This study also did sub-sample regression analysis; choose age group 60-70 years old and age group 71 years old and above comparison. The reason for age interval classify is because this study included elderly person has significant different health care utilization for age 70 years old below and 71 years old above. Some studies also did the sub-sample analysis and separated people from 70 years old (Fagerstrom, 2012). Considered the sample size when choose dependent variable as number of visits for OPD services at village clinics is bigger than at township clinics and county hospitals, the sub-sample regression model focus on village clinics only.

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┌─────────────────────────────────────────┐
│  Factors influencing elderly people's health │
│       care utilization in Bayannaoer City    │
└─────────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────────────────────────┐
│                                                           │
│  Predisposing factors: age, gender, education, occupation, ethnicity, marital status, │
│  social relationships (e.g., living arrangement), smoking, drinking.  │
│  Enabling factors: household gross-income, time spending for reach to the nearest health │
│  facility, health insurance scheme such as out-of-pocket expenditure rate.  │
│  Need factors: perceived physical condition.              │
│                                                           │
└─────────────────────────────────────────────────────────┘
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┌─────────────────────────────────────────────────────────┐
│   -   Health care services utilization in each type of health facility │
└─────────────────────────────────────────────────────────┘
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4.2. Study design

This study is a cross-section descriptive design. China Medical Board providing financial support to Inner Mongolia Medical University to do the project on "Construction and evaluation of appropriate mode integrated management of rural health services to improve the ability of health services and pastoral areas in Inner Mongolia". This research use household survey. Conducted in Wuyuan county and Wulate county in Bayannaoer city, Inner Mongolia autonomous region, China in January 2014.

4.3. Data source

In February 2015, this study was permitted by Inner Mongolia Health Policy Research Institution to use the data of township and village integration (TVI) program in the year 2014 for this study. The household survey had completed by January 2014. Household survey conducted in Wuyuan county and Wulate county in Bayannaoer City, Inner Mongolia Autonomous Region.

The sample size for the TVI survey was calculated basing on cluster sampling method. 1995 households from 2 counties, 8 townships (2 better-off, 2 worse-off per county), 24 administrative village (3 villages per township)，84 households per village were chosen based on simple random sampling. 3837 respondents are permanent residents who living in the surveillance areas over six months. 1233 elderly people are the main research objectives, and they distribute in 766 households. In regression analysis part, we random selected one represent from one household. Among 766 represents, only 441 persons had OPD services care, 84 elderly persons seeking health care services at village clinics only, 95 elderly persons seeking health care services at township clinics only, 107 elderly persons seeking health care services at county hospitals only, 44 elderly person seeking health care services both at village clinics and township clinics, 38 elderly person seeking health care services both at village clinics and county hospitals, 47 elderly person seeking health care services both at township clinics and county hospitals, 26 of them use health care services at all three

kind of health facility,   and 124 of them had IPD services care no matter at which kind of health facility.

4.4. Data analysis

4.4.1. Descriptive analysis

Summary statistics are presented by age groups, and shows the demographic characteristics help bedding research on health care utilization. Using descriptive statistics to show the use of health care services at village clinics, township clinics and county clinics (among three level of perceived illness severity and total descriptive statistics); predisposing factors, enabling factors and need factors effect on elderly people's health care utilization; calculated predisposing factors among each age group (age will be assign into five groups); living arrangement among all elderly people; major disease prevalence distribution in Bayannaoer; elderly people's educational level with different types of occupations; use of health care services by different age groups (among three level of perceived illness severity); health care utilization among different gross-income groups (gross-income will be assign into five groups), 1233 means total number of elderly people in the dataset, sample size equal to 766, one elderly person randomly chosen from each household; Finally, calculate the average number of visits per person among different gross income groups.

Referral system weak of management, people choose high-level facilities such as county hospitals are not condition on visiting lower-level facilities such like village

clinics and township clinics. People can accord their own willingness and perceived

illness severity or environment status, social economics conditions to choose any kind

of health facilities with the administration city. If people choose provincial hospitals

or higher level hospitals in outside the province for treatment need referral letter from

related referral center.

4.4.2. Regression models

4.4.2.1. Variable description

This sector gives detail explanation about dependent and independent variables

which will be used into this study and intuition the expectation of each independent

variables accord to literature review.

Alternative dependent variables including number of visits for OPD services in

village clinics in past 12 months; number of visits for OPD services in township

clinics in past 12 months; number of visits for OPD services in county hospitals in

past 12 months; number of hospitalization in IPD in past 12 months.

Independent variables include continuous variable of **age, household total

gross-income, time spending on reach to the nearest health facility**, a dummy

variable of **gender** (male and female), a dummy variable of **ethnicity** (Han majority

or others), a dummy variable for **marital status** (married and others), a dummy

variable for **educational level** (illiterate or semiliterate and others), a dummy variable

of **occupation** (farmers and others), a dummy variable for **smoking** (smoking and others), a dummy variable for **drinking** (barely drink or never drink alcohol and others), a dummy variable for perceived physical condition (feel uncomfortable two weeks before investigation and not feel discomfort at all) together with the rate of out-of-pocket (OOP) under new rural cooperative medical scheme and rate of number of permanent residents among total family size (PR rate). This study defined OOP rate and PR rate as below:

$$OOP\ rate = \frac{total\ medical\ cost - total\ reimbursement}{total\ medical\ cost} \times 100\%$$

$$PR\ rate = \frac{total\ number\ of\ permanent\ residents\ in\ one\ household}{total\ number\ of\ registered\ residents\ in\ one\ household\ (family\ size)} \times 100\%$$

Table 10 Dependent and independent variables

Alternative Dependent Variables	
NOVC	A count on the total number of doctor visits at village clinics in past 12 months
NOTC	A count on the total number of doctor visits at township clinics in past 12 months
NOCH	A count on the total number of doctor visits at county hospitals in past 12 months
NOIP	A count on the total number of hospitalized at (village clinics/ private clinics/ township clinics/ county hospitals/ prefecture hospitals/ provincial or central hospitals) in past 12 months
Independent variables and notation	**Definition**
Predisposing factors	
Sex	1 for male	Female (+) use more services for hospitalization and

(SEX)	and 0 for female	outpatient , aged female experience worse health than men, lower health condition may use more health care services (Nuamah, 2015)
Ethnicity (ETH)	1 for Han majority and 0 otherwise	Han majority seems more convenient to get health services. Minority have barrier for access to their own medical professionals and basic medical supplies, and lack of health workers in minority inhabited areas (ADB, 2000). Another reason may come from cultural barrier, different in language or belief and religion may make inconvenient for minority to have access to health care services (Isarabhakdi, 2003).
Marital status (MARI)	1 for married and 0 otherwise	Married person (+) seems had higher health care utilization because the company of spouse can help elderly access health care when necessary (Barros, 2003).
Age (AGE)	continuous variable	Higher number of emergency department visits, secondary health care costs, and numbers of hospitalization days associated with higher age (+) because older elderly may get more illness than those who are younger elderly.(Hailing, 2013) But among elderly people, higher age may have lower health care utilization; elderly had poor accessibility for health service (Fitzpatrick, 2004)
Education (EDU)	1 if illiteracy or semiliterate and 0 otherwise	Educated (+). Educated people know more knowledge to protect themselves and keep at good health status (Mallapur, 2014)
Occupation (OCUP)	1 if farmers people and 0 otherwise	Employment or working status (+). Co-relative to economic status, employee can earn more money than non-working people (Mallapur, 2014)
Permanent residents Registered residents (PR)	number of permanent residents in household over number of registered residents (%)	Permanent residents less than registered residents means that elderly people lack of family members company had a statistically positive association with mortality, living alone were more likely to die. But the expectation are not clear (+/-) (Ho, 2008)
Smoking (SMOK)	1 if smoking and 0 otherwise	*Smoking is risk behaviors*; it can cause lower health condition, further lead to a higher health care utilization (Azari, 2006). Another paper on the association of smoking and health care utilization conducted by Menn in 2013, found that *s*moking is the most important single risk to health, and smokers had higher health care utilizations than nonsmokers (Menn, 2013)
Drinking (DRINK)	1 if barely drink or never drink alcohol and 0 frequent drink	Alcohol abuse predicted the number of visits to the emergency department, smoking also significantly related to health care utilization (Azari, 2006). Davis

		have one study on the relationship between alcohol consumption and health care utilization, moderate alcohol drinking can offer some health benefits, which in turn may lead to lower health care utilization (Davis, 1999). But heavy drinking can have serious consequences, may lead to higher health care utilization, (Rehm, 2009)
Enabling factors		
Total household gross income (INC)	continuous variable unit 10000RMB	People can earned more money per day, or better household income seems had higher health care utilization. (+) (Hailing, 2013)
Time spend for reach to nearest hospitals (TIM)	continuous variable (minutes)	Less time spending on reach to hospitals (+) use more health care services because lower time cost (Hailing, 2013).
Out-of-pocket (OOP)	OOP rate (%)	OOP rate (+/-) No evidence confirmed effect of OOP under NRCM scheme on elderly people's health care utilization in rural China (Wu, 2012).
Need factors		
Perceived physical condition (PPC)	1 if people feel uncomfortable two weeks before the investigation and 0 for no discomfort at all	Perceived physical condition (+) un-well use more health care services than those feel well. (Kyriopoulos, 2007). Because poor or moderate perceived health condition may push forward them to seek health care services.

This study doing analysis on factors affecting health care utilization, and dependent variables set as number of visits in different kinds of health facility. Poisson regression model used to analysis counts of events, it will be used in this study. In this function model gender, ethnicity, marital status, age, educational, occupation, rate of permanent residents among registered residents, smoking, drinking, total household gross-income, time spend on reach to nearest health facility, out-of-pocket under new rural cooperative scheme, person perceived physical

condition are the main factors for analysis health care utilization. Outcome measured

by (ⅰ) number of visits for OPD services in village clinics in past 12 months, (ⅱ)

number of visits for OPD services in township hospitals in past 12 months, (ⅲ)

number of visits for OPD services in county hospitals in past 12 months, (ⅳ) number

of hospitalization at any type of health facility in IPD in past 12 months. The Poisson

distribution of 766 individual elderly people using health care services for OPD care

and IPD care as below:

Figure 11 The probability of distribution function (PDF) for number of visits at

village clinics
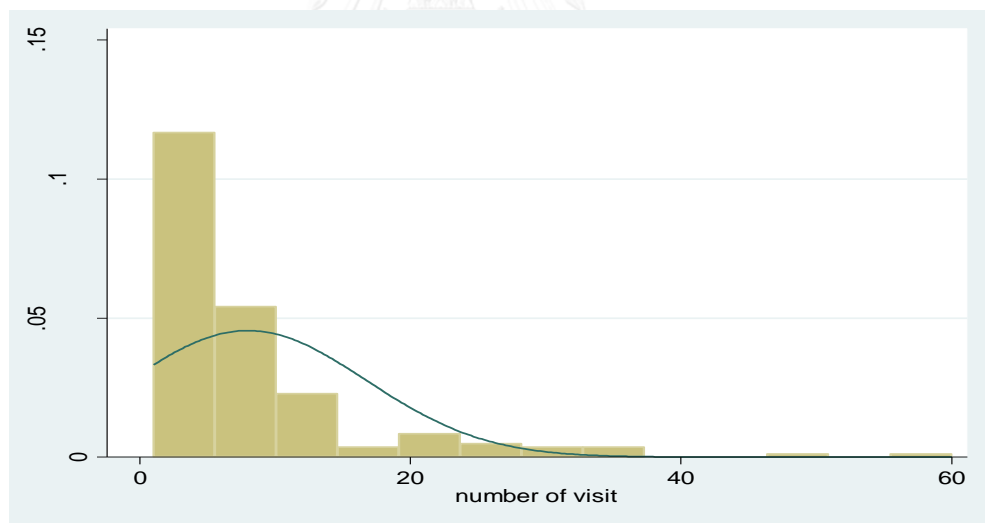
Figure 12 The probability of distribution function (PDF) for number of visits at township clinics
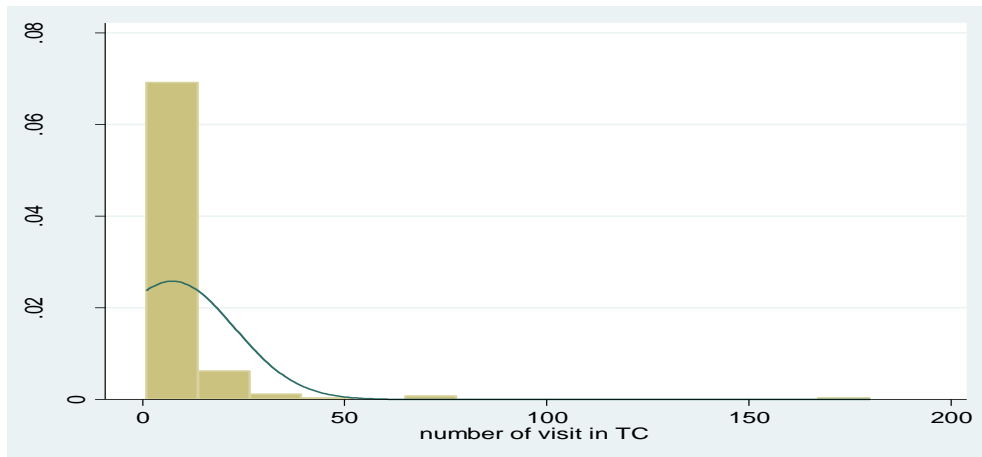
Figure 13 The probability of distribution function (PDF) for number of visits at county hospitals
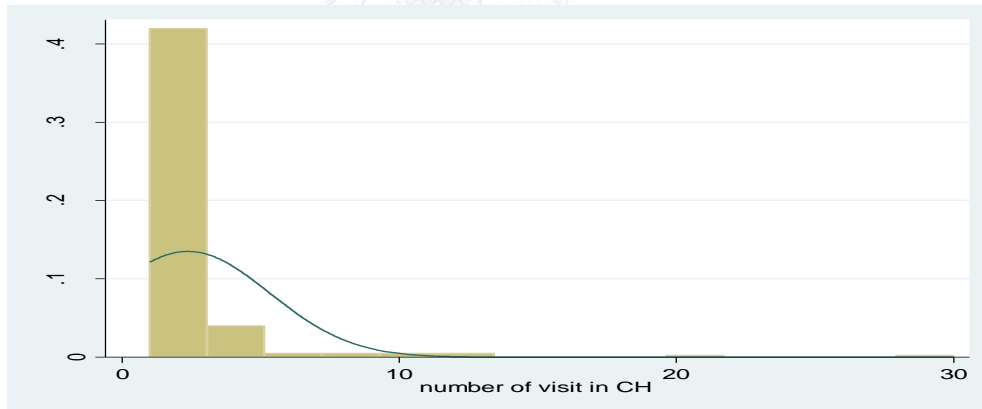
Figure 14 The probability of distribution function (PDF) for number of hospitalized
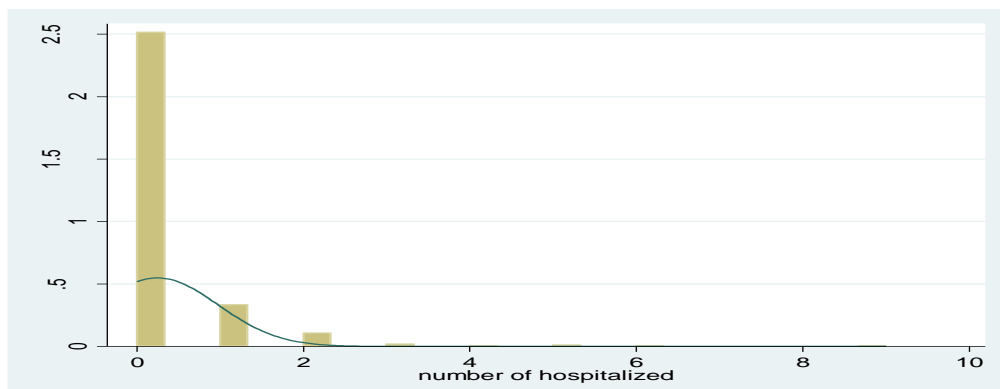
From the Poisson distribution analysis we can find that total number of doctor visits at village clinics, township clinics and county hospitals in past 12 months start from 1, this study use zero-truncated Poisson regression. From the Poisson distribution analysis in terms of total number of hospitalized at (village clinics/ private clinics/ township clinics/ county hospitals/ prefecture hospitals/ provincial or central hospitals) in past 12 months, the number start from 0, observations in total is 749, and 627 of them is zero, zero-inflated Poisson regression applied in this kind of dependent variable.

According to Greene's econometric analysis textbook, in principle, *the Poisson model is simply a nonlinear regression*. So far is easier to estimate the parameters with maximum likelihood techniques. The log-likelihood function is:

$$\ln L(\boldsymbol{\beta}) = \sum_{i=1}^{n} [-\lambda_i + y_i x_i' \boldsymbol{\beta} - ln y_i!]$$

Where: $\lambda_i = e x_i' \boldsymbol{\beta}$

The likelihood equation is:

$$\frac{\partial \ln L(\boldsymbol{\beta})}{\partial \boldsymbol{\beta}} = \sum_{i=1}^{n} (y_i - \lambda_i) x_i = \mathbf{0}$$

To be specific, the equation for the incidence rate ratio is reported:

$$\mathbf{Log}(\frac{\boldsymbol{\mu}}{\mathbf{N}}) = \mathbf{F}(\boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 X_1 + \cdots + \boldsymbol{\beta}_n X_n)$$

$$\mathbf{Log}(\boldsymbol{\mu}) = \mathbf{Log}(\mathbf{N}) + \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 X_1 + \cdots + \boldsymbol{\beta}_n X_n$$

$$\boldsymbol{\mu} = \mathbf{N} e^{\boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 X_1 + \cdots + \boldsymbol{\beta}_n X_n}$$

Where: $X_1,\ldots,X_n$ are independent variables. β_0 is constant term. $\beta_1,\ldots,\beta_n$ stands for the coefficient of each independent variables, n stands for the total number of independent variables. μ is the expected count, N is called for offset, $\mathbf{Log(N)}$ is used as the offset. $\frac{\mu}{N}$ stands for unit rate, when all covariates have no effect, it means $\mu = N$. The rate at which events occur is called the incidence rate, interpret the coefficients in terms of incidence rate ratios (Greene, 2002).

$$\boldsymbol{\beta = \log(\mu_{x+1}) - \log(\mu_x) = \log(\mu_{x+1}/\mu_x)}$$

When applied the proper dependent variables and independent variables into this model, we can find the Poisson model assumption as below:

OPD services utilization at village clinics

$\textbf{NOVC} = \beta_0 + \beta_1\textbf{SEX} + \beta_2\textbf{ETH} + \beta_3\textbf{MARI} + \beta_4\textbf{AGE} + \beta_5\textbf{EDU} + \beta_6\textbf{OCUP} + \beta_7\textbf{PR} + \beta_8\textbf{SMOK} + \beta_9\textbf{DRINK} + \beta_{10}\textbf{INC} + \beta_{11}\textbf{TIM} + \beta_{12}\textbf{OOP} + \beta_{13}\textbf{PPC}$

OPD services utilization at township clinics

$\textbf{NOTC} = \beta_0 + \beta_1\textbf{SEX} + \beta_2\textbf{ETH} + \beta_3\textbf{MARI} + \beta_4\textbf{AGE} + \beta_5\textbf{EDU} + \beta_6\textbf{OCUP} + \beta_7\textbf{PR} + \beta_8\textbf{SMOK} + \beta_9\textbf{DRINK} + \beta_{10}\textbf{INC} + \beta_{11}\textbf{TIM} + \beta_{12}\textbf{OOP} + \beta_{13}\textbf{PPC}$

OPD services utilization at county hospitals

$\textbf{NOCH} = \beta_0 + \beta_1\textbf{SEX} + \beta_2\textbf{ETH} + \beta_3\textbf{MARI} + \beta_4\textbf{AGE} + \beta_5\textbf{EDU} + \beta_6\textbf{OCUP} + \beta_7\textbf{PR} + \beta_8\textbf{SMOK} + \beta_9\textbf{DRINK} + \beta_{10}\textbf{INC} + \beta_{11}\textbf{TIM} + \beta_{12}\textbf{OOP} + \beta_{13}\textbf{PPC}$

IPD services utilization at village clinics/ private clinics/ township clinics/ county hospitals/ prefecture hospitals/ provincial or central hospitals

$$\mathbf{NOIP} = \beta_0 + \beta_1 \mathbf{SEX} + \beta_2 \mathbf{ETH} + \beta_3 \mathbf{MARI} + \beta_4 \mathbf{AGE} + \beta_5 \mathbf{EDU} + \beta_6 \mathbf{OCUP} + \beta_7 \mathbf{PR} +$$

$$\beta_8 \mathbf{SMOK} + \beta_9 \mathbf{DRINK} + \beta_{10} \mathbf{INC} + \beta_{11} \mathbf{TIM} + \beta_{12} \mathbf{PPC}$$

CHAPTER V

RESULT AND DISCUSSION

Cross-section data collected in 2014, 1,995 households with 3,837 individuals were included in the study showed a highly aging population proportion contained 1,233 elderly people. This chapter will show the association between health care utilization and pre-disposing, enabling, and need factors among different population groups.

5.1 Summary statistics

5.1.1 Individuals' characteristics

As mentioned above, cross-section data collected in 2014 included 1,995 households with 3,837 individual respondents. In this study, there have 1,233 elderly people distributed in 766 households, including 54.2% males and 45.8% females. 44% of them are illiterate or semiliterate. 77.8% elderly people being married, 41.0% are smokers, and 7.7% are frequent drink alcohol. 58.0% working as farmers. 91.9% elderly people covered by New Rural Cooperative Medical scheme.

Table 11 Descriptive statistics for selected variables (N=766)

Characteristics	Frequency	Percentage
Gender		
Male	415	54.2%
Female	351	45.8%
Educational level		
Illiteracy/Semiliterate	337	44.0%
educated	429	56.0%
Marital status		
Married	596	77.8%
Unmarried, divorce, Bereft of one's spouse	170	22.2%
Smoking		
smokers	314	41.0%
Non-smoker	452	59.0%
Drinking		
Barely drink or never drink alcohol	707	92.3%
Frequent drink	59	7.7%
Occupation		
Farmer	444	58.0%
Non-working and working as other occupations	322	42.0%
Health insurance		
Uninsured	62	8.1%
NRCM	704	91.9%

Target population distributed into eight age groups. Among 766 elderly people, 43.0% of them from age group 60 to 64 years old, 22.5% from age group 65 to 69 years old, and 14.4% from age group 70 to 74 years old. The proportion of gender in each age group has no significant difference, male in age groups 60 to 64 years old, 65 to 69 years old, and over 80 years old were a little bit higher than female.

Table 12 Male and female distribute by age interval (N=766)

Age group	Year interval	Male	Percent%	Female	Percent %	Total	Percent
60-64	1951-1955	187	24.4%	142	18.5%	329	43.0%
65-69	1946-1950	96	12.5%	76	9.9%	172	22.5%
70-74	1941-1945	55	7.2%	55	7.2%	110	14.4%
75-79	1936-1940	37	4.8%	44	5.7%	81	10.6%
Over80	----1935	40	5.2%	34	4.4%	74	9.5%

According to table 13, compare each age group individually, male is more than female in age group 65-69, 70-74, 75-79, and over 80. NRCM scheme coverage rate range starts from 89.8% to 93.3%. Rate of married and live together with their spouse decreases when age increase. Older age person have higher widowed rate. Focus on educational level, the higher age have higher illiterate rate, 35.3% in age group 60-64, but this number increase to 78% in age group over 80. 77.1% of population in age group 60-64 working as farmers, and 16.2% of them are non-working component, In terms of age group over 80, there have 23% respondents are farmers, non-working population rate up to 69%.

Table 13 Predisposing and enabling factors among each age group

Age groups	60-64	65-69	70-74	75-79	over 80
NRCM	93.3%	89.8%	91.6%	91.5%	93%
uninsured	3.5%	5.6%	7.3%	5.9%	7%
Married	94.1%	92.1%	77.9%	67.8%	48%
Divorced	0.4%	0%	0%	0.9%	0%
Widowed	4.2%	7.0%	21.1%	29.7%	52%
Illiteracv/ Semiliterate	35.3%	32.7%	45.0%	67.8%	78%
Primary school	41.8%	43.9%	39.3%	22.0%	14%
Junior high school	18.0%	19.1%	12.6%	7.6%	4%
Senior high school	4.8%	2.0%	1.6%	1.7%	4%
Famers	77.1%	57.1%	46.1%	32.2%	23%
Non-working	16.2%	35.6%	50.3%	64.4%	69%
Smokers	41.3%	44.6%	41.4%	30.5%	22%
Frequent Drinkers	9.6%	9.9%	7.9%	3.4%	3%

According to table 14, 766 elderly people separate by 5 categories. In general, 71.2% elderly live alone or live their spouse only, 30.8% of them live together with their children. In terms of age groups 60-64, there have 329 elderly people in this category, and 76.9% elderly people live alone or live with their spouse, only 23.1% live together with their children. We can find that, when age increase, the percentage of elderly live alone or with their spouse decrease category by category, and decreased from 76.9% in age group 60-64 to 41.7% in age group over 80 years old. Also, the percentage of elderly live together with their children increased when age increased. This table also shows the average number of permanent residents per household in

each age categories, for this variable, we use the rate ratio in terms of number of permanent residents divided by number of registered residents in household in regression analysis part to see how the rate ratio effect on elderly people's health care services utilization.

Table 14 Living arrangement for 766 elderly people

Age groups	60-64	65-69	70-74	75-79	Over 80	Total
Elderly (person)	329	172	110	81	74	766
Live alone/spouse %	76.9%	73.6%	63.1%	51.8%	41.7%	71.2%
Live with children %	23.1%	26.4%	36.9%	48.2%	58.3%	30.8%
Permanent(person)	485	262	169	134	128	1177
Mean1	2.4	2.5	2.5	2.7	2.8	2.5
Registered(person)	561	305	188	161	156	1370
Mean2	2.8	2.8	2.7	2.3	3.5	2.9

Table 15 below shows the elderly people's disease prevalence distribution. Hypertension, cerebral infarction, diabetes were the top three major diseases among elderly people, accounted 30%, 9.3%, and 5.8% respectively. In terms of IPD services, cerebral infarction was the main cause of hospitalized, hypertension followed behind, and coronary heart disease ranked third.

Table 15 Major disease prevalence among elderly people in Bayannaoer

Disease	Frequency	Percentage	IPD	Frequency	Percentage
Hypertension	440	30.0%	Cerebral infarction	74	12.09%
Cerebral infarction	136	9.3%	Hypertension	31	5.07%
Diabetes	85	5.8%	Coronary heart disease	26	4.25%
arthritis	72	4.9%	Diabetes	24	3.92%
Coronary heart disease	69	4.7%	Heart disease	23	3.76%
Heart disease	60	4.1%	Gall-stone	20	3.27%
Cerebral blood supply insufficiency	28	1.9%	Myocardial infarction	14	2.29%
Cerebral atherosclerosis	28	1.9%	Uremia	13	2.12%
Slipped discs	25	1.7%	Fracture	110	1.8%
Tracheitis	18	1.2%	Angina	11	1.8%
Others	505	34.4%	Others	365	59.63%
Total	1466	100%	Total	621	100%

Table 16 shows that 36.3% of elderly farmers are illiteracy or semiliterate, 42.7% of elderly farmers had primary school background, while only 3.3% of elderly farmers had senior high school backgrounds. The proportion of farmers who had educational background of junior high school and above was very low. Focus on Non-working elderly people, the percentage of non-working older population is illiteracy or semiliterate was pretty high, up to 56.9%. Only 1.6% of them had senior high school background. 9.3% of them had junior high school background.

Table 16 Elderly people's educational level with different types of occupation

N=766	Famers	Non-working	Others	Total
	Percentage	Percentage	Percentag	Percentage
Illiteracy/Semi	36.3%	56.9%	23.8%	42.7%
Primary School	42.7%	31.5%	27.5%	37.8%
Junior High School	17.3%	9.3%	30.0%	15.3%
Senior High School	3.3%	1.6%	10.0%	3.2%
Others	0.3%	0.7%	8.8%	1.0%
Total	100%	100%	100%	100%

5.1.2 Utilization of various health care services

Table 17, Table 18, and Table 19 below show the use of health care services at each public health facility. In terms of 766 total elderly people, part of them had not only one kind of disease at same time, as we mentioned above, this study contained at

most three diseases for one respondent, and ranked according to people's perceived

illness severity. From the descriptive statistics, Patients who had the most serious

disease highly used health care services at town clinics and village clinics, the average

visit times per patient were 7.3 and 8.0 respectively, the same cases happened among

second and third serious disease, 7.9 times and 7.1 times at village clinics respectively,

and 6.6 times and 7.3 times at township clinics respectively.

Table 17 OPD services utilization (the most serious of the three illnesses)

	County hospitals	Town clinics	Village clinics
Visiting times	486	1461	1660
Mean	4.7	7.3	8.0

Table 18 OPD services utilization (the second serious of the three illnesses)

	County hospitals	Town clinics	Village clinics
Visiting times	256	698	1102
Mean	2.3	6.6	7.9

Table 19 OPD services utilization (the third serious of the three illnesses)

	County hospitals	Town clinics	Village clinics
Visiting times	108	298	331
Mean	2.1	7.3	8.1

According to figure 15, number of visits at village clinics and township clinics is

higher than county hospitals. 3,093 total numbers of visits at village clinics, and 2,457

total numbers of visits at township clinics, and total number of visit at county

hospitals is 850.

Figure 15 Comparison the use of health care services at each health facility
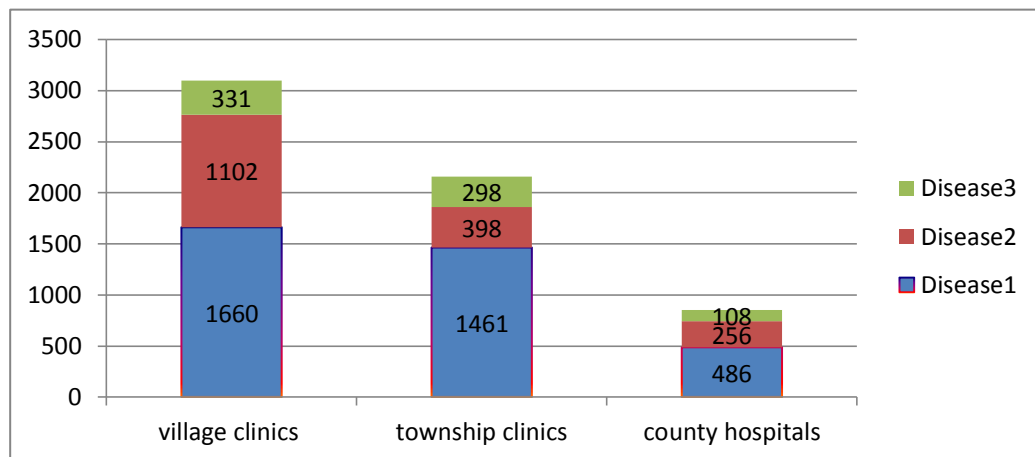
5.1.3 Cross-tabulation of health care utilization among different age groups

Table 20 is made up of three parts. First part in terms of most serious disease among elderly people, second one shows the second serious disease utilization, and third one shows the utilization of people who have three kind of disease at the same time, and the third serious disease's health care utilization at each health facility

Among the most serious disease, age group 60-64 shows the highest utilize of health care services, and it decrease when age increase, age group 64-69 and 70-74 using health care services at village clinics are more than other age groups. Age group 60-64 is higher utilized at township clinics. Compared the health care utilization in the same age groups, we can find that, people using more health care services at township clinics for age group 60-64; using more health care services at village clinics for age group 65-69, 70-74, and age group over 80; using more health care services

Among the second serious illness, same trend in the use of total health care services, age group 60-64 have highest total number of visits, and it decline by age goes up. Age groups 70-74 shows the highest average number of visits at village clinics when compared with other groups, reach to 17.5 times per patient. Focus on age group 70-74 only, it shows highest health care utilization at village clinics, less people choose consult with doctors at county hospitals for second serious illness. Look at the third table, we can find that, over 75 years old people use more health care services at village clinics for the illness which are not very serious.

Table 20 Use of health care service by different age groups

Collect base on most serious illness

Age groups		60-64 (N=329)	65-69 (N=172)	70-74 (N=110)	over75 (N=155)
Village clinics	Times	310	543	473	334
	Person	39	32	26	25
	Mean	7.9	16.9	18.2	13.4
Township clinics	Times	681	224	331	225
	Person	87	219	64	40
	Mean	7.8	1.0	5.2	5.6
County hospitals	Times	168	133	78	106
	Person	67	53	33	35
	Mean	2.5	2.53	2.36	3.06
Total	Times	1159	900	882	665
	Person	193	304	123	100
	Mean	6.0	3.0	7.2	6.7

Collect base on second serious illness

Age groups		60-64 (N=329)	65-69 (N=172)	70-74 (N=110)	over75 (N=155)
Village Clinics	Times	323	287	357	136
	Person	33	25	20	23
	Mean	9.7	11.6	17.5	5.9
Township clinics	Times	280	156	134	128
	Person	36	25	17	23
	Mean	7.8	6.3	7.6	5.6
County hospitals	Times	114	76	28	38
	Person	50	20	19	20
	Mean	2.3	3.9	1.5	1.9
Total	Times	717	519	398	302
	Person	119	70	56	66
	Mean	6.0	7.4	7.1	4.6

Collect base on third serious illness

Age groups		60-64 (N=329)	65-69 (N=172)	70-74 (N=110)	over75 (N=155)
Village Clinics331	Times	65	86	109	71
	Person	7	13	10	8
	Mean	9.3	6.6	10.9	7.9
Township clinics298	Times	139	30	99	30
	Person	12	5	12	8
	Mean	11.6	6	8.3	3.8
County hospitals108	Times	37	38	13	20
	Person	15	15	7	10
	Mean	2.5	2.5	1.9	2.0
Total	Times	241	154	221	121
	Person	34	33	29	26
	Mean	7.1	4.7	7.6	4.7

5.1.4 Cross-tabulation of health care utilization among different gross-income

groups

Gross income divides into 5 groups. Household gross income range from 0 to

20,000 RMB set as group income1, range from 20,001RMB to 40,000RMB set as

group income2, range from 40,001 RMB to 60,000 RMB set as group income3, range

from 60,001 RMB to 80,000 RMB set as group income4, and over 80,000 RMB set as

group5. Because gross income recorded from household data, there have 1,233 elderly

people in total, and distribute in 766 households, around 1.6 elderly people per family.

This table show is made up of two sections. Section one take all elderly people as

research on total number of visits in any kind of health facility and health care

utilization in each individual type of health care facility. Section two shows the health

care utilization among 766 elderly represents which are random selected from 766

households. When N=1233, it can find out elderly people's general health care

utilization, when N=766, it can be more strong evidence to identify the different effect

on health care utilization among economic factors because represent sample have

unique household characteristics.

According to table 21, when N=1233, compare total number of visits is

meaningless, because total number of patients in each income level is different. We

pay close attention to average number of visits per person. People in Income1 level

use more health care services at village clinics, average number of visits reach to 9.38

times per person per year, only 2.46 times at county level hospitals. For Income2 level,

people use more health care services at township clinics than village clinics. An

Income1 level person's number of visit at village clinics per person in up to 10.14,

only 4.54 times for people who are Income5 level. Income5 level people use more

health care services at county hospitals than which are Income1 level, rich person use

more services at county hospitals.

Table 19 Health care utilization among different gross income groups

Income groups (N=1233)		Income1 442	Income2 326	Income3 180	Income4 142	Income5 143
Total number of visit (times)	Times	2465	1728	911	499	419
	Person	384	266	154	101	102
	Mean	6.42	6.50	5.92	4.94	4.11
Village clinics (times)	Times	1239	661	332	172	148
	Person	133	75	48	31	29
	Mean	9.38	8.9	7.06	5.73	5.29
Town clinic (times)	Times	941	838	398	236	176
	Person	134	93	53	34	33
	Mean	7.08	9.11	7.65	7.15	5.5
County hospitals (times)	Times	285	229	181	91	95
	Person	117	98	53	36	40
	Mean	2.46	2.36	3.48	2.6	2.44

Income groups (N=766)		Income1 270	Income2 201	Income3 123	Income4 100	Income5 72
Total number of visit (times)	Times	1221	907	605	382	191
	Person	204	154	82	96	48
	Mean	5.99	5.89	7.38	5.03	3.98
Village clinics (times)	Times	700	321	187	141	59
	Person	69	42	31	25	14
	Mean	10.14	7.83	6.23	5.88	4.54
Town clinic (times)	Times	370	469	334	167	83
	Person	72	54	32	23	16
	Mean	5.21	8.85	10.77	7.59	5.53
County hospitals (times)	Times	151	117	84	74	49
	Person	63	58	36	28	18
	Mean	2.40	2.05	2.4	2.74	2.88

Figure 16 below shows the number of visits per person at each type of health facilities among different gross-income groups. Income1shows higher use of health care services at village clinics. A person seems to use more health care services at township clinics for other income groups.

The trend of using health care services at village clinics among different income groups shows as below. Color blue stands for number of visits per person at village clinics, the linear line above the chart shows the downtrend. Color green stands for number of visits per person at county hospitals, the linear line above shows the uptrend.

Figure 16 Number of visits per person among different gross income groups (N=766)
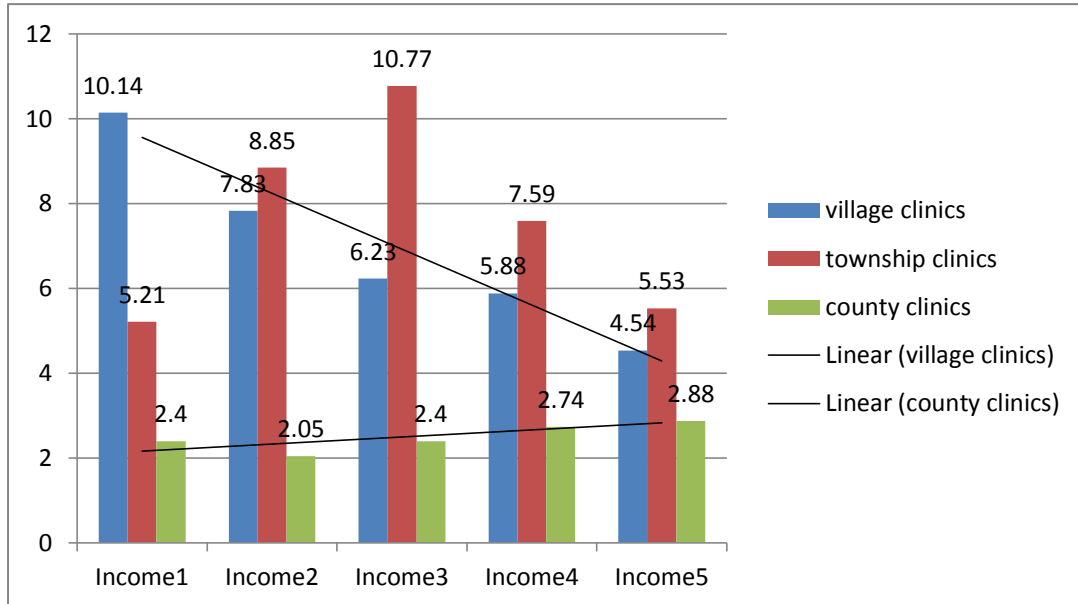
5.2 Regression result

This part including factors affecting health care utilization of OPD care and IPD care respectively. OPD cares be measured by use services at village clinics, township clinics and county hospitals individually. P value at 5% and 95% confident interval were applied to see the significance of coefficients of the variables included in the regression.

5.2.1 Factors affecting health care utilization of OPD care.

Zero-truncated Poisson regression was run with dependent variables of number of visits at village clinics in past 12 months, number of visits at township clinics in past 12 months, number of visits at county hospitals in past 12 months. Incidence rate ratios are reported in this model.

Table 20 Zero-truncated Poisson regression for OPD services utilization.
(Dependent variables: NOVC, NOTC, NOCH)

NOVC: Prob> chi2= 0.0000; Log likelihood = -860.34733; Pseudo R2=0.0859; N=176

NOTC: Prob> chi2= 0.0000; Log likelihood = -1273.1293; Pseudo R2=0.1480; N=194

NOCH: Prob> chi2= 0.0000; Log likelihood = -403.06162; Pseudo R2=0.0411; N=200

Variable	NOVC		NOTC		NOCH	
	IRR	Std. Err	IRR	Std. Err	IRR	Std. Err
SEX	1.144**	0.069	1.177***	0.072	0.895	0.114
ETH	1.107	0.103	3.707***	0.785	1.059	0.224
MARI	1.254***	0. 088	2.197***	0.199	0.768	0112
AGE	1.008*	0.005	0.981***	0.005	0.977**	0. 010
EDU	1.004	0.063	0.810***	0.051	1.107	0.142
OCUP	1.341***	0.087	0.817***	0.051	1.020	0.126
SMOK	0.937	0.058	1.321***	0.078	0.895	0.117
DRINK	0.761**	0.097	0.424***	0.088	0.841	0.206
PR	1.000	0.000	0.294***	0.035	1.000	0.000
INC	0.955***	0.008	1.011	0.008	1.017***	0.007
TIM	0.986***	0.003	1.002	0.002	0.988**	0.005
OOP	0.580***	0.060	1.491***	0.155	1.606	0.523
PPC	0.940	0.054	1.187***	0.067	1.035	0.121
_ cons	6.540***	2.396	8.072***	3.813	8.457**	7.024

*p< 0.10; **p< 0.05; *** p<0.01

Predisposing factors and health care utilization of OPD care

Gender variables: Gender variable is a dummy variable with the value of 1 for male and 0 for female. The coefficient of gender variable was significant in terms of number of visits at village clinics and township clinics; it was not significant in terms of number of visits at county hospitals. Elderly people, whose gender is male, use more primary health care services at village clinics and township clinics. This result is

different with other studies, like one study conducted by Nuamah in 2015, he find that

aged women experience worse health than men, women have higher rates of OPD

services than men (Nuamah, 2015). According to the factors of risk behaviors analysis,

this study find that, among 776 represents, 314 are smokers, 80.6% are males. And,

among the elderly who use alcohol more frequently, 91.5% are males. Risk factors

may cause male use higher health care services for primary health care services at

village clinics and township clinics (Azari, 2006). Male compared to female, while

holding all other variables constant, and are expected to have a rate 1.144 times

greater for village clinics OPD services utilization and 1.177 times greater for

township clinics OPD services utilization. Gender variable was not significantly effect

on OPD services utilization at county hospitals.

Ethnicity variable: Ethnicity variable is a dummy variable with the value of 1

for Han Majority and 0 for Minorities. The coefficient of ethnicity variable was not

significant in terms of OPD services at village clinics and county hospitals.

Implementation of "Small Medicine Box" project in the pastoral area of Inner

Mongolia ensures minorities primary health care services accessibility. The box

concludes essential drugs and health guide handbook. Basic medical and health

institutions workers do physical examination for pastoral residents every three months;

this is the reason why ethnicity may not influence OPD services utilization at village

clinics. Pastoral areas were a vast territory with a sparse population, poor

transportation systems, same situation for Han majorities, have poor tertiary health services accessibility caused not significant at county hospitals (Wei, 2014). The coefficient of ethnicity variable was significant in terms of OPD services at township clinics, when Han majority compare to Minority, an individual elderly expected to have a rate 3.707 times greater for township clinics health care utilization. There have several reasons why ethnic minority populations have poorer health care utilization than Han majority. One study reported minority have barrier for access to their own medical professionals and basic medical supplies, and lack of health workers in minority inhabited areas (ADB, 2000). Another reason may come from cultural barrier, different in language or belief and religion may make inconvenient for minority to have access to health care services (Isarabhakdi, 2003).

Marital status variable: The marital status variable is a dummy variable with value of 1 for being married and 0 for unmarried, widowed, or divorced person. The coefficient of marital status was significant in terms of number of visits at village clinics and township clinics; it was not significant in terms of number of visits at county hospitals. Elderly people, married and living together with spouse significantly have higher rate of health care services at village clinics and township clinics than those unmarried, widowed or divorced person. The results also conducted by Mendoza in 2003. Married people may use more health care services at village clinics rather than those who are not married, widowed, or divorced, while holding all other

variables constant, married are expected to have a rate 1.254 times greater for village clinics OPD services utilization and 2.197 times greater for township clinics OPD services utilization. According to individual coefficient showed in the result, while hold all other variables constant, coefficient of marital status in terms of township clinics bigger than it applied in village clinics. Marital status variable significantly influence elderly people's OPD services, the influence of township clinics services utilization is much more than village clinics services care utilization.

Age variables: The age is continuous variable. The coefficients of Age variables were significant in all three kinds of health facilities. Each additional year of age associated with an estimated 1.9% and 2.3% decrease in OPD services utilization at township clinics and county hospitals respectively, and expected to have a rate 1.008 times greater for OPD services utilization in village clinics, while holding all other variables constant. Like Hailing found in 2013, higher age may have higher health care services utilization (Hailing, 2013). But among elderly people, higher age may have lower health care utilization; elderly had poor accessibility for tertiary health care service. In terms of primary health care services, older elderly may use more (Fitzpatrick, 2004).

Educational level variable: The educational level variable is a dummy variable with the value of 1 for illiterate or semiliterate and 0 for educated person including primary school, junior high school, senior high school and higher educated level. In

rural areas, among elderly people, only small part of them have higher educational level, according to the describe data analysis showed above, 42.8% elderly people in this survey are illiteracy or semiliterate, 37.0% elderly have primary school educational background, only 3.2% of them have senior high school educational background. The coefficient of educational level variable was significant for OPD services at township clinics only. Illiterate or semiliterate elderly visit the doctor at township clinics nearly 2% less than those educated elderly people, while holding all other variables constant.

It was conducted in Austrian in 2006 by Maurer. He found that high education have lower levels of health care demand, because they have knowledge to keep themselves at a higher level of health condition, and seek health care immediately when they need (Maurer, 2006). Another study by Mallapur in 2014 found graduated person use more health care services than illiterate person as well (Mallapur, 2014).

Occupation variable: The occupation variable is a dummy variable with the value of 1 for farmers and o for others including unemployed, village cadres, technics, teacher, in business. According to the describe data analysis above, 58.5% elderly people working as farmer. The coefficient of occupation variable was significant in terms of number of visits at village clinics and township clinics. People who working as farmer expected to have a rate 1.341 times greater for village clinics OPD services utilization and visit the doctor at township clinics some 18% less than non-working

elderly or working as other occupations' elderly, while holding other variable constant. The reason for the result vary across different facility in terms of working as farmers may cause by the distance to village clinics is more shorter than township clinics. Farmers are not willing to spend long time to get health care services in a faraway facility, and we can see working as farmers was not significantly effect on elderly people's OPD services utilization at county hospitals at all.

Smoking variable: The coefficient of smoking variable was significant in terms of township clinics OPD services use. Smokers compared to non-smokers expected to have a rate 1.321 times greater for township clinics OPD services utilization, while holding all other variables constant. *Smoking is risk behaviors*; it can cause lower health condition, further lead to a higher health care utilization (Azari, 2006). Another paper on the association of smoking and health care utilization conducted by Menn in 2013, found that *s*moking is the most important single risk to health, and smokers had higher health care utilizations than nonsmokers (Menn, 2013).

Drinking variable: Drinking variable is a dummy variable with the value of 1 for barely drink or never drink alcohol and 0 for people who are frequent drinker. The coefficient of drinking variable was significant in terms of village clinics and township clinics OPD services use. If an individual was barely drink alcohol or never drink alcohol visit the doctor at village clinics and township clinics for OPD services 23.9% and 57.6% less than those use alcohol frequently, while holding all other

variables constant. Because this study set dummy variable 1 for barely drink alcohol, some paper also conduct that barely use alcohol is helpful for health. Davis have one study on the relationship between alcohol consumption and health care utilization, moderate alcohol drinking can offer some health benefits, which in turn may lead to lower health care utilization (Davis, 1999). But heavy drinking can have serious consequences, may lead to higher health care utilization (Rehm, 2009) .

Living arrangement variables: Living arrangement variables use the rate of permanent residents among total family size, it can be calculated by number of permanent residents in one household divided by number of registered residents in one household.

The coefficient of living arrangement variable was not significant in terms of village clinics and county hospitals OPD services. It shows that number of permanent in household have no effect on elderly use health care services at village clinics and county hospitals. Elderly people who live in one household have higher rate of permanent residents visit the doctor at township clinics for OPD services 70.6% less than those live in one household have lower rate of permanent residents, while holding all other variables constant.

Rate of permanent residents among total family size is the main factors for this study analysis elderly people's health care services utilization. Among the total sample size regression analysis, higher rate of permanent residents had lower OPD

services utilization at township clinics. It may cause by people prefer tertiary level hospitals for better health care services. Elderly people who have family members support, they may have high likely to seek health care services far away from home (Ho, 2008).

Enabling factors and health care services at village clinics

Economic status variables: Economic status is continuous variable, and it measured by total household gross-income, unit 10000 RMB. The coefficients of total household gross-income were significant in terms of village clinics OPD services and county hospitals OPD services. Elderly people who stay in a household with higher gross-income visit the doctor at village clinics for OPD services 4.5% less than those who live in the household with lower gross-income, and 1.017 times greater for OPD services utilization at county hospitals, while holding all other variables constant. Elderly with higher economic status expected to seek health care services at higher level of health facilities. The reason for the results vary across different facility may cause by people's priority. Higher gross-income family may choose more health care services at county hospitals. Because weak management in referral system, people choose county hospitals have no condition on village clinics transfer, when they decide to use health care services at county hospitals, they may not use is at village clinics.

Time variable: Time variable is continuous variable (measured in minutes) for indicate time spends on visit to nearest health facility. The coefficient of time variable was significant in terms of village clinics and county hospitals OPD services use. If an individual spending more time on travelling to the nearest health care facility visit the doctor at village clinics and county hospitals for OPD services 1.4% and 1.2% less than those spend shorter, while holding all other variables constant.

Time spend on travel to the nearest health facility longer may have barrier for elderly access health care services. Time always calculated as time cost, conclude in indirect cost for seek health care services, time spend depends on way of transportations, public infrastructure construction, people's willingness to seek health care, and ability for elderly to reach to hospitals. There have one study also conducted that shorter distance may associate with higher number of services use, but it also depends on other factors as well (Hailing, 2013).

Out-of-pocket variable: OOP rate calculated from total medical expenditure minus total health reimbursement at each health facilities. Different type of health facility had different reimbursement rate. The OOP rate has three kind of calculation way in this study. OOP rate for village clinics services use, township clinics services use and county hospitals services use. The coefficient of OOP rate was significant in terms of village clinics and township clinics OPD services. Elderly people who paid by themselves occupied a higher proportion in total medical cost visit doctor at village

clinics for OPD services 42.0% less than those who have lower OOP rate and 1.491 times greater for OPD services utilization at township clinics than those who have lower OOP rate as well, while holding all other variables constant.

As literature review part mentioned, previous study found that local health insurance scheme improve health services utilization so that provide financial protection for registered person in terms of reducing OOP expenditure. Some people do not visit hospitals because OOP payments were expensive (Wu, 2012).

More than 90% elderly in Bayannaoer registered in NRCM scheme. In terms of lower deducible and higher reimbursement rate for primary health services use, especially for elderly people, they choose village clinics may because of higher reimbursement rate and do not need to pay too much by themselves. Residents may decrease the utilization if the OOP rate is quiet high for OPD services in village clinics. The results vary across different facility, township clinics compared to village clinics, can provide better health care services for residents because of better health care resource. Elderly choose township clinics more when OOP rate is higher, but rate higher does not means total OOP expenditure also higher, compared to county hospitals, OOP rate was not significant at all, when seeking health care services at higher level of health facility, OOP rate was not the main factor for people to make decision. It had same explanation with study on how do out-of-pocket payment affect choices when accessing health care by Li-Chia Chen in 2012 in Taiwan (Chen, 2012)

Need factors and health care services at village clinics

Need factors measured by perceived physical condition. It is a dummy variable with the value of 1 if people feel uncomfortable two weeks before the investigation and 0 for no discomfort at all. The coefficient of perceived physical condition was not significant at in terms of village clinics and county hospitals OPD services use. It was significant in terms of township clinics services use. Elderly feel uncomfortable expected to have a rate 1.187 times greater for township clinics OPD services utilization. Kyriopoulos did one study in 2007 on determinants of healthcare utilization in Greece also conducted that utilization of primary healthcare services increased among elderly people had moderate and poor perceived health status (Kyriopoulos, 2007).

5.2.2 Factors affecting health care utilization of hospitalized at any types of health facility

Zero-inflated Poisson regression was run with dependent variables of number of hospitalized at any types of health facility in past 12 months, and the key variables may cause higher zero data occurred is smoking and time spend variable. The independent variables are not including in OOP rate, the model aims to identify factors affecting general elderly people's IPD services utilization, and it should be include all elderly people who involved in this study. OOP variable included the elderly people who had at least once hospitalized in past 12 months only, not include

the one who did not use IPD services at all. The dependent variable count numbers start from zero, if we put OOP into this model, the one who did not use IPD services will be omitted automatically, and number of observations will be less than total elderly population.

Table 21 Zero-inflated Poisson regression for IPD services utilization.
(Dependent variable: NOIP)
 Log likelihood = -430.191;   Prob> chi2= 0.0000;   LR chi2(10)=42.45
 N=749 ; Nonzero obs=122; Zero obs=627
 Vuong test of zip vs standard Poisson: z = 3.33; Pr>z=0.0004

Variables	Coef.	Std.Err	z	P-value	[95% Conf.	Interva
SEX	0.169	0.185	0.91	0.360	-0.193	0.532
ETH	-0.336	0.310	-1.08	0.278	-0.944	0.271
MARI**	0.487	0.230	2.12	0.034	0.036	0.937
AGE*	0.025	0.013	1.95	0.051	-0.000	0.051
EDU	0.153	0.197	0.77	0.440	-0.234	0.539
OCUP***	-0.735	0.190	-3.87	0.000	-1.108	-0.363
PR	-0.516	0.353	-1.46	0.143	-1.208	0.175
DRINK	0.245	0.317	0.77	0.441	-0.378	0.867
INC	0.002	0.013	0.12	0.905	-0.024	0.027
PPC***	-0.663	0.192	-3.45	0.001	-1.039	-0.286
_cons	-1.256	1.035	-1.21	0.225	-3.285	0.772
Inflate						
SMOK*	1.049	0.286	3.67	0.000	0.490	1.609
TIM*	-0.022	0.013	-1.64	0.100	-0.048	0.004
_cons**	0.611	0.265	2.31	0.021	0.092	1.130

*p< 0.10; **p< 0.05; *** p<0.01

According to Table 23, the use of IPD services at any types of health facility, gender, ethnicity, education, permanent resident's rate, drinking, gross-income, time spend to nearest health facility were all not significant. IPD services demand have

lower elasticity, people get illness will seek health care no matter they are male or female, married or unmarried, older elderly or younger elderly, illiterate or educated, and the economics status is poor or not. Because we use total household gross-income in our model, we don't know how much money for one family used for elderly people, and how much percent used for medical treatment. There have no evidence can conducted the permanent resident's rate influence elderly people's IPD services use.

The coefficient of disposing factor marital status variable was significant for IPD services utilization. The difference in the logs of excepted counts is expected to be 0.487 units higher for elderly people who are being married than those who are un-married, divorced, or widowed status in terms of IPD services utilization, while holding all other variables constant. The result is same to OPD services utilization analysis, elderly people who are being married seems to use more health care services.

The coefficient of predisposing factors age variable was significantly effect on IPD services utilization. The difference in the logs of expected counts is expected to be 0.025 units higher for each additional year of age. Older elderly is more likely to get illness, may lead to a higher IPD services utilization.

The coefficient of predisposing factors occupation variable was significantly effect on IPD services utilization. The difference in the logs of excepted counts is expected to be 0.735 units lower for elderly people who are working as farmers than

that non-working, or working as other occupations elderly people, while holding all other variables constant. Among elderly people, working as farmers most aged from 60-65 years old, they are younger than those really higher ages. We do not have data to see non-working elderly is lost productive capacity or cannot work because of illness, but compared to elderly who working as farmers, non-working elderly had higher IPD services utilization.

The coefficient of predisposing factors smoking variable was significant for IPD services utilization. The difference in the logs of excepted counts is expected to be 1.049 units higher for elderly people who are smokers than those never smoke, while holding all other variables constant.

The coefficient of enabling factors time spend on reach to nearest health facility was significant for IPD services utilization. The difference in the logs of excepted counts is expected to be 0.022 units lower for elderly people who spend longer on reach to nearest health facility.

The coefficient of need factor for perceived physical condition was significant for IPD services utilization. The difference in the logs of excepted counts is expected to be 0.663 units lower for elderly people who feel uncomfortable two weeks before the investigation than those feel no discomfort elderly people.

5.2.3 Factors affecting outpatient utilization among two age groups

Zero-truncated Poisson regression was run with dependent variables of number of visits at village clinics in past 12 months. This section do the sub-sample analysis aims to show factors effect on health care utilization at village clinics how different among two age groups. We choose 60-70 years old as younger elderly group and 71 years and above as older elderly group for comparison.

Table 22 Comparison of OPD services utilization at village clinics in different age groups. (Dependent variable: NOVC)

Age60-70 Log likelihood = -546.27012   Age71 and above Log likelihood = -244.3719

Prob>chi2= 0.0000 Pseudo R2=0.1438   Prob>chi2= 0.0000 Pseudo R2=0.1931

Variable	60-70		Age ≥ 71	
	IRR	Std. Err	IRR	Std. Err
SEX	0.830**	0.070	1.569***	0.159
ETH	1.115	0.124	0.988	0.210
MARI	1.576***	0. 192	1.092	0.109
AGE	1.017	0.014	0.993	0.010
EDU	1.151	0.094	0.953	0.108
OCUP	1.275**	0.132	1.598***	0.148
SMOK	1.213**	0.105	0.662***	0.071
DRINK	0.874	0.117	0.202*	0.188
PR	1.479***	0.199	1.000**	0.000
INC	1.213***	0.012	0.972**	0.012
TIM	0.956***	0.005	1.012**	0.005
OOP	0.501***	0.069	0.626**	0.125
PPC	1.001	0.073	0.822*	0.094
_ cons	3.449	3.254	15.402***	13.379

*p< 0.10; **p< 0.05; *** p<0.01

The purpose for this comparison want to exactly know what is the difference between older elderly and younger elderly use OPD services at village clinics in terms of all influence factors.

The variables of gender, working as farmers, smoking, total household gross-income, time spend on reach to the nearest health facility, OOP rate are all significant in two sub-sample groups.

In this case, male visit the doctor at village clinics for OPD services 17.0% less than female, in 60-70 years old group. But among 71 years and above group, male expected to have a rate 1.569 times greater than female for OPD services utilization at village clinics, while holding all other variables constant. It means that older elderly males seem to use more OPD services at village clinics than younger elderly males.

Occupation variable had same influence on both sub sample groups. Working as farmers expected to have a rate 1.275 times greater than those non-working elderly or working as other occupations elderly people for OPD services utilization at village clinics in age group 60-70 years old. Focus on 71 years old and above group, working as farmers expected to have a rate 1.598 times greater than others for OPD services utilization at village clinics, while holding all other variables constant. Working as farmers among older elderly had greater effect than younger elderly in terms of OPD services at village clinics.

Smoking is a key variable influence elderly people's OPD services utilization. Elderly people in age 60-70 years old expected to have a rate 1.213 times greater, and in age 71 years old and above visit the doctor at village clinics for OPD services 33.8% less than those non-smoking elderly people, while hold all other variables constant. Smoking caused age 60-70 years old people use more OPD health care services at village clinics but in terms of older elderly people, performed lower health care utilization on the contrary. Risk behavior had bad influence on people's health, 60-70 years old elderly compare to 71 years old above, have higher possibility to get health care services at village clinics.

Drinking variable significantly effect on 71 years old and above population's OPD services utilization at village clinics, those who barely drink alcohol visit the doctor at village clinics for OPD services some 20% less than those who never drink alcohol, same with the result we mentioned before.

Rate of permanent residents significantly influence elderly people's health care utilization in terms of OPD services at village clinics. In age group 60-70 years old, elderly people who live in a household have higher permanent residents rate expected to have a rate 1.479 times greater than those who live in a household have lower permanent residents rate. In age group 71 years old and above, it was significant influence elderly people's health care utilization for OPD services at village clinics as well, elderly people who live in a household which have higher rate of permanent

residents expected to have a rate 1.000 times greater than those live in a lower rate of permanent residents household in terms of OPD services utilization at village clinics, while hold all other variables constant.

Total household gross-income significantly influence on elderly people's health care utilization in terms of OPD services at village clinics among the two sub-sample groups. In age group 60-70 years old, higher total gross-income expected to have a rate 1.213 times greater for OPD services utilization at village clinics than those have lower gross-income elderly people. In age group 71 years old and above, higher gross-income household visit the doctor at village clinics for OPD services 2.8% less than those in lower gross-income household elderly people, while hold all other variables constant.

Focus on time spends on reach to nearest health care facility influence OPD service at village clinics in both groups. We can find that, in age group 60-70 years old, longer time spends on reach to nearest health facility visit the doctor at village clinics for OPD services 4.4% less than those spends shorter. In terms of older elderly, longer time spends expected to have a rate 1.012 times greater than those spends shorter, while holding all other variables constant.

From the results we can know, 71 years old and above population's perceived physical condition significantly effect on their OPD services utilization at village clinics, elderly people in this age interval feel uncomfortable before the investigation

visit the doctor at village clinics for OPD services 82.2% less than those feel no discomfort elderly. The result was different with general elderly people's analysis, may because of older elderly people's poor health care services accessibility.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study aims to provide information on the differences in health care utilization among different predisposing, enabling, and need factors in Bayannaoer City, China, in the year 2014. Using Poisson regression, the results was achieved by number of visits. The study found that predisposing, enabling, and need factors had significant impacts on the use of health care services at village clinics, township clinics, and county hospitals.

The data set concludes 1233 elderly people, including 647 males and 586 females. 42.8% of the study group is illiterate or semiliterate. 58.5% elderly people in this area work as farmers. Regression Analysis was performed on 766 individuals representing 415 males and 351 females. 44.0% of them are illiterate or semiliterate, 58.1% elderly people working as farmers. 68.3% are aged from 60-70 years, 31.7% of them are 71 years old and above.

From the regression analysis, we can conclude that; among elderly people, higher OPD services utilization are associated with males, married people, educated person, smokers, and poor perceived physical condition. The results were also similar with a study conducted by Mendoza in 2003. To be specific, males, married elderly may use more OPD services at village clinics and township clinics. Illiterate or

semiliterate elderly use less OPD services at township clinics similar to the study,

conducted in Austria in 2006 by Maurer. Maurer had found that high education have

lower levels of health care demand; because they have knowledge to keep themselves

at a higher level of health condition, and seek health care immediately when they need

(Maurer, 2006). Another study by Mallapur in 2014 found that graduates use more

health care services than illiterates as well (Mallapur, 2014). Smokers, poor perceived

physical condition use more OPD services at township clinics than those non-smoking

elderly or good perceived physical condition. Smoking is a risky behavior since, it can

cause lower respiratory conditions (Azari, 2006). Kyriopoulos did one study in 2007

on determinants of healthcare utilization in Greece finding that utilization of primary

healthcare services increased among elderly people, who had moderate and poorly

perceived health status (Kyriopoulos, 2007).

We can also conclude that citizens who rarely consume alcohol or never drink

alcohol use fewer OPD services at village clinics and township clinics. Davis have

one study on the relationship between alcohol consumption and health care utilization,

moderate alcohol drinking can offer some health benefits, which in turn may lead to

lower health care utilization (Davis, 1999). But heavy drinking can have serious

consequences, may lead to higher health care utilization (Rehm, 2009). An individual

spending more time on reach to travelling to the nearest health care facility visit the

doctor at village clinics and county hospitals 1.4% and 1.2% less than those who

spend shorter respectively, while holding all other variables constant.

Analysis on IPD services usage among elderly people showed that married elderly and smokers have higher IPD services utilization while elders working as farmers or people feel uncomfortable expected to have a decrease the health care utilization. Gender, ethnicity, age, education, permanent residents rate, drinking alcohol, total household gross-income have no significant influence on elderly people's IPD services utilization.

From the regression on sub-sample groups in terms of OPD services use at village clinics, we can conclude that, male visit the doctor at village clinics for OPD services 17% less than female, in 60-70 years old group. But among 71 years and above group, male expected to have a rate 1.569 times greater than female, while holding all other variables constant. It means that older elderly males seem to use more OPD services at village clinics than younger elderly males. Moreover, employment factors such working as farmers among older elderly had greater effect than younger elderly in terms of OPD services utilization at village clinics as evidence from the results.

For answering the first hypothesis in this study, out-of-pocket rate does have an impact on lowering OPD services utilization at village clinics. From the result analysis, this study already found that; Elderly people who had higher OOP rate visit

the doctor at village clinics 58% less than those with lower OOP rates; hence, the first hypothesis is held.

Rate of permanent residents significantly influence elderly people's health care utilization in terms of OPD services at village clinics. In age group 60-70 years old, elderly people who live in a household have higher permanent residents rate expected to have a rate 1.479 times greater than those who live in a household have lower permanent residents rate. In age group 71 years old and above, it was significant influence elderly people's health care utilization for OPD services at village clinics as well, elderly people who live in a household which have higher rate of permanent residents expected to have a rate 1.000 times greater than those live in a lower rate of permanent residents household in terms of OPD services utilization at village clinics, while hold all other variables constant. The second hypothesis in this study is held.

For answering the third hypothesis, younger elderly people have higher OPD services utilization than older elderly people. We can see the regression results in terms of OPD services use among three kinds of health facilities. Older elderly visit the doctor at township clinics and county hospitals for OPD services 1.9% and 2.3% less than younger elderly respectively. The third hypothesis can be accepted.

6.2 Recommendations

Among the findings in this study, high OOP rate would have been a 58% decrease for OPD services utilization in village clinics than those with lower OOP

rates. We recommend that government should continually increase reimbursement rate, lower OOP rate to encourage higher use of OPD services, as some people do not visit hospitals because OOP payments were expensive (Wu, 2012).

Results also showed that younger elderly people have higher OPD services utilization than older elderly people; higher rate of permanent residents induced a higher OPD services utilization at village clinics among elderly residents. An elderly person with family member's support seems have higher likelihood access health care services. There should be a systematic, sensitive system to record elderly people's physical conditions. Health system that can provide immediate health care services to elderly people, who need or may need in a specific period, will encourage the elderly to take full advantage of available health services.

Elderly people who smoke are expected to use more OPD services at township clinics. Therefore, it would prove beneficial to ensure the elderly on disastrous effects of smoking, even though, they would not quite immediately, but the education should aim to decrease their consumption on a daily basis to improve their health condition. Community need organize more outside activities. Since, it is helpful for elderly quit smoking.

6.3 Limitations of the study and possible extensions

Because we use total household gross-income in our model, we don't know how much money one family spend for elderly people, how much percent used for medical

treatment and this study set the smoking variable as smoking or not, we do not know the number of cigarettes consumed per day. Hence, we had compared smoking elderly with non-smoking elderly but could not give evidence on how cigarettes effect elderly's health care utilization. We don't know how many elderly should have medical treatment but they cannot due to how accessibility to health care services or they have no wiliness to seek health care.

Time was calculated as time cost, conclude as indirect cost for seeking health care services, while, time spent depends on transportations, public infrastructure construction, people's willingness to seek health care, and ability for elderly to reach to hospitals. When we do regression among all elderly people in this study above, an individual, who spend more time travel to the nearest health care facility visit the doctor at village clinics and county hospitals for OPD services 1.4% and 1.2% less than those who spend shorter respectively. We cannot provide evidence to say time is a unique factor influencing elderly people's health care services accessibility. It should consider the distance to primary, secondary, and tertiary health facility as well.

There has been no study on the influence of the rate of permanent residents on IPD services. We know the rate of permanent residents in household; but we don't know whether the residents were healthy or disabled. We do not know how many hours they spend per day to accompany the elderly. Older elderly living with their children, who may helpful for health care services. On the other hand, even if they

live in same village; but in different yard, children are busy on farming or other businesses and cannot provide help to elderly.

A study should also be conducted to find out why the elderly feel uncomfortable uses lower IPD services than those who do are at ease. The required factors should include professional personnel examined health condition, because we do not know whether the perceived physical condition is exactly equal to health services care demand or not.

Another limitation in this study is that there was no data for the specific time between patients applying for reimbursement and patients receiving the reimbursement. There was also a lack in the data in way of reimbursement, immediate reimbursement or late reimbursement. In descriptive analysis part, this study lack data in death rate of major disease for Wuyuan and Wulate county, hence, we used Linhe district data instead, since it is the administrative area of Bayannaoer and may reflect the death causes in the whole area. This study use cross-sectional data are not allowed to establish causality. A small number of observations may cause some variables are not significant in these regressions.

Further studies about IPD services utilization should take disease and symptom into account. Different kinds of disease have different direct effect on people's decision on what kinds of hospitals will be chosen. Moreover, it may determine the number of visits in each health facility to recover from disease.

Further studies on elderly people in rural areas should focus on qualitative methods as well, because we can better understand the reason why those factors can have positive or negative effect on health care utilization.

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APPENDIX

APPENDIX A *Zero-truncated Poisson regression for OPD services utilization at village clinics (Dependent variable: NOVC)*

Log likelihood = -860.34733   Prob> chi2= 0.0000 Pseudo R2=0.0859 N=176

```
. ztp numberofvisit sex ethnicity maritalstatus age education occupation PR smoking dringking grossincome timespend OOP
> VCrate PPC,irr


Iteration 0:   log likelihood = -861.03106
Iteration 1:   log likelihood = -860.34895
Iteration 2:   log likelihood = -860.34733
Iteration 3:   log likelihood = -860.34733


Zero-truncated Poisson regression              Number of obs   =       176
                                               LR chi2(13)     =    161.76
                                               Prob > chi2     =    0.0000
Log likelihood = -860.34733                    Pseudo R2       =    0.0859
```

numberofvisit	IRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
sex	1.144033	.069315	2.22	0.026	1.015934	1.288283
ethnicity	1.106875	.1031112	1.09	0.276	.9221568	1.328595
maritalstatus	1.254276	.0882833	3.22	0.001	1.092649	1.439811
age	1.007927	.0046562	1.71	0.087	.9988424	1.017094
education	1.003576	.0625307	0.06	0.954	.8882062	1.133932
occupation	1.341239	.0865116	4.55	0.000	1.18196	1.521983
PR	.9998876	.0001642	-0.68	0.494	.9995658	1.00021
smoking	.9346805	.0576261	-1.10	0.273	.8282927	1.054733
dringking	.7611435	.0974534	-2.13	0.033	.5922191	.9782517
grossincome	.9551833	.0081545	-5.37	0.000	.9393337	.9713004
timespend	.9862447	.003453	-3.96	0.000	.9795	.9930357
OOPVCrate	.5796847	.0596507	-5.30	0.000	.4738071	.7092218
PPC	.940366	.0539084	-1.07	0.283	.840427	1.052189
_cons	6.540718	2.396158	5.13	0.000	3.190011	13.41092

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APPENDIX B *Zero-truncated Poisson regression for OPD services utilization at township clinics (Dependent variable: NOTC)*

Log likelihood = -1273.1293   Prob> chi2= 0.0000   Pseudo R2=0.148   N=194

```
. ztp  numberofvisitinTC sex ethnicity maritalstatus age education occupation PR smoking dringking grossincome timespen
> d  OOPTCrate PPC,irr


Iteration 0:   log likelihood = -1274.3872
Iteration 1:   log likelihood = -1273.1333
Iteration 2:   log likelihood = -1273.1293
Iteration 3:   log likelihood = -1273.1293
```

```
Zero-truncated Poisson regression            Number of obs   =        194
                                             LR chi2(13)     =     442.34
                                             Prob > chi2     =     0.0000
Log likelihood = -1273.1293                  Pseudo R2       =     0.1480
```

numberofvisitinTC	IRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
sex	1.177147	.0716913	2.68	0.007	1.044697	1.326389
ethnicity	3.70707	.7853439	6.18	0.000	2.447391	5.615107
maritalstatus	2.196853	.1986964	8.70	0.000	1.839981	2.622943
age	.9805139	.0052568	-3.67	0.000	.9702647	.9908713
education	.8100561	.0514128	-3.32	0.001	.7153044	.9173589
occupation	.8166662	.0511568	-3.23	0.001	.7223115	.9233465
PR	.293602	.0354117	-10.16	0.000	.23179	.3718976
smoking	1.320728	.0783622	4.69	0.000	1.175735	1.483602
dringking	.4237878	.0882359	-4.12	0.000	.2817875	.6373458
grossincome	1.010936	.0082411	1.33	0.182	.9949118	1.027218
timespend	1.002095	.0018871	1.11	0.266	.9984033	1.0058
OOPTCrate	1.490714	.154626	3.85	0.000	1.216473	1.82678
PPC	1.187345	.0666778	3.06	0.002	1.063594	1.325494
_cons	8.071642	3.813083	4.42	0.000	3.197791	20.37388

.

APPENDIX C *Zero-truncated Poisson regression for OPD services utilization at county hospitals (Dependent variable: NOCH)*

Log likelihood = -403.06162   Prob> chi2= 0.0000   Pseu

```
. ztp   numberofvisitinCH sex ethnicity maritalstatus age education occupation PR smoking dringking grossincome timespe
> nd   OOPCHrate PPC,irr

Iteration 0:   log likelihood = -407.98851
Iteration 1:   log likelihood =  -403.0868
Iteration 2:   log likelihood = -403.06163
Iteration 3:   log likelihood = -403.06162


Zero-truncated Poisson regression              Number of obs   =       200
                                               LR chi2(13)     =     34.55
                                               Prob > chi2     =    0.0010
Log likelihood = -403.06162                    Pseudo R2       =    0.0411
```

numberofvisitinCH	IRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
sex	.894761	.1140156	-0.87	0.383	.6970149	1.148609
ethnicity	1.058841	.2239214	0.27	0.787	.6995531	1.602659
maritalstatus	.7676401	.1115162	-1.82	0.069	.5774341	1.0205
age	.976787	.0096604	-2.37	0.018	.9580352	.9959057
education	1.10707	.1422702	0.79	0.429	.8605704	1.424175
occupation	1.019964	.125744	0.16	0.873	.8010252	1.298743
PR	1.000247	.0001745	1.41	0.158	.9999046	1.000589
smoking	.895012	.1172852	-0.85	0.397	.6922847	1.157106
dringking	.8409369	.2062411	-0.71	0.480	.5200019	1.359947
grossincome	1.01739	.0066045	2.66	0.008	1.004528	1.030418
timespend	.9881424	.004942	-2.39	0.017	.9785036	.9978761
OOPCHrate	1.606407	.5232013	1.46	0.146	.8484423	3.041509
PPC	1.035302	.1212647	0.30	0.767	.8229356	1.302471
_cons	8.457343	7.024106	2.57	0.010	1.660667	43.07103

.

APPENDIX D *Zero-inflate Poisson regression for IPD services utilization*

(Dependent variable: NVIP)   Log likelihood = -463.12444   Prob> chi2= 0.0000   Pseudo R2=0.0938   N=749

```
Zero-inflated Poisson regression              Number of obs   =      749
                                              Nonzero obs     =      122
                                              Zero obs        =      627

Inflation model = logit                       LR chi2(10)     =    42.45
Log likelihood  =  -430.191                   Prob > chi2     =   0.0000
```

numberofhospitalized	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
numberofhospitalized						
sex	.169227	.1850075	0.91	0.360	-.1933812	.5318351
ethnicity	-.3363632	.3100688	-1.08	0.278	-.944087	.2713605
maritalstatus	.4869536	.2298734	2.12	0.034	.03641	.9374971
age	.0253338	.0129876	1.95	0.051	-.0001215	.050789
education	.1525169	.1973066	0.77	0.440	-.2341969	.5392307
occupation	-.735347	.1900702	-3.87	0.000	-1.107878	-.3628162
PR	-.5163914	.352619	-1.46	0.143	-1.207512	.1747291
dringking	.2445765	.3174398	0.77	0.441	-.377594	.8667469
grossincome	.0015251	.0128465	0.12	0.905	-.0236536	.0267038
PPC	-.6625805	.191951	-3.45	0.001	-1.038797	-.2863636
_cons	-1.256432	1.034889	-1.21	0.225	-3.284778	.7719134
inflate						
smoking	1.049371	.2856472	3.67	0.000	.4895124	1.609229
timespend	-.0218612	.0132977	-1.64	0.100	-.0479243	.0042019
_cons	.6108001	.2647515	2.31	0.021	.0918967	1.129704

```
Vuong test of zip vs. standard Poisson:          z =     3.33  Pr>z = 0.0004
```

.

APPENDIX E *Zero-truncated Poisson regression for OPD services utilization at village clinics for age 60-70 years old (Dependent variable: NOVC)*

Age 60-70   Log likelihood = -546.27012   Prob>chi2= 0.0000

Pseudo R2=0.1438   N=106

```
. ztp numberofvisit sex ethnicity maritalstatus age education occupation PR smoking dringking grossincome timespend OOP
> VCrate PPC,irr


Iteration 0:   log likelihood = -546.35279
Iteration 1:   log likelihood = -546.27015
Iteration 2:   log likelihood = -546.27012


Zero-truncated Poisson regression              Number of obs   =       106
                                               LR chi2(13)     =    183.44
                                               Prob > chi2     =    0.0000
Log likelihood = -546.27012                    Pseudo R2       =    0.1438
```

numberofvisit	IRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
sex	.8302004	.069859	-2.21	0.027	.7039742	.9790596
ethnicity	1.115186	.1238638	0.98	0.326	.897024	1.386405
maritalstatus	1.57591	.1922019	3.73	0.000	1.240843	2.001457
age	1.016602	.0136772	1.22	0.221	.9901452	1.043765
education	1.150633	.0938602	1.72	0.085	.9806228	1.350117
occupation	1.27521	.1318385	2.35	0.019	1.041309	1.561651
PR	1.478783	.1992111	2.90	0.004	1.135629	1.925627
smoking	1.213406	.1047903	2.24	0.025	1.024462	1.437197
dringking	.8742535	.117026	-1.00	0.315	.6725074	1.136521
grossincome	.9448748	.0118126	-4.54	0.000	.9220039	.9683131
timespend	.9555023	.0053778	-8.09	0.000	.9450199	.966101
OOPVCrate	.5011397	.0688734	-5.03	0.000	.3828029	.6560584
PPC	1.00055	.073188	0.01	0.994	.8669126	1.154788
_cons	3.449319	3.254412	1.31	0.189	.5427875	21.91982

APPENDIX F *Zero-truncated Poisson regression for OPD services utilization at village clinics for age 71 years old and above (Dependent variable: NOVC)*

Age≥71 log likelihood = -244.3719 Prob>chi2= 0.0000 Pseudo R2=0.0000 N=70

```
. ztp numberofvisit sex ethnicity maritalstatus age education occupation PR smoking dringking grossincome timespend OOPV
> Crate PPC,irr


Iteration 0:   log likelihood = -244.70602
Iteration 1:   log likelihood = -244.37394
Iteration 2:   log likelihood =  -244.3719
Iteration 3:   log likelihood =  -244.3719


Zero-truncated Poisson regression              Number of obs   =        70
                                               LR chi2(13)     =    116.94
                                               Prob > chi2     =    0.0000
Log likelihood =  -244.3719                    Pseudo R2       =    0.1931
```

numberofvisit	IRR	Std. Err.	z	P>|z|	[95% Conf. Interval]	
sex	1.569279	.1589135	4.45	0.000	1.286776	1.913804
ethnicity	.9882754	.2095163	-0.06	0.956	.6522613	1.497388
maritalstatus	1.092225	.1087926	0.89	0.376	.8985189	1.327692
age	.9926131	.0101315	-0.73	0.468	.972953	1.012671
education	.952598	.1083615	-0.43	0.669	.7622236	1.190521
occupation	1.598266	.148167	5.06	0.000	1.332719	1.916724
PR	.9995867	.0001695	-2.44	0.015	.9992545	.9999191
smoking	.6624365	.0705998	-3.86	0.000	.5375596	.8163226
dringking	.2018194	.1883794	-1.71	0.086	.0323927	1.257417
grossincome	.9720629	.0123561	-2.23	0.026	.9481446	.9965845
timespend	1.012223	.0052198	2.36	0.018	1.002044	1.022506
OOPVCrate	.6262898	.124889	-2.35	0.019	.4236786	.9257935
PPC	.8219256	.0939356	-1.72	0.086	.6569784	1.028286
_cons	15.40178	13.37915	3.15	0.002	2.806423	84.52569

APPENDIX G Correlative matrix

```
. correlate numberofvisit sex age maritalstatus education occupation smoking dringking OOP PR PPC ethnicity grossincome
> timespend
(obs=8)
```

	number~t	sex	age	marita~s	educat~n	occupa~n	smoking	dringk~g	OOP	PR	PPC
numberofvi~t	1.0000										
sex	0.5296	1.0000									
age	-0.3263	-0.1404	1.0000								
maritalsta~s	0.4027	0.2582	-0.8880	1.0000							
education	-0.6610	-0.7746	0.4893	-0.6000	1.0000						
occupation	0.4027	0.2582	-0.8880	1.0000	-0.6000	1.0000					
smoking	0.3723	0.2582	-0.1993	-0.0667	-0.0667	-0.0667	1.0000				
dringking	.	.	.	.	.	.	.	.			
OOP	-0.1351	-0.0875	-0.8164	0.5532	-0.1694	0.5532	0.1016	.	1.0000		
PR	0.3655	0.0776	-0.3230	0.2081	-0.1988	0.2081	-0.1618	.	0.3417	1.0000	
PPC	0.3875	0.2582	-0.5618	0.6000	-0.4667	0.6000	0.0667	.	0.1694	0.2605	1.0000
ethnicity	.	.	.	.	.	.	.	.	.	.	.
grossincome	-0.2286	0.0345	0.3428	-0.1864	0.1978	-0.1864	0.1973	.	-0.5222	-0.8413	0.1378
timespend	-0.5236	-0.7498	0.1682	-0.0082	0.6680	-0.0082	-0.4444	.	-0.1482	-0.3734	-0.1227

	ethnic~y	grossi~e	timesp~d
ethnicity	.		
grossincome	.	1.0000	
timespend	.	0.3655	1.0000

.

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