FACTORS AFFECTING HEALTH SERVICE UTILIZATION AMONG RURAL RESIDENT WITH CHRONIC DISEASES: A CASE STUDY OF BAYAN NUR CITY, CHINA

Miss Zhihui Wang

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Health Economics and Health Care Management
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ปัจจัยที่ส่งผลต่อการใช้บริการสุขภาพของคนไข้โรคเรื้อรังในชนบท: กรณีศึกษานครบายันนอร์ ประเทศจีน

นางสาวไซฮุย หวัง

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
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By	Miss Zhihui Wang
Field of Study	Health Economics and Health Care Management
Thesis Advisor	Associate Professor Pongsa Pornchaiwiseskul, Ph.D.

Accepted by the Faculty of Economics, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

.....Dean of the Faculty of Economics

(Associate Professor Chayodom Sabhasri, Ph.D.)

THESIS COMMITTEE

.....Chairman

(Associate Professor Siripen Supakankunti, Ph.D.)

.....Thesis Advisor

(Associate Professor Pongsa Pornchaiwiseskul, Ph.D.)

.....Examiner

(Sawarai Boonyamanond, Ph.D.)

.....External Examiner

(Phusit Prakongsai, M.D.)

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การบริการทางการแพทย์เป็นนโยบายสำคัญที่เป็นประเด็นขบคิดในประเทศจีนและนี่ก็เป็นการสำรวจเชิงพรรณนาโดยใช้วิธีCross section ใน เมือง Bayan Nur ซึ่งมีวัตถุประสงค์ในการหาปัจจัยที่ส่งผลกระทบต่อการใช้บริการทางการแพทย์ของผู้คนที่เป็นโรคเรื้อรังในท้องถิ่นทุรกันดาร ข้อมูลที่นำมาใช้เป็นข้อมูลทุติยภูมิ ประกอบด้วย คนไข้ตัวอย่าง 410 คนที่ได้รับการรักษาในแผนกผู้ป่วยนอก และอีก 112 คนที่ได้รับการรักษาในแผนกผู้ป่วยใน โดยใช้วิธี OLS regression และ Poisson regressionเพื่อวิเคราะห์ข้อมูล นอกจากนี้ ยังมีการใช้ดัชนีความเข้มข้นและเส้นแนวโน้มของความเข้มข้นเพื่อประมาณความเท่าเทียมระหว่างแผนกผู้ป่วยนอกและผู้ป่วยในแปดเมืองหลัก ผลการศึกษาแสดงให้เห็นว่าอัตรารายได้เฉลี่ยครัวเรือนที่นับเฉพาะผู้ใหญ่และอายุ โรคเรื้อรัง สถานที่อยู่ สถานการณ์สมรส อาชีพและสถานพยาบาล มีผลต่อการใช้บริการทางการแพทย์สำหรับแผนกผู้ป่วยใน ขณะที่ อายุ จำนวนเตียง โรคเรื้อรัง ที่อยู่ รายได้ต่อครัวเรือน สถานพยาบาล อาชีพ ส่งผลกระทบต่อการใช้บริการสุขภาพของแผนกผู้ป่วยนอก นอกจากนี้ ดัชนีความเข้มข้นได้ระบุว่าคนรายได้น้อยมีแนวโน้มที่จะได้รับผลกระทบทางลบกับการบริการทางการแพทย์แผนกผู้ป่วยในได้ง่ายกว่า การที่ดัชนีความเข้มข้นของผู้ป่วยในสูงกว่าผู้ป่วยนอกแสดงให้เห็นว่าแผนกผู้ป่วยในมีความไม่เท่าเทียมมากกว่า และจากการเปรียบเทียบในแปดเมืองหลักที่ใช้พบว่า Bayanhua เป็นเมืองที่มีความไม่เท่าเทียมกันในแง่ของการใช้บริการทางการแพทย์

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ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

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ZHIHUI WANG: FACTORS AFFECTING HEALTH SERVICE UTILIZATION AMONG RURAL RESIDENT WITH CHRONIC DISEASES: A CASE STUDY OF BAYAN NUR CITY, CHINA. ADVISOR: ASSOC. PROF. PONGSA PORNCHAIWISESKUL, Ph.D., 114 pp.

Health services utilization are important policy concern in China. This is a cross sectional descriptive survey in Bayan Nur city, China. This study aims to find out factors which affect health services utilization among rural residents with chronic diseases. Data was secondary data. It consists of 410 patients who received treatment in outpatient department, and 112 patients who received treatment in inpatient department. OLS regression and Poisson regression methods were used to analyze the data. In addition, concentration index and concentration curve were used estimated equality in outpatient and inpatient department and in eight townships. The results of this study show that household income per adult equivalent scale and age, chronic disease, county, marital status, occupation and medical institution have impacts on health services utilization in inpatient department. Age, bed, chronic disease, county, household income per capital and distance, education, family size, gender, medical institution and occupation influences health services utilization in outpatient department. In addition, concentration index indicate that poorer people tend to more easily suffer inequity of inpatient health services. Moreover, the concentration index of inpatient is higher than outpatient, it means the inpatient have more inequality. By comparison of the eight townships, Bayanhua Township appears to have more inequality than others.

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

Advisor's Signature .....

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LIST OF ABBREVIATIONS

NBSC	National Bureau of Statistic of China
WHO	World Health Organization
BNCG	Banyan Nur City Government
MOH	Ministry of Health
UNDP	United National Development program
CCDC	Chinese Center for Disease Control and Prevention
BNCG	Bayan Nur city government
WBG	Wulateqianqi banner government
WCG	Wuyuan county government

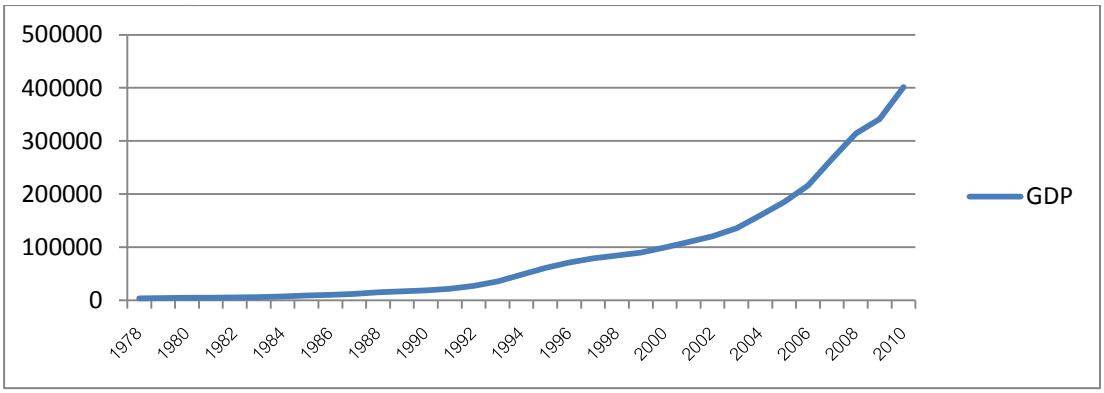
CHAPTER I

INTRODUCTION

1.1 Rationale

In 1978, Deng Xiaoping as the leader of the China government decided to implement reform and opened up policy environment, China's economy has seen rapid development. In the last 30 years, China's GDP increased significantly, from 364,522 million in 1978 to 401,512.8 million in 2010 (NBSC, 2012). In corresponding, People's living standards improved. Per capita balance of saving deposit increased from 623 yuan in 1990 to 22,619 yuan in 2010 (NBSC, 2012). The Chinese government put forward concept of "rejuvenating the city by science and technology, people-oriented" in 1995, it means under the premise to ensure people's health, focus on developing science and education career. In only 20 years, China's health career and education career has seen rapid development, respectively. China's beds in health care institutions increased from 0.22 million in 1980 to 0.48 million in 2011(NBSC, 2012). Basic education funds increased from 8,670.5 million in 1992 to 195,618.5 million in 2010 (NBSC, 2012) (see figure 1, 2, 3 table 1).

Figure 1 China's GDP 1978-2010



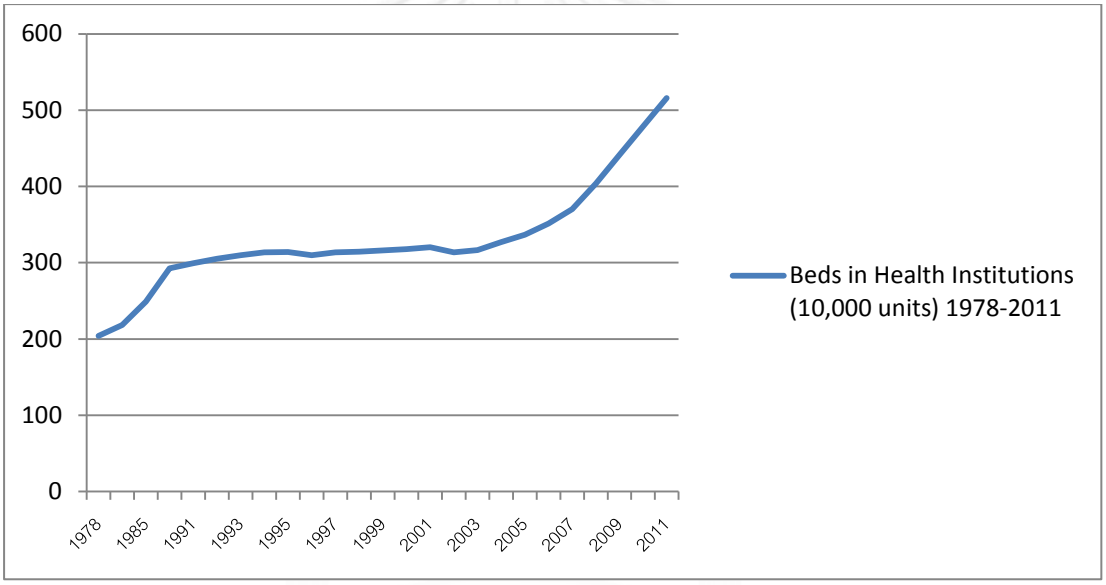
(Source: NBSC, 2012)

Table 1 Per Capita Balance of Saving Deposit

Year	Per Capita Balance of Saving Deposit (yuan)
1990	622.72
2000	5075.82
2010	22619
2011	25505

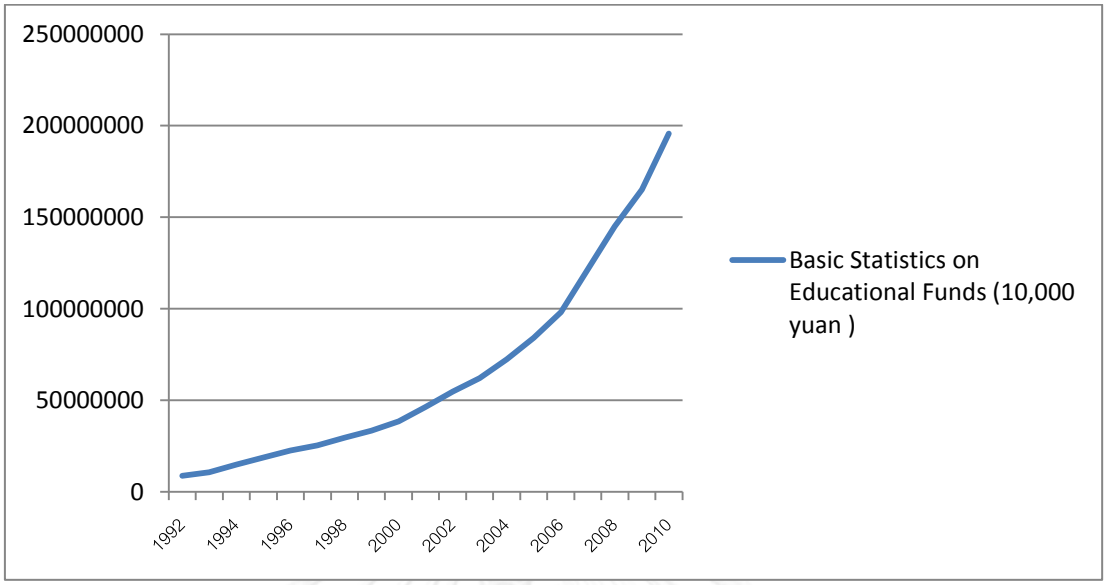
(Source: NBSC, 2012)

Figure 2:Beds in Health Institutions 1978-2011



(Source: NBSC, 2012)

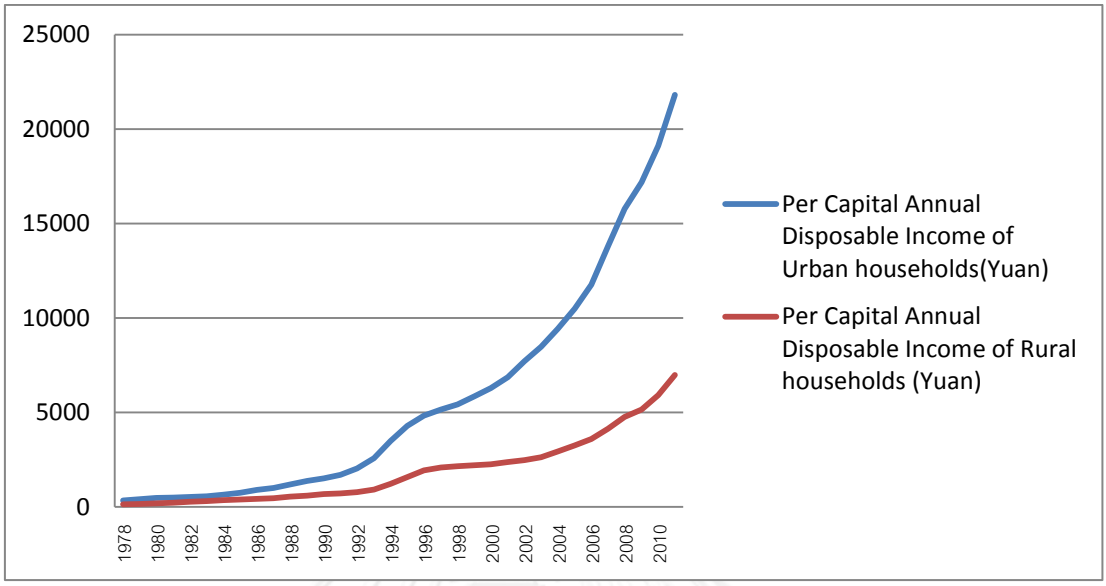
Figure 3: Basic Statistics on Educational Funds 1992-2010



(Source: NBSC, 2012)

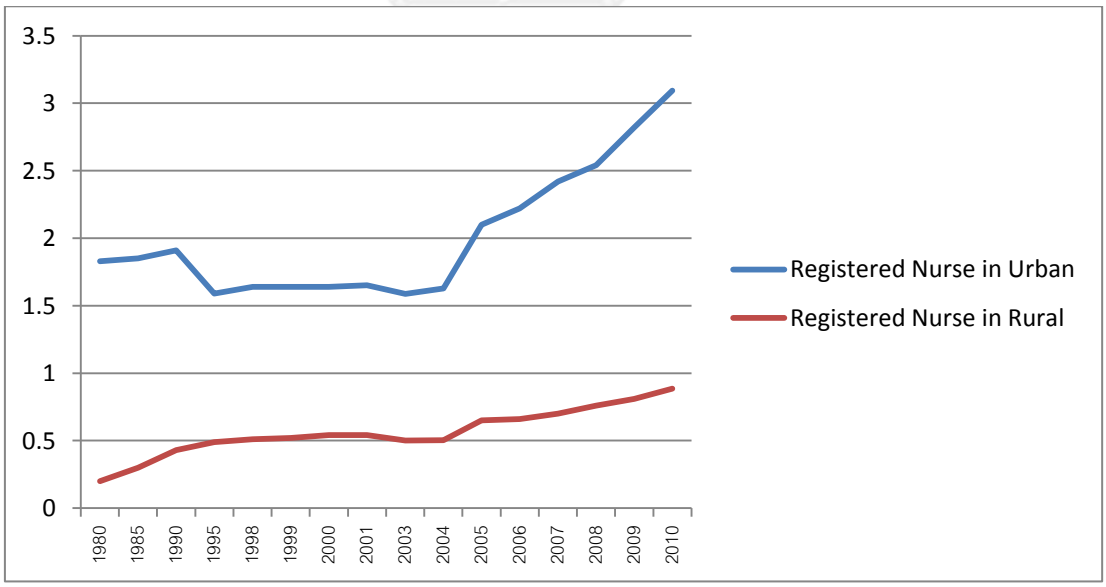
While China's economy grew greatly nationwide from 1970s, a gap existed between urban and rural population in terms of development, after 30 years, this gap is seen to be growing. For example, In terms of income, china's per capita annual disposable income of rural household was 133.6 in 1978 and urban household's was 343.4 yuan in 1978, after 30 years, per capita annual disposable income of rural household was 6977.3 yuan in 2010 and urban household's was 21,809.8 yuan in 2010(NBSC, 2012). In term of health resource, the registered Nurse in Health Care Institutions per 1000 Persons was 0.20 person in rural areas in 1980 and urban areas' was 1.83 person in 1980, after 30 years, the registered Nurse in Health Care Institutions per 1000 Persons was 0.89 person in rural areas in 2010 and urban areas' was 3.09 person in 2010(NBSC, 2012) (see figure 4, 5).

Figure 4: Per Capital Annual Disposable Income of Urban and Rural households 1978-2011



(Source: NBSC, 2012)

Figure 5: Registered Nurse in Health Care Institutions per 1000 Persons

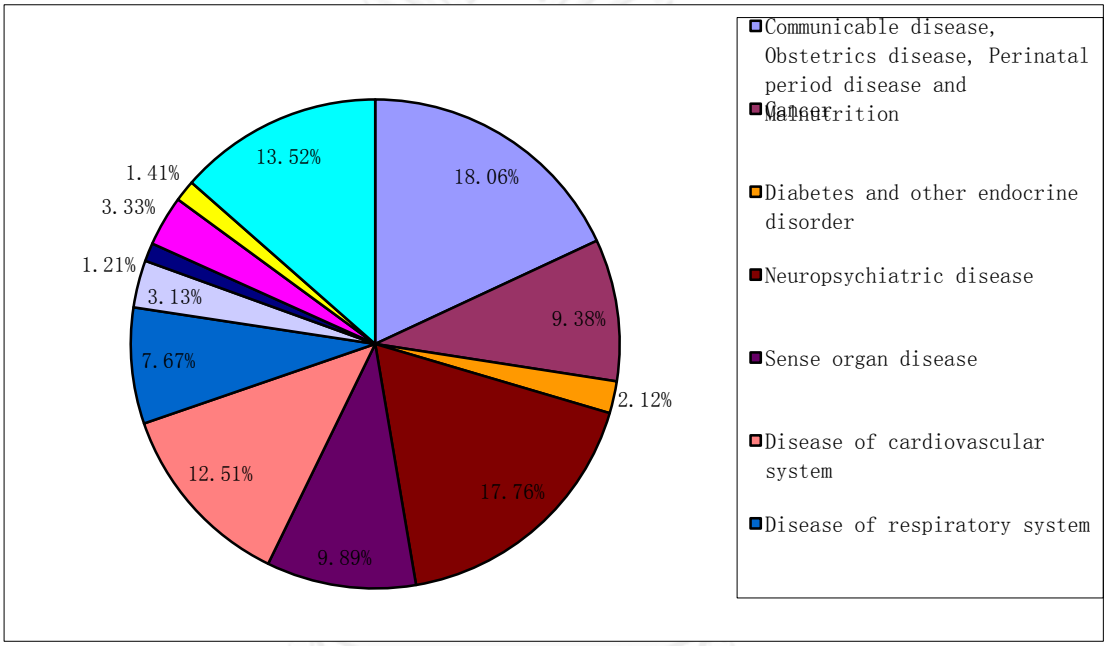


(Source: NBSC, 2012)

Even though the number of China residents with infectious disease has become less and less, instead, resident with chronic disease on the increase. The

total proportion of the chronic diseases in the burden of diseases was 68.6% (see figure 6), chronic disease has brought great economic burden to China residents. According to situation of burden of chronic diseases, China's Ministry of Health has begun work to shift the focus to govern chronic diseases and most of provinces were also ready to establish compensation mechanism for residents with chronic diseases.

Figure 6: China's disease burden character



(Source: WHO, Burden of diseases study, 2012)

In recent years, some provinces had established chronic diseases' compensation mechanism, but the Inner Mongolia Autonomous Region still has not establish a perfect compensation mechanism for chronic diseases. Thanks to the prevalence rate of chronic disease which was higher in rural areas, so this study focuses on research health services utilization among rural residents with chronic disease in Inner Mongolia's rural areas.

Through to assess rural residents with chronic disease's health services utilization, this study will show factors which influence rural residents with chronic

disease's health services utilization and then we can target. In addition, using concentration index we can know the situation of equity of health services in Banyan Nur city. This valuable information will provide some recommendations for Inner Mongolia Autonomous Region medical and health system. To provide the data base to establish the compensation policy of chronic disease in Inner Mongolia Autonomous Region, the Policy maker can adjustment compensation policy emphasis which according to the chronic patients' outpatient and inpatient health services utilization, and improve the efficiency of the compensation policy of chronic diseases to rural resident, and final aim is to reduce the economic burden of rural residents which is beneficial for making policy and people welfare.

1.2 Research Questions:

General questions:

What factors affect health services utilization of rural residents with chronic disease and its equality in Banyan Nur city, China?

Specific question:

1 What factors affect health services utilization of rural residents with chronic disease's Bayan Nur city, China?

2 Which has more equality between rural resident who suffer from chronic disease's inpatient and outpatient health services utilization in Bayan Nur city, China?

3 What is the equality situation for each of the eight regions?

1.3 Research Objectives:

General objective:

To measures influence factors of rural residents with chronic disease's health services utilization and its equality in Banyan Nur city, China.

Specific objective

1. To describe the situation of rural resident, such as chronic diseases, social-demographic, size of family and health services accessibly.

2. To analyze the factors that influence rural residents with chronic disease's health services utilization.

3. To assess equality between rural residents with chronic disease's inpatient and outpatient health services utilization in Bayan Nur city, China.

4. To compare the level of equality across regions in Bayan Nur city, China.

1.4 Scope of the study

This study researches the rural residents with chronic disease's health services utilization and its equity in Bayan Nur city which is a city in central-west Inner Mongolia, China. This fieldwork was conducted from July 10, 2011 to July 14, 2011 and included 2004 household, there are 522 residents with chronic disease who are diagnosed by doctors.

1.5 Expected Benefits

This study is an assessment of rural residents with chronic disease's health services utilization equity in Inner Mongolia, China. This study involves the following three aspects: Firstly, this study shows factors affecting rural residents with chronic disease's health services utilization including socioeconomic status, demographic characteristic and clinical characteristics. Secondly, this study will indicate that

outpatient services utilization has more equity than inpatient services utilization. Lastly, Baiyanhua Township has most inequity than the others in health services utilization.

The information from this study is useful for:

- This study provides information to Health policy makers, to improve chronic disease's health services utilization and to reduce inequity in inpatient services by their relevant policy.
- Health policy makers can use this information to establish compensation policy of chronic diseases in Inner Mongolia areas.
- Rural areas' medical facilities are relatively smaller than urban areas', this information shows real situation in Baiyanhua Township, that to only increase the number of medical facility and medical person, might solve the problem of economic burden of chronic disease in rural areas, and reduce the gap between rural and urban areas.
- This information is useful for Inner Mongolia's economic department, education department. Such as policy makers in economic department can use this information to develop the minimum finance Medicaid program.

CHAPTER II
BACKGROUND

2.1 General Overview of Bayan Nur city, Inner Mongolia, China

China, the People's Republic of China, is located in East Asia. The People's Republic of China was founded in 1949 and established the people's congress system in China. China is the most populous country in the world where has a total of 1.34735 billion citizens (NBSC, 2012), and covers areas of 9.6 million square kilometers. A total of 23 Chinese provinces, five autonomous regions (Inner Mongolia, Ningxia, Tibet, Guangxi and Xinjiang), four municipalities (Beijing, Shanghai, Tianjin and Chongqing) and two special administrative regions, is the Hong Kong and Macao special administrative regions respectively. A total of 56 Chinese ethnic groups among the Han is the most important nation. The capital is Beijing.

Inner Mongolia Autonomous Region, Located in the northern frontier of Chinese (Figure 7), the total land areas of 1,183,000 square kilometers, accounting for 12.3% of the China's total surfaces, and in China's all provinces, city and autonomous region ranked third, north and Mongolia, Russian border. Inner Mongolia Autonomous Region was composed of 12 two cities (Hohhot City, Baotou City, Hulun Buir City, Hing'an, Tongliao, Chifeng City, Xilin Gol League, Ulanqab city, Ordos City, Bayan Nur city, Wuhai City and Alashan), the Autonomous Regions' capital is Hohhot city. In 2011, the whole population of 24,820,000 citizens, of which the main ethnic is Han Chinese, followed by Mongolian. In the same year, GDP is 1.588058 trillion yuan (NBSC, 2012). In addition, per capita annual net income of rural households is 6,977.3 yuan and per capita annual net income of urban households is 21,809.8 yuan in 2011 (NBSC, 2012).

Bayan Nur city is an emerging city in Inner Mongolia in the Midwest; the provinces' capital is Linhe district, North and bordering Mongolia. Covers total areas of 64,000 square kilometers, a total of 176 million people. Banyan Nur city a total of 1 municipal district, 2 townships and 4 towns (Linhe District, Wuyuan County, Dengkou County, Wulateqian Banner, Wulatezhong Banner, Wulatehou Banner, Hangjinhou Banner.).In 2011, GDP is 71.85 billion yuan. Per capita annual net income of rural households is 9,483 yuan and per capita annual net income of urban households' is16, 386 yuan (BNCG, 2011).

Figure 7: The map of Inner Mongolia

(Source: Google. Inner Mongolia Map)

2.2 China's Health care system

2.2.1 China's health insurance system

There are primarily three types of basic medical insurance in China. Respectively are New Rural Cooperative Medical Scheme (NRCMS), Basic Medical Insurance for Urban Employees (BMIUE) and Basic Medical Insurance for Urban Residents (BMIUR).

2.2.1.1 New Rural Cooperative Medical Scheme (NRCMS)

Under China's planned economy, almost rural residents were covered by a traditional Rural Cooperative Medical Insurance Scheme which was established in the 1950s, and this scheme was based on the People's Commune system. But in 1980s, China started its transition from planned economy to market economy, the People's Commune System was collapsed, the traditional Rural Cooperative Medical Insurance Scheme finally disappeared too. Without the traditional Rural Cooperative Medical Insurance Scheme, the situation of burden of disease was very serious in the rural China. People urgent need for health care scheme in order to affordable health care expenditure, so the New Rural Cooperative Medical Scheme (NRCMS) is being developed in 2003.

According to the official government statistics, from 2003 to 2008, the coverage of the scheme expanded dramatically, table 2 presents the NRCMS on the aspect of data start, enrolled, coverage, guideline, administration, risk pooling, target population, insurance premium, financing mechanism, designated health facilities and covered services.

Table 2: Character of the NRCMS

Objective	Interpretation
Date started	2003
Enrolled	Voluntary at rural household level
Coverage	97.5% of whole population in 2012
Guideline	General guideline was issued by the central government ,local government (province and county government) retain considerable discretion over the details
Administration	County government sets the reimbursement rate, ceilings, medical saving account, etc.
Risk pooling	County level
Target population	Rural residents (832 million)
Insurance premium	Individual contribution per capital per year : 2003-2012 : 10 RMB (US$1.60)- 60 RMB (US$9.63) Central and local government contribution per capital per year : 2003-2012 : 10 RMB (US$1.60)- 240 RMB (US$38.51)
Financing mechanism	In the western and central China ,the central government assisted the local government in providing financing for the scheme .In the more affluent eastern and coastal region ,financing the premium was mainly through local government
Designated health facilities	All levels of health facilities
Covered services	Inpatient series, catastrophic outpatient

	services, some prevention care services.

(Source: author)

In 2011, NRCMS already covered 2,637 counties, 832 million people is enrolled, enrollment rate is 97.5%, and central government total put fund raised in 2011 is 204,760 million and payout is 171,020 million, per capita fund-raising 246.2 yuan, number of beneficiaries reimbursement is 1,315 million in China. Table 3 shows detail information about NRCMS from 2007 to 2011.

Table 3: Conditions of NRCMS, China, 2007-2011

Indicator	2007	2008	2009	2010	2011
Number of counties of NRCNS	2451	2729	2716	2678	2637
Number of Enrollees (100 Million)	7.26	8.15	8.33	8.36	8.32
Enrollment Rate (%)	86.2	91.5	94.0	96.0	97.5
Total Fund Raised at Current Year (100 Million yuan)	428.0	785.0	944.4	1308.3	2047.6
Per Capita Fund-raising Standard (yuan)	58.9	96.3	113.4	156.6	246.2
Payout at Current Year (100 million yuan)	346.6	662.0	922.9	1187.8	1710.2
Number of Beneficiaries from Reimbursement (100 Million)	4.53	5.85	7.59	10.87	13.15

(Source: MOH , 2012)

In 2011, Inner Mongolia covered 96 counties, 124,020,000 people are enrolled, per capita fund-raising 246.2 yuan, and number of beneficiaries from NRCMS reimbursement is 83,500,000. Table 4 shows detail information about NRCMS in 2011.

Table 4: Condition of NRCMS, Inner Mongolia, 2011

Objective	Number
Counties of NRCMS	96
Number of Enrollees (10,000)	1240.2
Per Capita Fund-raising Standard (yuan)	246.4
Beneficiaries from Reimbursement (10,000)	835.0

(Source: MOH, 2012)

In 2011, Bayan Nur city have 94,180,000 people are enrolled, enrollment rate is 98.57%, and central government total put fund raised in 2011is 231 million yuan, per capita fund-raising 245 yuan, number of beneficiaries from NRCMS reimbursement is 12,260,000. Table 5 shows detail information about NRCMS in 2011.

Table 5: Condition of NRCMS, Banyan Nur city, 2011

Objective	Number
Number of Enrollees (10,000)	94.18
Enrollment Rate (%)	98.57
Total Fund Raised at Current Year (100 Million yuan)	2.31
Per Capita Fund-raising Standard (yuan)	245
Payout at Current Year (100 million yuan)	1.88
Number of Beneficiaries from Reimbursement (10,000)	122.6

(Source: MOH, 2012)

2.2.1.2 **Basic Medical Insurance of Urban Employees (BMIUE)**

Since the 1980s, China government conducted a series of reform to the BMIUE. From 1980 to 1992, the main goal of reform of BMIUE was control the excessive growth medical expenditure by introducing medical expenses sharing mechanism; strengthen control of hospital supply chain. In 1994, the China central government conducted reform pilot in Zhengjiang and Jiujiang city, medical insurance

reform entered a second stage. By the end of 1996, under the direct leadership of China central government, pilot expanded to 29 provinces. And by the end of 2007, 179.8 million employed people were participating (UNDP, 2008). Table 6 shows detail information about BMIUE in China.

Table 6: Character of the BMIUE

Objective	**Interpretation**
Date started	1998 (Formally established)
Enrolled	Employees and retirees of government agencies, public institutions and private non-enterprise organizations in urban areas.
Guideline	General guideline are issued by the central government ,local government retain considerable discretion over the details
Risk pooling	Urban level
Target population	Urban residents (195.28million, 2011).
Financing mechanism	Payroll taxes paid by employees (2%) and employers (6%). Among , Employees' premiums and 30% of the premiums paid by the employers go to the personal accounts, and 70% of the premiums paid by the employers go to the social pool program funds.
Reimbursement mechanism	Outpatient medical expenditure paid from personal accounts. Inpatient medical expenditure paid from social pool program funds.
Designated health facilities	All levels of health facilities
Covered services	Inpatient stays and outpatient visits

(Source: Author)

In 2010, 237,350 people were join BMIUE, among 17, 791 is employee, 5, 944 is retiree, and total fund raising 395,540 million, total payout 327,160 million. Table 7 shows detail information about BMIUE from 2007 to 2010 in China.

Table 7: Condition of BMIUE, China, 2007-2010

Indicator	2007	2008	2009	2010
Number of Enrollees (10,000)	18020	19996	21937	23735
Employees	13420	14988	16411	17791
Retirees	4600	5008	5527	5944
Revenue (100 million yuan)	2214.2	3040.0	3672.0	3955.4
Payout (100 million yuan)	1551.7	2084.0	2797.0	3271.6
Balance at Years-end (100 million yuan)	2440.8	3432.0	4276.0	4741.2
Urban Residents Basic Medical Insurance (10,000)	4291	11826	18210	19528

(Source: NBSC, 2012)

In 2011, the BMIUE covered 43,800,000 people, total revenue is 8,910 million, and total payout is 7,700 million. Table 8 shows detail information about BMIUE in Inner Mongolia.

Table 8: Condition of BMIUE, Inner Mongolia, 2011

Objective	Number
Covered populations (10,000)	438.0
Revenue (100 million yuan)	89.1
Expenditure (100 million yuan)	77.0

(Source: NBSC, 2012)

2.2.1.3 Basic Medical Insurance for Urban Residents (BMIUR)

Established Basic Medical Insurance system for Urban Residents was the one of important measures for non-working urban residents; this system followed by the New Rural Cooperative Medical System and Basic Medical Insurance of Urban

Employees. A pilot program was launched in 2007 and expanded to 299 cities in 2008, now this system already almost coverage the target populations (see Table 9).

Table 9: Character of the BMIUR

Objective	Number
Date started	2007
Enrolled	Unemployed urban residents, students, children and youth, and the elderly.
Guideline	General guideline are issued by the central government ,local government retain considerable discretion over the details
Risk pooling	Urban level
Target population	181 million, 2010
Premium	General, BMIUR premium higher than NRCMS and lower than BMIUE.
Designated health facilities	All levels of health facilities

(Source: Author)

In 2011, 46,900,000 people are covered, total revenue is 1,060 million, and total payout is 840 million in Inner Mongolia. Table 10 shows detail information about BMIUR in Inner Mongolia.

Table 10: Condition of BMIUR, Inner Mongolia, 2011

Objective	Number
Covered populations (10,000)	469.3
Revenue (100 million yuan)	10.6
Expenditure (100 million yuan)	8.4

(Source: NBSC, 2012)

2.2.2 China's Health Care Institutions

In China, medical services are provided by governmental health care institutions and private health care institutions; the mainly provider is governmental health care institutions. The private health care institutions include three type hospitals (General hospitals, Hospitals Specialized in Traditional, Specialized hospitals). The governmental health care institutions also include hospital (General hospitals, Hospitals Specialized in Traditional, Specialized hospitals), Community Health Services Centers, Urban Health Centers, Township Health Centers, Outpatients Department, Village Clinics, Center for Diseases Control and Prevention, Specialized Disease Prevention & Treatment Institution, Women and Children Care Agencies and Health Inspection Institutions (center) (see figure 8) . In those health care institutions, except Village Clinics only provide services to rural areas, Urban Health Centers only provided services to urban areas, other institutions are provide services to rural and urban areas. In the last decade, the health care an institution has seen increased (see table 11).

Table 11: Number of health care Institutions

Year	Hospital	Community Health Services Centers	Urban Health Centers	Township Health Centers	Outpatients Department
2000	16318	-	548	49229	240934
2001	16197	-	553	48090	248061
2002	17844	8211	1022	44992	219907
2003	17764	10101	925	44279	204468
2004	18393	14153	845	41626	208794
2005	18703	17128	787	40907	207457
2006	19246	22656	816	39975	212243
2007	19852	27069	803	39876	197083
2008	19712	24260	780	39080	180752
2009	20291	27308	1152	38475	182448
2010	20918	32739	929	37836	181781

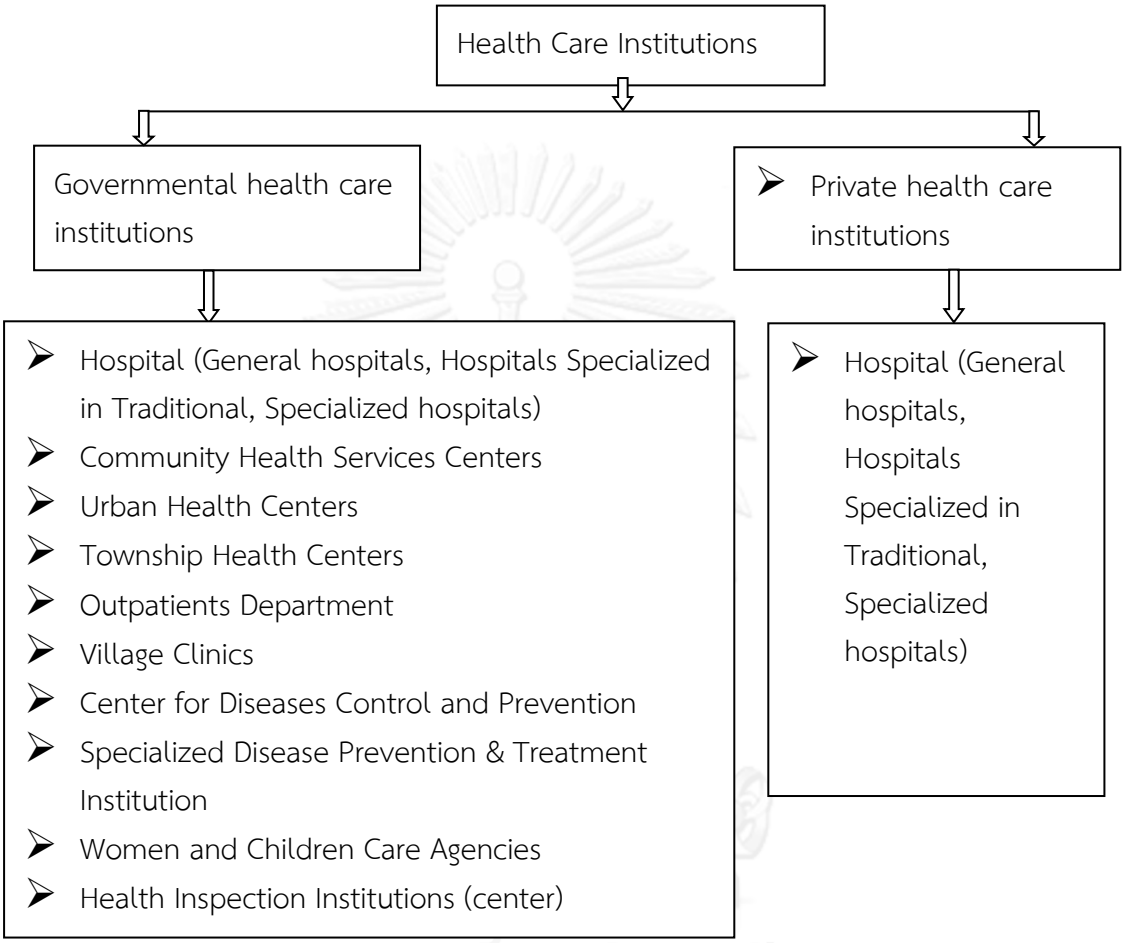
Continue...

Year	Village Clinics	Center for Diseases Control and Prevention	Specialized Disease Prevention & Treatment Institution	Women and Children Care Agencies	Health Inspection Institutions (center)
2000	709458	3741	1839	3163	-
2001	698966	3813	1783	3132	-
2002	698966	3580	1839	3067	571
2003	514920	3584	1749	3033	838
2004	551600	3588	1583	2998	1284
2005	583209	3585	1502	3021	1702
2006	609128	3548	1402	3003	2097
2007	613855	3585	1365	3051	2553
2008	613143	3534	1310	3011	2675
2009	632770	3536	1291	3020	2809

(-: indicates no figure)

(Source: NBSC, 2011)

Figure 8: China's health care institution



(Source: Author)

According to 2012 NBSC presentation, Inner Mongolia has 488 hospitals, 1,148 Community Health Services Centers, 3 Urban Health Centers, 1,323 Township Health Centers, 4,998 Outpatients Department, 14,433 Village Clinics, 121 Center for Diseases Control and Prevention, 50 Specialized Disease Prevention & Treatment Institution, 117 Women and Children Care Agencies and 112 Health Inspection Institutions (center).

For Bayan Nur city, it has 35 hospitals, 56 Community Health Services Centers, 110 Health Centers (Urban Health Centers and Township Health Centers) and 513 Outpatients Department (BNCG, 2011).

Specific to Wulateqian banner, it has 2 hospitals (1 General hospitals and 1 Hospitals Specialized in Traditional), 1 Women and Children Care Agency, 1 Center for Diseases Control and Prevention, 1 Health Inspection Institution (center), 20 Township Health Centers, 4 Community Health Services Centers, 120 Village Clinics, 58 private Outpatients Department and 1 private hospital (WBG, 2011).

And specific to Wuyuan County, it has 2 hospitals (1 General hospitals and 1 Hospitals Specialized in Traditional), 1 Women and Children Care Agency, 1 Center for Diseases Control and Prevention, 1 Health Inspection Institution (center), 19 Township Health Centers, 7 Community Health Services Centers, 113 Village Clinics, 51 private Outpatients Department and 3 private hospital (WCG, 2011).

2.2.3 China's Essential Drug System

China's Ministry of Health published the national essential drug list in August 18th, 2009, which marked the beginning of establishing the National Essential Drug System (NEDS) in China. All national essential drugs will be included in this basic medical insurance drug list; essential drugs' reimbursement rate was significantly higher than that of non-essential drugs, its reducing the proportion of the individual pays, using economic means to guide the masses, let them use essential drug when they sick. Inner Mongolia and Bayan Nur city started in same time.

2.2.4 Health status of population in China

According to 2012 NBSC presentation, it finds that Birth rate decrease obviously, and Death rate increase significantly from 2005 to 2010. The Birth rate was 12.40‰ in 2005 and 11.90‰ in 2010. The Death rate was 6.51‰ in 2005 and 7.11‰ in 2011. The table 12 shows the Birth and Death rate from 2005 to 2010.

Table 12: Birth and Death rate of population

Year	Birth Rate (‰)	Death Rate(‰)
2005	12.40	6.51
2006	12.09	6.81
2007	12.10	6.93
2008	12.14	7.06
2009	12.13	7.08
2010	11.90	7.11

(Source: NBSC, 2012)

Inner Mongolia Birth and Death rate was 9.30‰ and 5.54‰ in 2010, respectively. According to Health Strategy of China in 2020 Research Report presentation (2010), it shows that the Life Expectancy increase dramatically, it was 73.5 years old. Table 13 shows Life Expectancy from 1981 to 2010.

Table 13: Life Expectancy (Year)

Year	Source	Total	Male	Female
1981	The 3rd National Population Census	67.9	66.4	69.3
1990	The 4th National Population Census	68.6	66.8	70.5
2000	The 5th National Population Census	71.4	69.60	73.3
2005	The sample survey of population changes	73.0	71.0	74.0
2010	Health Strategy of China in 2020 Research Report	73.5	71.3	75.9

(Source: CCDC, 2012)

According to the 2011 MOH presentation, it shows that morbidity rate of chronic diseases computed by cases was 199.9‰ in 2008. More specifically, the rate in rural area was 170.5‰, and rate in urban area was 282.8‰ (MOH, 2008). The study ranks the morbidity rate of 10 main chronic diseases (‰), and three of the top were Hypertension, Gastroenteritis and Diabetes Mellitus (see table 14).

Table 14: Morbidity Rate of 10 Main Chronic Diseases (‰)

Ranking	Diseases	Total	Urban	Rural
1	Hypertension	54.9	100.8	38.5
2	Gastroenteritis	10.7	7.9	11.7
3	Diabetes Mellitus	10.7	27.5	4.8
4	Rheumatoid Arthritis	10.2	7.2	11.3
5	Cerebrovascular Disease	9.7	13.6	8.3
6	Intervertebral Disc Disorders	9.5	10.2	9.3
7	COPD	6.9	6.6	7.1
8	Ischaemic Heart Disease	6.0	12.7	3.7
9	Cholelith & Cholecystitis	5.1	5.0	5.2
10	Pepeic Ulcer	3.3	2.8	3.5

(Source: MOH, 2011)

CHAPTER III

LITERATURE REVIEW

3.1 Rural area

In general, people tend to divide the area into two categories, urban area and rural area. There are a lot of classification methods and each area has its own characteristic.

(Jian, 2010) definition of rural area is centered on agriculture.

Comparing urban area, (Deavers, 1992) put forward three characteristics of rural area. First of all, rural area is small scale and low density population. Secondly, rural area is far from urban center, it reflected in social, information, technology and culture. Lastly, economy is lower than urban area.

Similarly, (Carr-Hill, 2005) also considered that rural is influenced by culture differences, employment type, population density and remoteness. In other words, education level, employment patterns, population, economy, technology innovation and accessibility of services are important factors influence rural area and rural resident.

3.2 Health Equity

There is no common definition of health equity. Some researchers consider that: (Braveman, 1998) defines equity in health as the minimization of existing disparities between groups that present differing degrees of social privilege.

(Culyier, 1993) argued that equity has two forms: Horizontal equity, which is equal attention to equal needs; and Vertical equity, which is unequal attention for

different needs. In contrast, (Newbold, Eyles, 1995) states that horizontal inequity is same health care needs might not met by similar services. Vertical inequity is greater health care needs might not be met be same greater use.

However, the health inequality, (Murray, 1999), explained that it measures variation in health status across individuals in whole population.

Many scholars had researched equity in different areas, different countries and used different methods. Table 15 shows the detail information about these literatures; the table includes objective, size of sample, method of analysis and conclusion or significant variable.

Table 15: literature reviews about equity

Objective	Sample	Method of analysis	Significant Variables	Author
To measure factors influence inequity in the use National Health Service	50977 respondents in UK, 1998-2000	Concentration index and Gini index	Income, ethnicity, employment status and education	Morris et al., (2005)
To measure and compare the magnitude of inequality in mortality and self-assessed health	350000 observations among 22 European country	Relative and slope of inequality index	Income, education, health relate behavior (smoking, drinking and obesity) and access to health care	Mackenbach et al., (2008)

To analysis factors influence equity in access to healthcare under the NCMS	8270 respondents in rural China, 2004 and 2009	Erreygers's Concentration Index and Decomposition of Erreygers's Concentration Index	Income, commercial insurance	Yang , (2013)
To access factors influence Horizontal equity in health care utilization	1.12 million individuals in the three surveys in Brazil ,1998-2008	Concentration indices(CI), Lorenz Curves , Horizontal inequity indices (HI), Decompositions of concentration index	Income, geographic location and private health plan	Macinko and Lima-Costa , (2012)
To analysis factors influence equity in access to health care	109,964 adults' observations aged over 16 years old in Italy.	Horizontal inequity index (HI), Concentration index and Gini coefficient.	Income, regional variation, educational attainment and insurance	Masseria and Giannoni , (2010)

(Sources: Author)

3.3 Health equity measurement tool

(Wagstaff, 1991) in their paper, state that there are many methods to measure health equality, such as the Gini Coefficient, the pseudo-Gini Coefficient, the slope index of equality and concentration index and associated with concentration curve.

(Wagstaff, 1991) emphasizes that the pseudo Lorenz curve based on group data, where the groups are occupational classes. And index of dissimilarity is developed from pseudo Lorenz curve, which is based on below complete equality and in order to guarantee everyone would be sharing equal health.

(Wagstaff, 1991) argued that the slope and relative index of equality is defined as the slope of regression line showing the relationship between a group's health status.

(Wagstaff, 1991) defines concentration curve and concentration index (CI) are tools to measure equality. The CI is defined with the concentration curve. If the CI is zero, the concentration curve will coincide with the line of equality. If the CI is positive value, indicating disproportionate concentration of health services utilization concentrated in the richer socioeconomic group. If the CI is negative value, it indicates disproportionate concentration of health services utilization concentrated in the poorer socioeconomic group.

3.4 services utilization Health

(Andersen, 1973) discussed groups in logic sequence; three clusters of factors which are predisposing factors, enabling factors and need factors, those factors can affect health behaviors.

(Weller, 1997) explain that there are four aspects which can incur using health services: Predisposing factors: age, gender, prior experience with illness, education and knowledge about the illness will incur health care utilization. Enabling factors: availability of services, financial resources to buy health care services, and health insurance will incur health care utilization. Need factors: total days of admission, total number of visits. Treatment actions: traditional healers, public health facility and private health facility.

(Kroeger, 1983) argues that based on Andersen's model, individual's predisposing factor should be adding marital status, family size, and occupation, assets (land, cash, and income). Characteristics of the disorder and their perception: chronic or acute, severe or trivial.

(Wagstaff, 1989) posited that health services utilization have four most common definitions: i) equity treatment for equal need, ii) equality of health, iii) equality of access iv) equality of final incomes. There are various points that are worth noting before considering the relevance of each of these definitions: First, the concept of ' access' is often ill-defined in policy documents. Second, definitions (ii) and (iii) both view equity in terms of the attainment of equality across the population as a whole, whilst the first views equity in terms of the attainment of equality amongst specific sub-groups in the population, notably those in equal 'need'. Third, all three definitions are difficult to operationalize.

Many scholars have studies that show the influence of factors on utilization in different areas, different countries and different methods. Table 16 shows the detail information about these literatures, which include objective, size of sample, method of analysis and Significant variables, from this table, can find that age, gender,

insurance, income, education, distance, chronic disease, race and medical spending can effect health services utilization.

Table 16: literature reviews about influence factors of utilization

Objective	Sample	Method of analysis	Significant Variables	Author
To analysis factors influence outpatient mental health services utilization of children in foster care	480 children who used long-term foster care in 1990-1991, San Diego	Poisson regression model	Age, race, gender, placement pattern and behavioral problem	Leslie et al., 2000
To determine factors influence maternal healthcare services utilization in individual, household and community level	Married women 15 to 49 years of age in 1993, Turkey	Logistical regression model	Education level, parity level, health insurance, race, household income and geographic region	Celik et al., 2000
To analysis	4247	Poisson	socio-economic gradient	Rabi et

factors influence diabetes' health services utilization4	patients with diabetes in Calgary, Alberta and Canada, 2000-2009	regression model		al., 2006
To analysis different ethnic's health services utilization	7057 visible minorities and 114 225 white people in Canada, 2001	Logistic regression model	Visible minorities people more likely than white people to go to visit general practitioner, not specialist physician, but they don't like to go to hospital	Quan et al., 2006
To assessment factors influence health services utilization	400 households in Ghana	Multiple stepwise regression	Distance ,income ,services cost ,education , waiting time and transport cost	Buor, (2003)

(Sources: Author)

3.5 Chronic disease

There is no general agreement on the definition of chronic disease.

(Kenneth, 1989) discussed that chronic diseases are an increasingly frequent cause of mortality, it is not common, and it also quite diverse.

Many scholars had studied the influence factors of chronic disease's health services utilization which in different areas, different countries and different methods.

Table 17 shows the detail information about these literatures, which include objective, sample and conclusion.

Table 17: literature reviews about influence factors of chronic disease's health services utilization

Objective	Sample	Method	Conclusion	Author
To analysis healthcare services utilization of chronic drug user and non-drug uesr	1480 individuals in African and American, 1996-1997	Multivariate regression model	Chronic drug user consumed more inpatient and emergency care than non-drug user. Non-chronic drug user consumed more outpatient than drug user.	French et al., (2000)
Rural-urban gap for the patients with chronic disease	In 2003, 193,689 individuals and in 2008, 177,501 individuals were sampled, China	Binary logistic regression and ordinary least squares regression	Prevalence of chronic disease increased from 2003 to 2008 in rural areas faster than urban areas. Rural areas patient with chronic diseases' admission rate was lower than urban areas in	Jian et al., (2010)

			2003, but in 2008, rural areas higher than urban areas. Rural areas patient with chronic disease gave up treatment higher than urban areas in 2003 and 2008. Rural areas patient with chronic diseases' out-of –pocket medical expenditure higher than urban areas in 2003 and 2008.	
Patients with chronic disease use specialty care	Nationally-representative telephone survey included 2,475 sample, US	Bivariate, Multivariate, Logistic and Chi-square analysis	Lack of insurance, minority status and poor perceived health are influence the patients with	Bellinger et al., (2010)

			chronic disease use specialty care.	
Factors associated with the utilization of Community Health Centers (CHCs) for patients with hypertensive	2,030 patients who suffer from hypertension or diabetes registered in CHCs , China	Univariate analysis and Multiple logistic regression analysis	Education, occupation and patients' knowledge on hypertension are significant. The low-income, unemployed patients who suffer from hypertension are more used primary health services centre.	Chai et al., (2011)

(Sources: Author)

3.6 Economic burden of chronic disease

There are many methods to calculated economic burden of chronic disease, but the principles are the same, which is divided into direct cost and indirect cost.

(Zhao, 2008) discussed that calculation of economic burden from two areas, including clinic visits (mean medical expenditure for clinic visit plus indirect cost from clinic visit) and inpatient stays (mean medical expenditure for inpatient stay plus indirect cost during hospitalization).

(Patra, 2007) argued that calculated the economic burden of chronic disease from two aspects which are direct cost (hospital care, specialized treatment, physician care and drug) and indirect cost (mortality cost and morbidity cost).

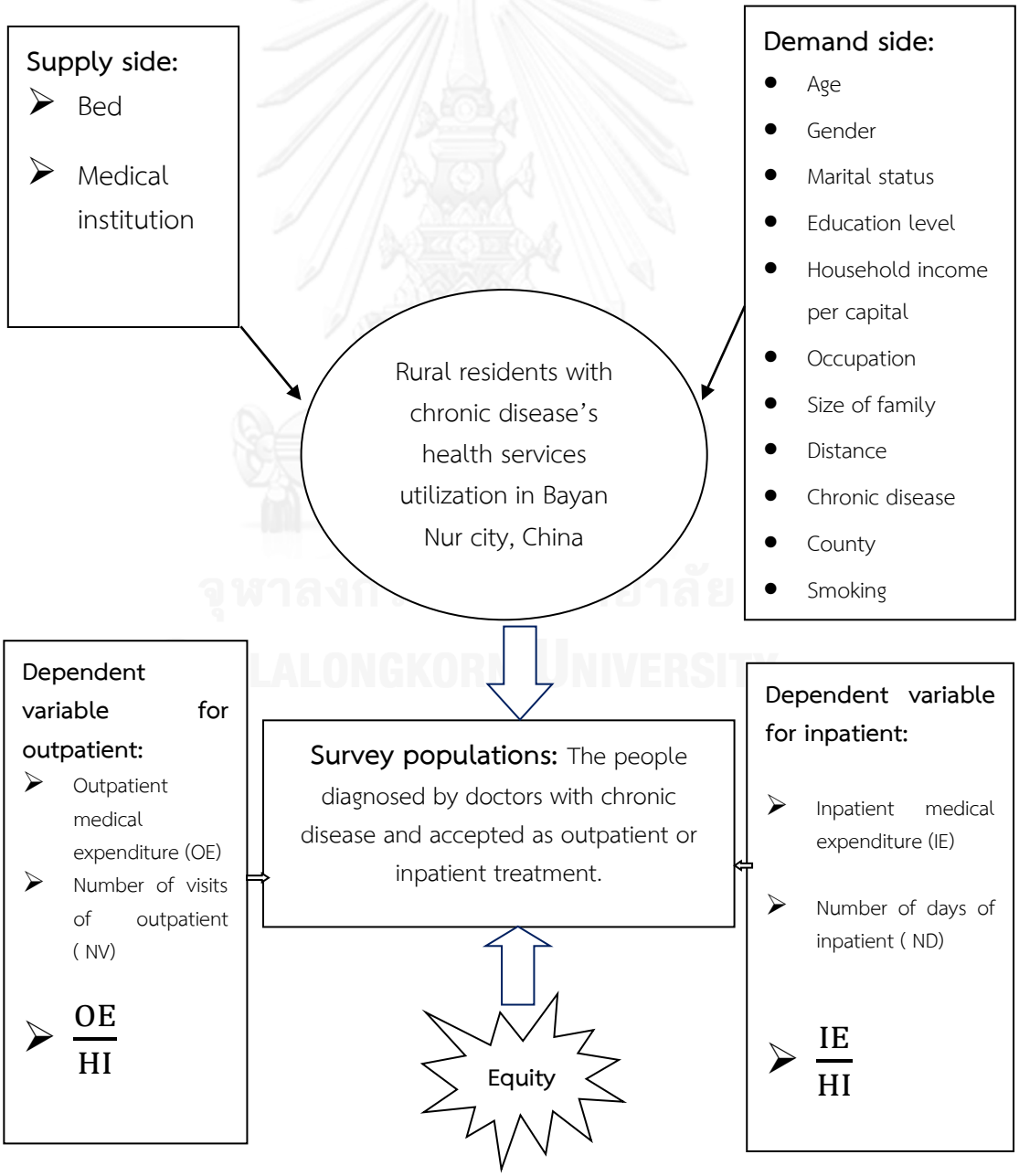
(Suhrcke, 2006) separate the costs of illness into three parts: direct costs (prevention, diagnosis and treatment of chronic disease), indirect costs (the loss of human resources caused by morbidity or premature death and the loss of future earnings).

CHAPTER IV
RESEARCH METHODOGY

4.1 Conceptual framework

The figure 9 shows the conceptual framework to analysis factors affecting rural residents with chronic disease's health services utilization equity in Bayan Nur city, China.

Figure 9: Conceptual framework



(Source: Author)

4.2 Research design:

This study used cross-sectional household data. This study picked 2 counties of Banyan Nur city, China. Concentration Index, multiple regression model and count model are used as tools to measure health services utilization of rural residents with chronic diseases.

4.3 Data sources

This study data is secondary data, which was collected by Inner Mongolia Medical University. The data were collected from July 10, 2011 to July 14, 2011. This survey used questionnaire, with face-to-face interviews. The questionnaire included 300 questions, including demographic characteristic, socioeconomic status, health-related behavior, insurance, hospitalization, health services accessibility (distance and time), satisfaction with health services and medical environment and acute diseases and injuries, chronic and other diseases.

4.3.1 Target population:

The target population is all rural residents with chronic diseases that accepted outpatient or inpatient treatment in Wulateqian Banner and Wuyuan County of Banyan Nur city of Inner Mongolia, China.

4.3.2 Sampled population and Study sites

This study is conducted in 2 counties (8 townships , 32 villages), which are Wulateqian Banner and Wuyuan County of Banyan Nur city of Inner Mongolia, China, including 2004 households are collected (See table 18).

Table 18: Study sites of sample

Counties (Banners)	Townships	Villages	Number of households
Wulateqian	Xianfeng	Xibeitou	91
		Hongqi	84
		Fenshui	82
	Mingan	Seqikouzi	84
		Jianjiayaozi	81
		Taolaikouzi	98
	Baiyanhua	Wubaolige	58
		Wuritu	58
		Darigai	120
	Dashetai	Shinagan	73
		Mapuzi	81
		Nanyuan	98
Wuyuan	Taerhu	Fengsheng	83
		Xianfeng	78
		Nairi	79
	Tianjitai	Jingyanglin	82
		Xiafeng	83
		Xiongwanku	81
	Xingongzhong	Heshao	85
		Yongshengcun	80
		Liansheng	88
	Gudingtu	Xiechengqiao	87
		Qianjin	90
		Shengli	80
Total	8	24	2004

(Source: Author)

4.3.3 Sickness status of sample

This study defined main chronic diseases including three diseases: Hypertension, Coronary disease, Diabetes mellitus. Table 19 shows detail information about the kinds of chronic diseases.

Table 19: chronic diseases situation of sample

System of chronic disease	Name of chronic disease	Number of patients	Total
Endocrine, Nutritional and Metabolic, Immune system disease	Diabetes mellitus	49	49
Hematopoietic disease	Anemia	6	6
Circulatory system disease	Coronary disease	34	382
	Acute myocardial infarction	1	
	Hypentension	280	
	Cerebral hemorrhage	1	
	Cerebral infarction	79	
	Ischemic heart disease	1	
	Myocardial infarction	11	
	Hyperlipidemia	8	
	Arrhythmia	1	
Respiratory system disease	Emphysema	13	34
	Pulmonary heart disease	11	
	Chronic bronchitis	8	
	Asthma	2	
Nervous system disease	Epilepsy	4	6
	Parkinson	1	
	Depression	1	
Cancer	Leukemia	1	1

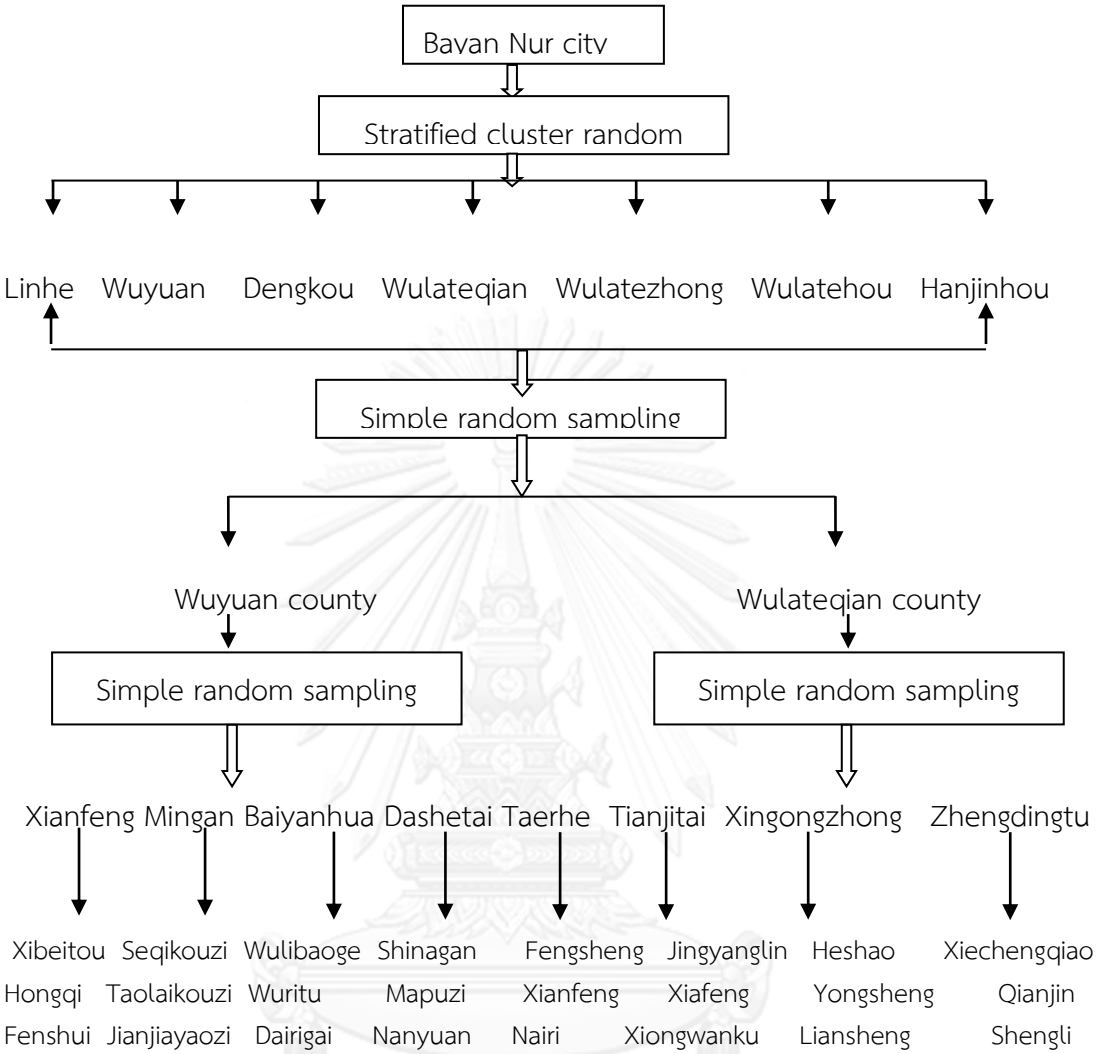
Eye disease	Cataract	3	8
	Glaucoma	5	
Skin disease	Lupus erythematosus	2	2
skeletal system	Rheumatic arthritis	14	14
Digestive system disease	Cirrhosis	1	8
	Chronic Gastritis	7	
Urogenital disease	Chronic nephritis	1	6
	Nephrotic syndrome	5	
Others	Strike	1	1
Total		550	550

(Source: Author)

4.3.4 Sampling method:

All households were sampled by three-stage stratified cluster random sampling. First stage, 7 counties were stratified based on economic level to sample 2 counties (high and low GDP) as the sample areas from Banyan Nur city, Second stage, from 2 counties were randomly select 8 townships where 4 townships in Wulateqian Banner and 4 townships in Wuyuan County. Third stage, from 8 townships were randomly select 24 villages where 12 villages in Wulateqian Banner and 12 village in Wuyuan County, specific information as follows (Figure 10).

Figure 10: Sampling Process



(Source: Author)

4.4 Data analysis

In this study, Multivariate Regression Model and Count Data Model are used to analyze rural residents with chronic disease's health services utilization. Independent variables use real numbers which are age, size of family and household income per capital. Dummy variables are education level, gender, marital level, occupation, distance and smoking. In order to find out factors affecting rural resident

with chronic disease's health services utilization and its equity, this study uses Ordinary Least Squares for Multivariate Regression model and uses Poisson regression for count model, all at 5% significance level.

In this study, Inpatient services utilization is defined as inpatient medical expenditure, number using inpatients services in the one year prior to the survey and inpatient medical expenditure per income. Outpatient services utilization is defined as outpatient medical expenditure, number using outpatient services in the two weeks prior to the survey and proportion of outpatient medical expenditure per income. Generally, a number of studies use direct cost plus indirect cost to calculate economic burden. However, in this study medical expenditure per household income per adult equivalent scale is used to represent economic burden. This is because there are only the data contains only household income, and most families' sizes are more than 2, which means children in the households and students alike don't earn income to contribute to the family. This study considers household income per adult equivalent scale instead of individual income.

This study uses the concentration index to measures equality. Use the concentration index to estimates the equality of rural residents with chronic disease's health services utilization in 8 townships, respectively, and compared. In addition it used the concentration index to estimate the equality of rural residents with chronic disease's inpatient and outpatient health services utilization, respectively, and compared.

4.5 Definition of dependent Variables:

Dependent Variables 1: Inpatient medical expenditure (IE), its defined as the out-of-pocket medical expenditure for inpatient department in the twelve months prior to the survey. This variable is used to multiple regression model (Ordinary least squares regression).

Dependent Variables 2: Number of days of admission (ND), its defined as how long the patients stay at hospital accepted treatment in the twelve months prior to the survey. This variable is used to count model (Poisson regression).

Dependent Variables 3: $\frac{\textbf{Inpatient medical expenditure}}{\textbf{Household income per adult equivalent scale}}$ ($\frac{\mathbf{IE}}{\mathbf{HI}}$), its defined as proportion of inpatient medical expenditure per income. It reflects the patient's economic burden of chronic diseases in the inpatient department. This variable is used to multiple regression model (Ordinary least squares regression).

Dependent Variables 4: Outpatient medical expenditure (OE), its defined as the out-of-pocket medical expenditure for outpatient services in the two weeks prior to the survey. This variable is used to multiple regression model (Ordinary least squares regression).

Dependent Variables 5: Number of visits of outpatient (NV), its defined as how many times the patients to go to outpatient department in the two weeks prior to the survey. This variable is used to count model (Poisson regression).

Dependent Variables 6: $\frac{\text{Outpatient medical expenditure}}{\text{Household income per adult equivalent scale}}$ ($\frac{OE}{HI}$), its defined as proportion of outpatient medical expenditure per income. It reflects the patients' economic burden of chronic diseases in the outpatient department. This variable is used to multiple regression model (Ordinary least squares regression).

4.5.1 **Definition of independent Variables:**

Gender variable: It is measured as a dummy variable. Female is equal to 0, Male is equal to 1, respectively.

Age variable: It is measure in years.

Marital status: It is measured as dummy variables. Married is equal to 1, divorced and widowed are equal to 0, respectively.

Education level: It is measured as dummy variables, which are complete primary education, complete middle education, complete secondary education, complete university or postsecondary education are equal to 1, illiteracy is equal to 0 respectively.

Income level: It is measured in number. It defined as income using household income per adult equivalent scale.

Occupation: It is measured as dummy variables; which is famer is equal to 1 and students, teacher and technicist et al are equal to 0.

Distance: It is measured in kilometers. It defined as how far people use transport from home to the nearest health care institution.

Smoking: It is measured as a dummy variable, which people have smoke use is equal 1, people not have smoke use is equal 0, respectively.

Family size: It is measured in number. It defined as number of people in the household.

Chronic diseases: This study defined chronic diseases as consisting of the following 28 conditions: Diabetes mellitus, Anemia, Coronary disease, Acute myocardial infarction, Hypentension, Cerebral hemorrhage, Cerebral infarction, Ischemic heart disease, Myocardial infarction, Hyperlipidemia, Arrhythmia, Emphysema, Pulmonary heart disease, Chronic bronchitis, Asthma, Epilepsy, Parkinson, Depression, Leukemia, Cataract, Glaucoma, Lupus erythematosus, Rheumatic arthritis, Cirrhosis, Chronic Gastritis, Chronic nephritis, Nephrotic syndrome, Strike.

Townships: In this study, total have 2 counties as conducted objected.

More information about independent variables is shown in table 20.

Table 20: Demographic and socioeconomic characterizes of respondents

Independent Variable	Measures as	Expected sign		Source
		Inpatient	Outpatient	
Gender (GEN) (Dummy)	1=Male 0=Female	+/-	+/-	Secondary
Age (AGE)	Measure in years	+	+	Secondary
Marital status (MS) (Dummy)	1= Married 0= Widowed, Single and divorce	+	+	
Education level	1= More than primary	+	+	Secondary

(EDU) (Dummy)	education 0= Illiteracy			
Income level (INC)	It is measured in number	+	+	Secondary
Occupation (OCC) (Dummy)	1= Farmer 0= Unemployed, student, teacher and technicist et al.	+/-	+/-	Secondary
Distance (DIS) (Dummy)	1= Less than 1 kilometer 0=More than 1 kilometer	+	+	Secondary
Smoking (SMO) (Dummy)	1= Smoking 0= Non-smoking	+	+	Secondary
Family size (FS)	It is measured in number	+	+	Secondary
Chronic diseases(CD) (Dummy)	CD1: 1=Circulation system disease 0=Otherwise CD2: 1= Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease 0=Otherwise	+	+	Secondary

	If all CD1, CD2 = 0 it means Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system.			
CT (CT) (Dummy)	1=Wulateqian county 0= Wuyuan county	+	+	Secondary
Medical institution (MI) (Dummy)	MI1=1 If village clinic 0= Otherwise MI2=1 If township health center 0= Otherwise MI3= 1 If county level and above hospital 0= Otherwise If all MI1, MI2 and MI3= 0 it means private hospital	+ - -	- +	

(Source: Author)

4.5.2 Rationale for inclusion of independent variables

Gender variable: In term of habits, male prefer smoking than female. Smoking, drinking, and these habits might lead to male get higher risk and suffer from lung diseases than female. So male may be having higher hospital admission rate

and average length of stay. So this variable may have significant effect on health services utilization.

Age variable: In this study, residents with chronic disease's average age are more than 50; (Jian, 2010) research found that number of elderly people who got chronic diseases was more than younger in rural areas, China. So this variable may have significant effect on health services utilization.

Marital status: (Jian, 2010) showed that of people who suffer from chronic diseases, 78.2% are married. In this study, almost survey objects are married, so this variable may have significant effect on health services utilization.

Education level: In this study, most of residents just complete primary education or secondary education, so his health knowledge may be less than high level of educations', low level educated people don't know more about healthcare, good habit and diet, so this variable may have significant effect on health services utilization.

Income level: The families with higher income are willing to spend more money to medical care. People who have more money are willing to accept better quality and quantity of health treatment to ensure their healthy body, so this variable may have significant effect on health services utilization.

Occupation: If the people have work, it means they can earn more money and use better quality and quantity of health treatment, they may not care about distance, expenses and other factors, so this variable may have significant effect health services utilization.

Distance: In China, more outpatient department are built in rural areas, but little inpatient department are built in rural areas. If patients' disease situation is not serious, they may choose to go to outpatient department for treatment, but if they get serious disease, they must receive inpatients' treatment. But if it's far from nearest inpatient and time is limited, the result may not be good. So this variable may have significant effect on health services utilization.

Smoking: Long-time smoking may increase the risk of suffering from Lung disease, COPD and other diseases. Personal life style might affect health status. So this variable may have significant effect on health services utilization.

Family size: In the same households' income level, the bigger family size, the number of patient with chronic diseases who accept inpatient treatment may decrease; on the contrary, the number of patients with chronic diseases who accept outpatient treatment may increase. The family size might affect patient's health seeking behavior. So this variable may have significant effect on health services utilization.

Chronic diseases: The more serious chronic diseases, the more medical spending, and more health services utilization, irrespective of whether its outpatient or inpatient. So this variable may have significant effect on health services utilization.

Townships: Health services utilization depends on township's GDP, medical facilities and medical personnel. In this study, if one township has more medical facility and personnel than others, this townships' health services utilization may be more than other areas. So this variable may have significant effect on health services utilization.

Medical institution: In China, different levels of medical facility have different sanitary installation and medical personnel, people with more facilities are more prone to utilize services frequently. So this variable may have significant effect health services utilization.

4.5.3 Model specification

In this study, there are six models.

For inpatient services utilization, dependent variables are inpatient medical expenditure (IE), number of days of admission (ND) and $\frac{\textbf{Inpatient medical expenditure}}{\textbf{Household income per adult equvalent sacle}}$ ($\frac{\mathbf{IE}}{\mathbf{HI}}$). There have eleven independent variables as follow: GEN, AGE, MS, EDU, OCC, INC, MI, DIS, FS, CD, MS and CT.

$IE^{IPD}=f_1$ (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD_1, CD_2, CT, MI_1, MI_2, MI_3)

ND^{IPD}=f2 (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD1, CD2, CT, MI1, MI2, MI3)

$\frac{\mathbf{IE}}{\mathbf{II}}$IPD= f3 (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD1, CD2, CT, MI1, MI2, MI3)

Estimation equation:

$IE^{IPD}=\beta_0+\beta_1 GEN+\beta_2 AGE+\beta_3 MS+\beta_4 EDU+\beta_5 OCC+\beta_6 INC_1+\beta_7 INC_2+\beta_8 INC_3+\beta_9 SM+\beta_{10} DIS+\beta_{11} FS++\beta_{12} CD_1+\beta_{13} CD_2+\beta_{14} CT+\beta_{15} MI_1+\beta_{16} MI_2+\beta_{17} MI_3+\varepsilon$

, Where β_0 is constant.

$ND^{IPD}=\beta_0+\beta_1 GEN+\beta_2 AGE+\beta_3 MS+\beta_4 EDU+\beta_5 OCC+\beta_6 INC_1+\beta_7 INC_2+\beta_8 INC_3+\beta_9 SM+\beta_{10} DIS+\beta_{11} FS++\beta_{12} CD_1+\beta_{13} CD_2+\beta_{14} CT+\beta_{15} MI_1+\beta_{16} MI_2+\beta_{17} MI_3+\varepsilon$

, Where β_0 is constant.

$\frac{IE_{IPD}}{II}=\beta_0+\beta_1 GEN+\beta_2 AGE+\beta_3 MS+\beta_4 EDU+\beta_5 OCC+\beta_6 INC_1+\beta_7 INC_2+\beta_8 INC_3+\beta_9 SM+\beta_{10} DIS+\beta_{11} FS++\beta_{12} CD_1+\beta_{13} CD_2+\beta_{14} CT+\beta_{15} MI_1+\beta_{16} MI_2+\beta_{17} MI_3+\varepsilon$

, Where β_0 is constant.

For outpatient services utilization, dependent variable is outpatient medical expenditure (OE), number of visits of outpatient (NV) and $\frac{\textbf{Inpatient medical expenditure}}{\textbf{Household income per adult equivalent scale}}$ ($\frac{IE}{HI}$). There have eleven independent variables as follow: GEN, AGE, MS, EDU, OCC, INC, MI, DIS, FS, CD, MS and CT.

OE^{OPD}=f4 (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD1, CD2, CT, MI1, MI2, MI3)

NV^{OPD}=f5 (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD1, CD2, CT, MI1, MI2, MI3)

$\frac{OE_{OPD}}{II}$ = f6 (GEN, AGE, MS, EDU, OCC, INC1, INC2, INC3, SM, DIS, FS, CD1, CD2, CT, MI1, MI2, MI3)

Estimation equation:

$$OE^{OPD} = \beta_0 + \beta_1 GEN + \beta_2 AGE + \beta_3 MS + \beta_4 EDU + \beta_5 OCC + \beta_6 INC_1 + \beta_7 INC_2 + \beta_8 INC_3 + \beta_9 SM + \beta_{10} DIS + \beta_{11} FS + + \beta_{12} CD_1 + \beta_{13} CD_2 + \beta_{14} CT + \beta_{15} MI_1 + \beta_{16} MI_2 + \beta_{17} MI_3 + \varepsilon$$

, Where β_0 is constant.

$$NV^{OPD} = \beta_0 + \beta_1 GEN + \beta_2 AGE + \beta_3 MS + \beta_4 EDU + \beta_5 OCC + \beta_6 INC_1 + \beta_7 INC_2 + \beta_8 INC_3 + \beta_9 SM + \beta_{10} DIS + \beta_{11} FS + + \beta_{12} CD_1 + \beta_{13} CD_2 + \beta_{14} CT + \beta_{15} MI_1 + \beta_{16} MI_2 + \beta_{17} MI_3 + \varepsilon$$

, Where β_0 is constant.

$$\frac{OE_{OPD}}{II} = \beta_0 + \beta_1 GEN + \beta_2 AGE + \beta_3 MS + \beta_4 EDU + \beta_5 OCC + \beta_6 INC_1 + \beta_7 INC_2 + \beta_8 INC_3 + \beta_9 SM + \beta_{10} DIS + \beta_{11} FS + + \beta_{12} CD_1 + \beta_{13} CD_2 + \beta_{14} CT + \beta_{15} MI_1 + \beta_{16} MI_2 + \beta_{17} MI_3 + \varepsilon$$

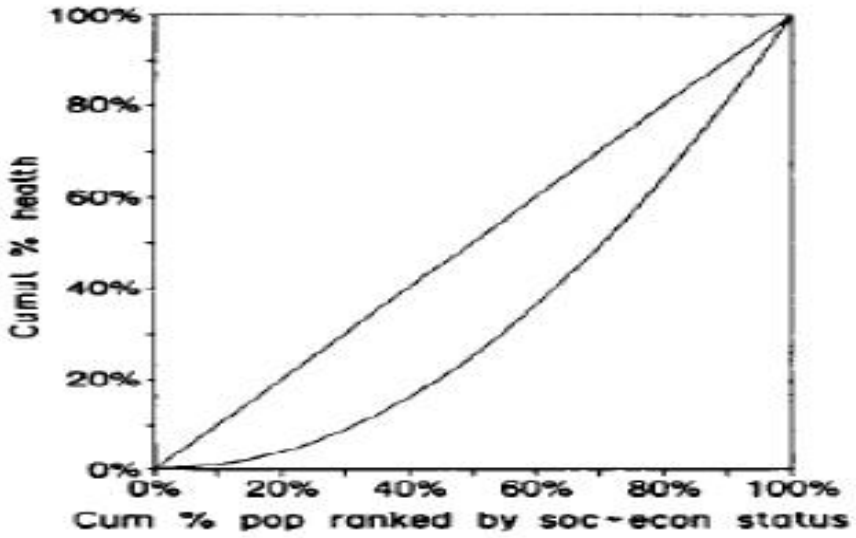
, Where β_0 is constant.

4.6 Concentration curve and concentration index:

The concentration index (CI) is defined as twice the area between the concentration curve and the line of equality. The CI is defined with the concentration curve, which graphs on the x- axis the cumulative percentage of the sample, ranked by living standards and on the y- axis the cumulative percentage of the health variables. People rank their health and socioeconomic status which beginning with the most disadvantages (shows figure 11), so in the case in which there is equality in socioeconomic-related group, When the CI is zero, the concentration curve will coincide with the line of equality. If the CI is positive value, the concentration curve

lies below the line of equality, indicating disproportionate concentration of health services utilization concentrated in the richer socioeconomic group. If the CI is negative value, the concentration curve lies above the line of equality, indicating disproportionate concentration of health services utilization concentrated in the poorer socioeconomic group (Wagstaff,Paci and Doorslaer ,1991).

Figure 11:Concentration Curve



(Source: Wagstaff,Paci and Doorslaer ,1991)

Computing the concentration index:

The concentration index for t=1, 2, 3... T groups are easily computed in a spreadsheet program using the following formula:

$$C=(p_1L_2-p_2L_1)+ (p_2L_3-p_3L_2)+...+(p_{T-1}L_T-p_TL_{T-1})$$

Where pt is the cumulative percentage of the sample ranked by economic status in group t, and Lt is the corresponding concentration curve ordinate (Fuller and Lury ,1997).

4.7 Hypothesis (es)

H_1: Gender is expected to have negative impact on $\frac{OE}{HI}$.

H_2: Household income per adult equivalent scale is expected to have positive impact on number of visits of outpatient.

H_3: Household income per adult equivalent scale is expected to have negative impact on $\frac{IE}{HI}$.

H_4: Household income per adult equivalent scale is expected to have positive impact on number of days of inpatient.

H_5: Outpatient health services utilization more equity than inpatients' in Bayan Nur city, China.

H_6: Xianfeng townships health services utilization most equity in eight townships in Bayan Nur city, China.

CHAPTER V
RESULTS AND DISCUSSION

According to research methodology developed in the previous chapter, this chapter will show the research results and discussions, to answer research objectives and questions of this study set in the first chapter.

5.1 Data description

There is a brief description of the criteria of each sample used in this study. This study aim to analyses rural residents with chronic disease who are diagnosed by doctors and suffer from chronic disease and obtained outpatient department or inpatient department treatment, it includes 410 individuals obtained outpatient treatment, and 112 individuals received inpatient treatment.

Table 21 show the percentage of figures of chronic patients obtained outpatient and inpatient treatment in term of gender.

Table 21: Distribution of respondents in term of gender

Department	Gender	Frequency	Percentage (%)
Outpatient	Male	174	42%
	Female	236	58%
	Total	410	100%
Inpatient	Male	45	40%
	Female	67	60%
	Total	112	100%

(Source: author)

According to table 21, in outpatient department, the percentage of male is 42 percent (174), whereas the percentage of female is 58 percent (236). In inpatient department, the percentage of male is 40 percent (45), but the percentage of female is 60 percent (67).

Table 22 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of age.

Table 22: Distribution of respondents in term of age

Department	Age	Frequency	Percentage (%)
Outpatient	19-49 years old	95	23%
	50-80 years old	307	75%
	More than 81 years old	8	2%
	Total	**410**	**100%**
Inpatient	19-49 years old	11	9%
	50-80 years old	98	88%
	More than 81 years old	3	3%
	Total	**112**	**100%**

(Source: author)

This study categorizes age into four places. People less than 18 years of age are considered to be students. Those between the ages of 19 to 49 years are said to be productive and of good labor capacity. Furthermore, the people between 50 and 80 years old are said to be of relatively poor labor capacity, while those who are more than 81 years of age are referred to as having no labor capacity. According to table 22, in outpatient department, the largest proportion of patient is from 50 to 80 years old, with 75 percent (307), the second largest proportion of patient is between 19 and 49 years old, with 23 percent (95), however, the smallest proportion of patient is more than 81 years old, which is only 2 percent (8). In inpatient

department, the most percentage of patient is from 50 to 80 years old, with 88 percent (98), the second most percentage of patient is between 19 and 49 years old, with 9 percent (11), the least proportion of patient is more than 81 years old, which is only 3 percent (3).

Table 23 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of marital status.

Table 23: Distribution of respondents according to marital status

Department	Marital status	Frequency	Percentage (%)
Outpatient	Married	361	88%
	Single	49	12%
	Total	410	100%
Inpatient	Married	94	84%
	Single	18	16%
	Total	112	100%

(Source: author)

This study segments marital status into two parts; married and single (Single , divorce and Widowed).The table 23 shows the percentage of patients' marital status, in general, the most percentage of marital status is married, with 88 percent (361) in outpatient department, only 12 percent (49) patient are single, divorce and widowed. In inpatient department, the largest percentage of marital status is still married, with 84 percent (94), whereas the percentage of 16 (18) are single, divorce and widowed.

Table 24 shows the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of whether or not accepting education.

Table 24: Distribution of respondents according to education

Department	Education	Frequency	Percentage (%)
Outpatient	More than primary education	127	31%
	Illiteracy	283	69%
	Total	410	100%
Inpatient	More than primary education	35	31%
	Illiteracy	77	69%
	Total	112	100%

(Source: author)

This study categorizes education level into two parts; education and Illiteracy. The table 24 shows that in both outpatient and inpatient department, the most of percentage of patient is illiteracy, with 69 percent (283 and 77 respectively), and only 31 percent patient (127 and 35 respectively) is completed primary education and more, such as middle education, secondary education and university or postsecondary education.

Table 25 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of Household income per capital.

Table 25: Distribution of respondents according to Household income per capital

Department	Household income per capital	Frequency	Percentage (%)
Outpatient	0-1,045	4	1%
	1,046-23,035	252	61%
	23,036-45,025	106	26%
	45,026+	48	12%
	Total	410	100%
Inpatient	0-1,045	3	3%
	1,046-23,035	83	74%

	23,036-45,025	18	16%
	45,026+	8	7%
	Total	112	100%

(Source: author)

This study uses mean and standard deviation of data to categorize income group. The table shows that the percentage of Household income per capital in outpatient department and inpatient department, in general, the largest percentage of Household income per capital in outpatient is from 1,046 to 23,035, with 61 percent (252), the second percentage of Household income per capital is between 23,036 and 45,025, which is 26 percent (106), followed by more than 45,026 and from 0 to 1,045, with 12 percent (48) and 1 percent (4) respectively. In inpatient department, the most percentage of Household income per capital are between 1,046 and 23,035, with 47 percent (83), and the second most percentage of Household income per capital are from 23,036 to 45,025, with 16 percent (18), followed by more than more than 45,026 and from 0 to 1,045, with 7 percent (8) and 3 percent (3) respectively.

Table 26 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of occupation.

Table 26: Distribution of respondents according to occupation

Department	Occupation	Frequency	Percentage (%)
Outpatient	Famer	270	66%
	Non-farmer	140	34%
	Total	410	100%
Inpatient	Famer	49	34%
	Non-farmer	63	56%
	Total	112	100%

(Source: author)

In China, the main employment in rural area is farming, so this study Classifies occupation into two parts which are farming and non-farmer (Unemployment, studentship, teaching and technicist et al.). The table 26 shows, in outpatient department, the most of patients are famer, which is 66 percent (270), however, the percentage of 34 (140) are unemployment, student, teacher and technicist and others. In contrast, the most percentage of occupation in inpatient department are unemployment, student, teacher and technicist and others, with 56 percent (63), however, the percentage of 34 (49) is famer.

Table 27 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of distance.

Table 27: Distribution of respondents according to distance

Department	Distance	Frequency	Percentage (%)
Outpatient	Less than 1 kilometer	247	60%
	1 kilometer and more than 1 kilometers	163	40%
	Total	410	100%
Inpatient	Less than 1 kilometer	62	55%
	1 kilometer and more than 1 kilometers	40	45%
	Total	112	100%

(Source: author)

Distance is defined as how far people use transport from home to the nearest health care institution. Distance of less than 1 kilometer means near to the health facility, and 1 kilometer or more means far from health facility. The table 27 shows that the percentage of patient went to the nearest outpatient department is less than 1 kilometer, with 60 percent (247), on the other hand, 40 percent (163) patient went to the nearest outpatient department are 1 kilometer and more than 1 kilometers. In outpatient, the percentage of patient went to the nearest inpatient department is less than 1 kilometer, which is 55 percent (62), alternatively, 45 percent (40) patient went to the nearest inpatient department are 1 kilometer and more than 1 kilometers, with 45 percent.

Table 28 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of smoking.

Table 28: Distribution of respondents according to smoking

Department	Smoking	Frequency	Percentage (%)
Outpatient	Smoking	122	30%
	Non-smoking	288	70%
	Total	410	100%
Inpatient	Smoking	1	0%
	Non-smoking	111	100%
	Total	112	100%

(Source: author)

The table 28 shows the distribution of whether or not smoking, in general, most of patients is non-smoking, which is 70 percent (288) in outpatient department, there only have 30 percent (122) patient is smoking. In inpatient department, the percentage of 100 (111) is non-smoking, only 1 patient is smoking.

Table 29 show the distribution of figures of chronic patients' utilized outpatient and inpatient treatment in term of chronic disease.

Table 29: Distribution of respondents according to chronic disease

Department	Chronic disease	Frequency	Percentage (%)
Outpatient	Circulation system disease	319	78%
	Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease	43	11%
	Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system	49	11%
	Total	410	100%
Inpatient	Circulation system disease	74	66%
	Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease	26	24%
	Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system	12	10%
	Total	112	100%

(Source: author)

This study classifies chronic disease into three according to percentage of patients with the disease (Circulation system disease; Endocrine, Nutritional and

Metabolic, Immune system disease and Respiratory system disease; Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system). The table 29 shows that the distribution of chronic disease, in general, the most percentage of chronic diseases are Circulation system disease in outpatient department, with 78 percent (319), the percentage of Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease and Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system are same, which are both 11 percent (43 and 49 respectively). However in inpatient department, the most percentage of chronic disease is Circulation system disease, with 66 percent (74), the second most percentage of chronic diseases are Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease, which are 24 percent (26), the least percentage of percentage of chronic disease are Nervous system disease, Digestive system disease, Skin disease, Eye disease, mental disease, urogenital disease, cancer, hematopoietic disease, skeletal system are 10 percent (12).

Table 30 shows the distribution of figures of chronic patients received outpatient and inpatient treatment in term of county.

Table 30: Distribution of respondents according to county

Department	County	Frequency	Percentage (%)
Outpatient	Wulateqian	178	43%
	Wuyuan	232	57%
	Total	410	100%
Inpatient	Wulateqian	55	49%
	Wuyuan	57	51%
	Total	112	100%

(Source: author)

This study, surveys two counties, which are Wulateqian County and Wuyuan County. The table shows that the number of patients in Wuyuan county more than Wulateqian county in outpatient department where 57 percent patient (232) in Wuyuan county and 43 percent (178) patient in Wulateqian county. However, in inpatient department, the number of patients in Wuyuan and Wulateqian County are both nearly 50 percent.

Table 31 show the distribution of figures of chronic patients obtained outpatient and inpatient treatment in term of medical institution.

Table 31: Distribution of respondents according to medical institution

Department	Medical institution	Frequency	Percentage (%)
Outpatient	Village clinic	152	37%
	Township health center	99	24%
	County level and above hospital	0	0%
	Private hospital and tradition hospital	159	39%
	Total	410	100%
Inpatient	Village clinic	22	19%
	Township health center	42	38%
	County level and above hospital	28	25%

Private hospital and tradition hospital	20	18%
Total	112	100%

(Source: author)

In China, the MOH depend on different regions to divide medical institution, for example, in the village, there are public medical institution only have village clinic, and in township, the public health facility is township health center. So in this study, divide medical institution into four parts (village clinic, township health center, county level and above hospital and private hospital and tradition hospital). In addition, the village clinic, township health center, county level and above hospital are both public medical institutions. The table 31 shows the percentage of patients is willing to which medical institution. In general, in outpatient, most of patients prefer to choose private hospital and tradition hospital and village clinic, with 39 percent (159) and 37 percent (152) respectively. 24 percent (99) patient choose township health center, there is nobody choose county level and above hospital. In inpatient department, the percentage of township health center is relatively higher than others, with 38 percent (42), the second most percentage of medical institution is county level and above hospital, which is 25 percent (28), however the percentage of village clinic and private hospital and traditional hospital are both less than 20 percent, which are 19 percent (22) and 18 percent (20).

5.2 Concentration curve and concentration index

This study uses the concentration curve and concentration index to measure equality, the prevalence rate of chronic disease and health services utilization as health variables are chosen as described and calculated by the concentration curve

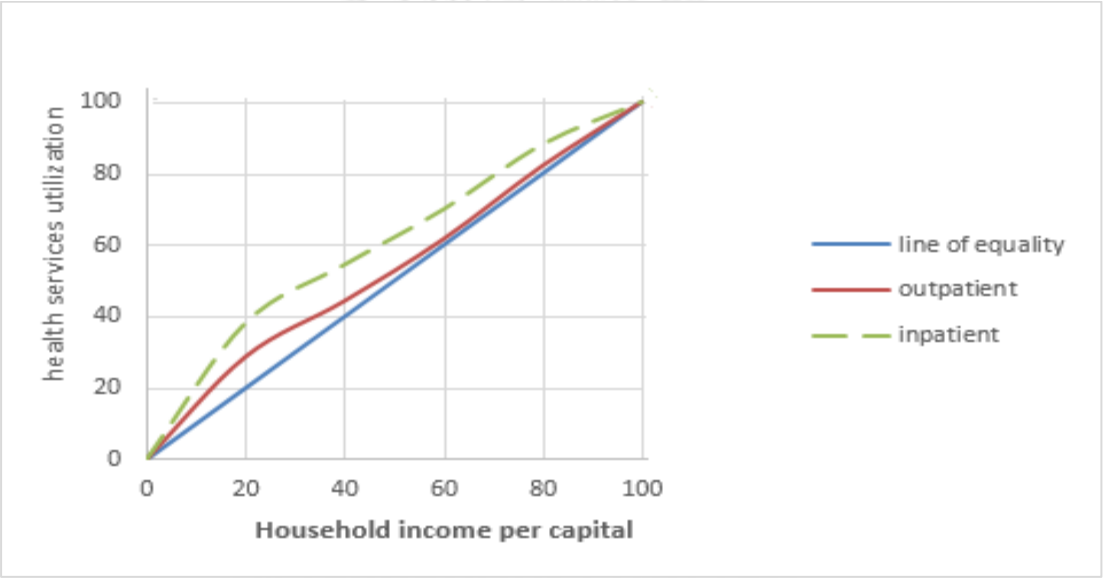
and concentration index in inpatient department, outpatient department and in eight townships.

5.2.1 The concentration curve

This study uses EXCEL to draw the concentration curve.

The figure 12 shows the concentration curve of health services utilization in outpatient and inpatient department.

Figure 12: The concentration curve of health services utilization in outpatient and inpatient department



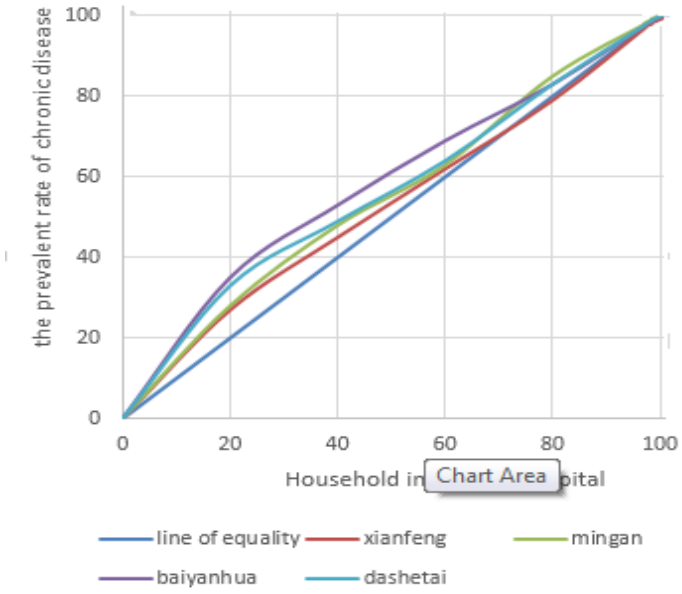
(Source: author)

Figure 12 shows the concentration curve of health services utilization in outpatient and inpatient department in 2011 in Bayan Nur city. The x-axis is household income per adult equivalent scale and the y-axis is number of rural patients who used inpatient healthcare services. The concentration curve for inpatient and outpatient both lie above the line of equality, indicating that the number of rural patients that used inpatient and outpatient healthcare services are

concentrated amongst the poor group in 2011. From this graph, we can infer that poor patients use outpatient and inpatient services more than rich patients. This result is the same with the result of regression. Poor people want to seek more medical services, but they cannot receive more healthcares, this might be because of income, family size and occupation and so on. The outpatient's curve lies everywhere closer to the line of equality than that of inpatient, meaning there is less inequality in health services utilization in outpatient than in inpatient.

The figure 13 shows the concentration curve of Wulateqian County which included Xianfeng Township, Mingan Township, Baiyanhua Township and Dashetai Township.

Figure 13: The concentration curve of Wulateqian County



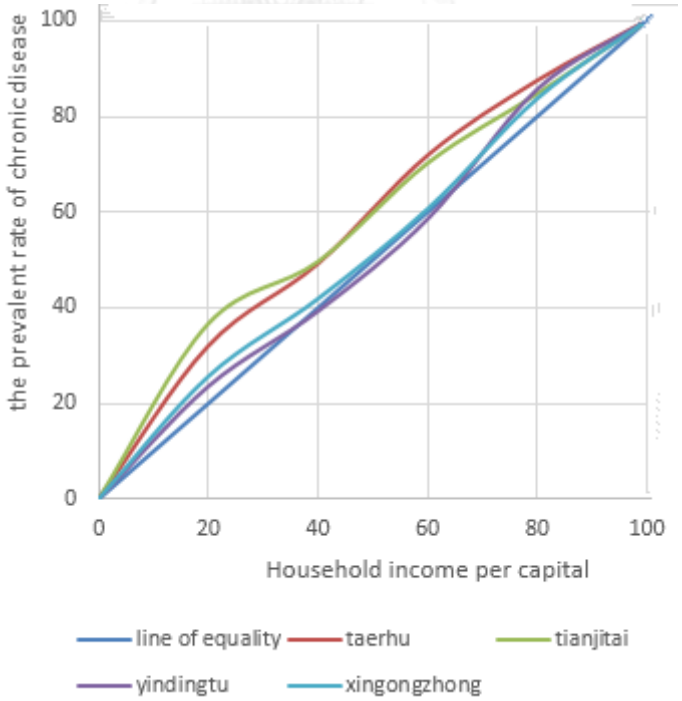
(Source: author)

Figure 13 shows the concentration curve of prevalence rate of chronic disease in 2011 in Wulateqian County. The x-axis is household income per capital and the y-axis is number of rural patients with chronic diseases in Wulateqian County. The

concentration curve for four townships both lie above the line of equality, indicating that the number of rural patients with chronic diseases is concentrated amongst the poor wealth group in 2011. This result is same to the result of regression, the poor people want to seek more medical services, but they cannot receive more healthcares, may be because of income, family size and occupation and so on. The Baiyanhua Township's curve lies everywhere farthest to the line of equality than that of inpatient, meaning there is less equality in prevalence rate of chronic disease in Baiyanhua Township than other Townships.

The figure 14 shows that the concentration curve of Wuyuan County which included Taerhu Township, Tianjitai Township, Xingongzhong Township and Yindingtu Township.

Figure 14: The concentration curve of Wuyuan County



(Source: author)

The figure 14 shows the concentration curve of prevalence rate of chronic disease in 2011 in Wuyuan County. The x-axis is household income per capital and the y-axis is number of rural patients with chronic disease in Wuyuan County. The concentration curve for four townships both lie above the line of equality, indicating that the number of rural patients with chronic disease is concentrated amongst the poor wealth group in 2011. In this line graph, we cannot easily distinguish which township's concentration curve is farthest from the line of equality. So, this study uses concentration index to compare.

5.2.2 The Concentration index

The concentration index can measure the magnitude of inequality and compare the degree of socioeconomic inequality. In this study, EXCEL is used to do the calculation.

Using the EXCEL calculation and according to the formula:

$$C=(p_1L_2-p_2L_1)+ (p_2L_3-p_3L_2)+...+(p_{T-1}L_T-p_TL_{T-1})$$

The results of outpatient and inpatient department see the table 32.

Table 32: The concentration index in outpatient and inpatient department

Department	Wealth group	No. of rural patients use healthcare service	Rel% rural patients use healthcare service	Cumul % rural patients use healthcare service	Concentration index
Inpatient	Poorest	42	38.18182%	38.18182%	-0.04364
	2nd	18	16.36364%	54.54545%	-0.04727
	Middle	17	15.45455%	70%	-0.03091
	4th	20	18.18182%	88.18182%	-0.08182
	Richest	13	11.81818%	100%	0
	Total/ average	110	100%		-0.20364

Outpatient	Poorest	118	28.78049%	28.78049%	-0.02634
	2nd	64	15.60976%	44.39024%	-0.01951
	Middle	71	17.31707%	61.70732%	-0.00049
	4th	84	20.4878%	82.19512%	-0.02195
	Richest	73	17.80488%	100%	0
	Total/ average	410	100%		-0.06829

(Source: author)

The results indicate the concentration index of health services utilization in outpatient and inpatient department in Bayan Nur city. In general, the concentration index of health services utilization in inpatient is -0.20364, while, in comparison the concentration index of outpatient is just -0.06829. From these results, we can see both the concentration index takes negative values which means disproportionate concentration of the health services utilization of outpatient and inpatients among the poor wealth group in rural area of Bayan Nur city in 2011. This result is same to the concentration curve's result, according to the numbers; we can see there is less inequality in health services utilization in outpatient than in inpatient.

Table 33: The concentration index in Wulateqian County and Wuyuan County

Township	Wealth group	No. of chronic disease	Rel% chronic disease	Cumul % chronic disease	Concentration index
Xianfeng	Poorest	27	27%	27%	-0.018
	2nd	18	18%	45%	-0.022
	Middle	17	17%	62%	-0.022
	4th	17	17%	79%	0
	Richest	21	21%	100%	0
	Total/ average	100			-0.062

Mingan	Poorest	29	28%	28%	-0.016
	2nd	20	20%	48%	-0.036
	Middle	16	15%	63%	0.006
	4th	23	22%	85%	-0.05
	Richest	16	15%	100%	0
	Total/ average	104	100%		-0.096
Baiyanhua	Poorest	37	35.2381%	35%	-0.034
	2nd	19	18.09524%	53%	-0.042
	Middle	17	16.19048%	69%	-0.054
	4th	15	14.28571%	83%	-0.03
	Richest	17	16.19048%	100%	0
	Total/ average	105	100%		-0.16
Dashetai	Poorest	36	32.72727%	33%	-0.034
	2nd	18	16.36364%	49%	-0.038
	Middle	17	15.45455%	64%	-0.014
	4th	21	19.09091%	83%	-0.03
	Richest	18	16.36364%	100%	0
	Total/ average	110	100%		-0.116
Taerhu	Poorest	41	32.03125%	32.03125%	-0.0297
	2nd	22	17.1875%	49.21875%	-0.0078
	Middle	29	22.65625%	71.875%	-0.05
	4th	20	15.625%	87.5%	-0.075
	Richest	16	12.5%	100%	0
	Total/ average	128	100%		-0.1625
Tianjitai	Poorest	48	36.64122%	36.64122%	-0.0473
	2nd	17	12.9771%	49.61832%	-0.0168
	Middle	27	20.61069%	70.22901%	-0.0534

	4th	19	14.50382%	84.73282%	-0.0473
	Richest	20	15.26718%	100%	0
	Total/ average	131	100%		-0.1649
Xingongzhong	Poorest	30	25.64103%	25.64103%	-0.0188
	2nd	19	16.23932%	41.88034%	-0.0085
	Middle	22	18.80342%	60.68376%	0.01709
	4th	27	23.07692%	83.76068%	-0.0376
	Richest	19	16.23932%	100%	0
	Total/ average	117	100		-0.0479
Yindingtu	Poorest	33	23.57%	23.57%	-0.0157
	2nd	22	15.71%	39.28%	-0.0014
	Middle	27	19.29%	58.57%	0.04576
	4th	38	27.145%	85.72%	-0.0572
	Richest	20	14.29%	100%	0
	Total/ average	140	100%		-0.0286

(Source: author)

The results indicate the prevalence rate of chronic disease in eight townships that Xianfeng is -0.062, Mingan is -0.096, Baiyanhua is -0.16, Dashetai is -0.116, Taerhu is -0.1625, Tianjitai is -0.1649, Xingongzhong is --0.0479 and Yindingtu is -0.0286 respectively. In this result, both concentration index takes negative values, it means disproportionate concentration of residents with chronic disease concentrated among the poor wealth group in Bayan Nur city in 2011. In addition, through comparison of the result of eight townships' concentration index, we can see there is more inequality in Tianjitai Township than other Townships. The result of concentration index is same to the concentration curve.

5.3 Factor affecting health services utilization among rural residents with chronic disease

In order to provide recommendation for Inner Mongolia Autonomous Region medical and health system, and aim to improve the compensation mechanism of chronic diseases, this study chooses six regressions to find factors which might affect health services utilization among rural residents with chronic disease. Ordinary Least Square and Poisson regression are used to estimate values of P and other indicators. This study considers patients' side and medical institution's side. Variables included patients' age, gender, chronic disease, education level, family size, Household income per capital, marital status, occupation, life style, medical expenditure, number of visits that patients went to outpatient department, number of days that patients stay in hospital and distance that how far the nearest from house to health care facility, however, the medical institution's side included number of bed in different health care facilities and different levels of health care facilities.

5.3.1 Factor affecting health services utilization in inpatient department

Table 34: OLS and Poisson regression Estimated for inpatient

Independent	Inpatient medical expenditure (OLS)		Inpatient medical expenditure/ household income per adult equivalent scale (OLS)		Number of days of admissions (Poisson)	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	21606.80	0.2003	11.83279	0.0000*	3.052791	0.0000*
AGE	-284.3044	0.0797	-0.023968	0.3639	-0.006628	0.0111*
BED	21.51002	0.7047	0.000541	0.9535	0.000329	0.7041

CD1	4616.297	0.3735	-0.367285	0.6648	0.338651	0.0001*
CD2	1734.725	0.7647	-0.619138	0.5144	0.049846	0.6226
CT	1233.490	0.7566	-0.153075	0.8142	-0.445649	0.0000*
DIS	1495.025	0.6825	-0.115459	0.8469	-0.018247	0.7609
EDU	4338.953	0.2358	-0.056752	0.9242	-0.099341	0.0812
FS	-437.6275	0.7438	-0.202702	0.3561	-0.034761	0.1213
GEN	6163.276	0.0792	0.515202	0.3670	-0.104924	0.0575
INC1	836.0999	0.9315	-8.205745	0.0000*	0.323037	0.0861
INC2	1041.791	0.9182	-9.318786	0.0000*	0.409842	0.0332*
INC3	-1935.700	0.8635	-9.656910	0.0000*	0.355719	0.0887
MI1	-1607.697	0.7640	-0.767263	0.3821	-0.289242	0.0018*
MI2	-35.29288	0.9938	0.273364	0.7137	0.065100	0.3631
MI3	11876.79	0.0203	1.448700	0.0817	0.183024	0.0170*
MS	530.3254	0.9080	0.122916	0.8700	0.018201	0.8071
OCC	-3280.332	0.3358	-0.284274	0.6097	-0.511540	0.0000*
SM	3298.935	0.4419	-0.977236	0.1656	0.333511	0.0000*
R-squared		0.210758	0.353205			0.244734
Adjusted R-squared		0.058001	0.228019			0.098554
Prob(F-statistic)		1.379697	2.821438	LR statistic		234.3009
F-statistic		0.160466	0.000611	Prob(LR statistic)		0.000000
N=112						
***sign significant coefficient at 5 percent**						

(Source: author)

From table 34,

When the dependent variable is outpatient medical expenditure, we can see that the independent variables seem to be unrelated to the dependent variables; as such they cannot explain the dependent variable.

When the dependent variable in this model is $\frac{IE}{II}$ (inpatient medical expenditure / individual income), in regression equation, there are four significant coefficients which are constant term, individual income 1, individual income 2 and

individual income 3. The value of R square is 0.353205, which means 35.3205 percent of the dependent variable can be explained by the independent variables. The R square of this regression equation is relatively low. Because data limitation, therefore might be as a result of non-inclusion of some important variables. The F value is 2.821438 ($P<0.05$), which means the coefficients of significant variables in this regression model are not equal to 0, simultaneously.

- The regression analysis shows that the coefficient of inc (individual income 1, 2 and 3) are negative values, this means the patient with higher income level will bear less economic burden of the diseases. There are probably reason why the coefficients are negative. Rural areas that have individuals with relatively higher income can afford high medical expenditure.

When the dependent variable is number of days of patients stay in the hospital, in regression equation, there are seven significant coefficients which are constant term, age, cd1, ct, inc2, mi1, mi3, occ and sm. The value of R square is 0.244734 which means 24.4734 percent of dependent variable can be explained by independent variables. The R square of this equation is relatively low and might be related to omission of some important variables.

- The regression analysis shows that the coefficient of age is negative; it means older patients will spend short time on hospitalization. Because rural patients grow older, they might earn less, and also because cost of hospitalization is high, they can only stay in hospital for fewer days.

- The results indicate that the coefficient of chronic disease 1 is positive; this means the patient with chronic disease 1 will have increased number of days of

patient stay in hospital. Variable of chronic disease is a dummy variable. Chronic disease 1 is Circulation system disease which includes Hypertension, Cerebral infarction and cerebral hemorrhage and so on in this study. Patients with circulatory system disease often go to the hospital; as such the cumulative number of days of patient stay in the hospital is high.

- The regression analysis shows that the coefficient of county is negative; it means more patients live in Wuyuan County and have increased number of days of patient stay in hospital. The variable of county is a dummy variable which 1 is Wulateqian County and 0 is Wuyuan County. The household income of Wuyuan County is higher than Wulateqian County in Bayan Nur city in 2011, this can be interpreted to mean that the patients who live Wuyuan County have more individual income and so it's easy to understand that the people have more money, and are willing to pay more money to accept longer treatment.

- The results indicate that the coefficient of income 2 is positive; this means for patients who have high income, their number of days of patient stay in hospital will increase. The individual income 2 is higher income group in this study, so it’s easy to understand that income 2 might spend more money on hospitalization.

- The regression analysis shows that the coefficient of medical institution 3 is positive; this means if health care facilities 3 increases in sample areas, the number of days of patient stay in hospital will increase. In this study, the variable of medical institution is a dummy variable which 1 is Village clinic, 2 is Township health center, 3 is County level above hospital and 0 is Private hospital and tradition hospital. The medical institution 3 has better medical equipment and

much more medical personnel. This mean, patients with chronic disease must often go to the hospital and usually prone to accessing professional services, so, this medical institution might attract patients to spend more time on hospitalization.

The regression analysis also shows that the coefficient of occupation is negative; it means the people who are famer have increased potentials to spend more number of days of patient stay in hospital. In this study, the variable of occupation is a dummy variable which 1 is famer, and 0 is unemployed, student, teacher or technicist and so on. Because farmers do not earn more money than others, their resources are limited and hence their visit to outpatient department will decrease.

- The result indicate that the coefficient of smoking is positive; it means people who smoke will have increased number of days of patient stay in hospital. Some people argue that people who smoke will easily get respiratory system disease, so they will spend more time on hospitalization.

5.3.2 Factor affecting health services utilization in outpatient department

Table 35: OLS and Poisson regression Estimated for outpatient

Independent	**Inpatient medical expenditure (OLS)**		**Inpatient medical expenditure/ household income per adult equivalent scale (OLS)**		**Number of days of admissions (Poisson)**	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	1.388945	0.4244	-6.984202	0.0002*	0.200865	0.6582
LNAGE	1.014956	0.0060*	1.447467	0.0003*		

AGE					0.001288	0.6889
LNBED	0.417359	0.0002*	0.389459	0.0014*		
BED					0.008094	0.0000*
CD1	-0.839281	0.0001*	-1.018457	0.0000*	-0.295896	0.0012*
CD2	-0.484530	0.0948	-0.678400	0.0288*	-0.440872	0.0008*
CT	0.433940	0.0039*	0.466576	0.0037*	-0.257629	0.0006*
DIS	0.000258	0.9986	0.118483	0.4475	0.237950	0.0006*
EDU	0.147979	0.3092	0.156370	0.3147	0.294578	0.0000*
LNFS	0.206321	0.2087	-0.063315	0.7179		
FS					0.103053	0.0000*
GEN	-0.274476	0.0683	-0.177798	0.2687	-0.493399	0.0000*
INC1	0.443349	0.5220	-1.841592	0.0132*	-0.139327	0.7011
INC2	0.518631	0.4604	-2.894095	0.0001*	-0.348604	0.3446
INC3	0.168452	0.8132	-4.051780	0.0000*	-0.033780	0.9282
MI1	-2.002713	0.0000*	-1.985941	0.0000*	0.320645	0.0001*
MI2	-1.092680	0.0000*	-0.987535	0.0000*	0.556952	0.0000*
MS	-0.129491	0.5603	0.182110	0.4436	0.457880	0.0001*
SM	0.197338	0.2261	-0.390692	0.0264*	-0.235507	0.0012*
OCC	-0.185227	0.2594	0.113903	0.5131	0.121342	0.1002
R-squared		0.439727	0.501945			0.130210
Adjusted R-squared		0.415430	0.480345			0.092490
Prob(F-statistic)		18.09761	23.23888	LR statistic		369.1591
F-statistic		0.000000	0.000000	Prob(LR statistic)		0.000000
N=410						
***sign significant coefficient at 5 percent**						

(Source: author)

From table 35,

When the dependent variable in this model is outpatient medical expenditure, in regression equation, the heteroskedasticity test shows that prob. Chi-square = 0.0263< 0.05. The dependent variable and independent variables are changed to log form, so the dependent variable is lnOE, independent variables are

lnage, lnbed, cd1, cd2, ct, dis, edu, lnfs, gen, inc1, inc2, inc3, mi1, mi2, ms, occ and sm. The result shows that there are six significant coefficients which age, number of bed in different health care facilities, chronic disease 1, county, individual income1, medical institution 1 and 2, and occupation. The value of R square is 0.439727 which means 43.9727 percent of dependent variable can be explained by independent variables. The R square of this regression equation is relatively low. Because data limitation, therefore might be as a result of non-inclusion of some important variables. The F value is 18.09761 ($P<0.05$), this means coefficients of both significant variables in this regression model are not equal to 0, simultaneously.

- The regression analysis shows that the coefficient of lnage is positive; it means when other variables constant, increase 1 percent of age, the outpatient medical expenditure will increase 1.014956%. Because if the people get older, their physical fitness might wane, and they may use outpatient services more. So age have positive impact on medical expenditure of outpatient.

- The results indicate that the coefficient of lnbed is positive; it means that when other variables constant, increase 1 percent of bed, the outpatient medical expenditure will increase 0.417359%. In general, with increase in number of beds, there is a corresponding increase in the number of medical personnel. The more medical personnel in medical institution, the more services will be available in that hospital, and patients will be attracted to the expanded and available services. Hence, the more people seek medical attention in the hospital and so the medical expenditure will increase.

- The regression analysis shows that the chronic disease 1 is negative; it means the more people get chronic disease 1, the outpatient medical expenditure will decrease. Because the more patients get chronic disease 1. With fewer cases of chronic disease cost it of treatment is high. But as the cases of the chronic disease increase, the average total cost of treating it becomes low, hence, the assertion that when more people get chronic disease, the outpatient expenditure will decrease.

- The results indicate that the county is positive; it means the more patients live in Wulateqian County, the outpatient medical expenditure will increase. The variable of county is a dummy variable which 1 is Wulateqian County, and 0 is Wuyuan County. In this study, the mean of household income of Wuyuan is higher than Wulateqian's in 2011 in Bayan Nur city. So patients who live in Wulateqian County have relatively low income, and this might lead to their low living standard and malnutrition, and they easily get disease. So the patient who lives in Wulateqian County will spend more on outpatient medical expenditure.

- The regression analysis shows that medical institution 1 and 2 are negative; it means the more medical institution in sample areas, the outpatient medical expenditure will decrease. In this study, the variable of medical institution is a dummy variable which 1 is Village clinic, 2 is Township health center, 3 is County level above hospital and 0 is Private hospital and tradition hospital. Patients prefer to go to higher level medical facilities to access good health services. Therefore, there are less patients who visit medical institution 1 and 2. And more patients visit other higher facilities.

When the dependent variable in this model is $\frac{OE}{II}$ (outpatient medical expenditure / household income per adult equivalent scale), In regression equation, the heteroskedasticity test indicate prob. Chi-square = 0.0263< 0.05. The dependent variable and independent variables are changed to log form. The dependent variable is lnOE/II, and independent variables are lnage, lnbed, cd1, cd2, ct, dis, edu, lnfs, gen, inc1, inc2, inc3, mi1, mi2, ms, occ and sm. The result shows that there are twelve significant coefficients which are constant term, age, bed, chronic disease 1 and 2, county, individual income1, 2 and 3, medical institution1 and 2, and occupation. The value of R square is 0.501945 that means 50.1945 percent of dependent variable can be explained by the independent variables. The R square of this regression equation is relatively low and this might be as a result of independent variables that have been left out of the regression. The F value is 23.23888 (P<0.05) which means coefficients of both significant variables in this regression model are not equal to 0, simultaneously.

- The regression analysis shows that the coefficient of lnage is positive; it means when other variables constant, increase 1 percent of age, the economic burden of the diseases will increase 1.447467%. Because as patients grow older, they might earn less, so that the economic burden will increase in this study.

- The regression analysis shows that the coefficient of lnbed is positive; it means it means when other variables constant, increase 1 percent of bed, the economic burden of the diseases will increase 0.389459%. We can infer that when number of beds increase, the hospital becomes larger in size. They have more medical

personnel and can provide more services, making more patients to go there to seek health services and hence their economic burden of the disease increases.

- The regression analysis shows that the coefficient of chronic disease 1 (Circulation system disease) and 2 (Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease) is negative; it means the more rural residents get circulation system disease; the rural resident will bear more burden of disease economic. Because circulation system disease is a common disease in sample areas, and treatment this disease is generally cheap, the economic burden will be less than other chronic diseases.

- The regression analysis shows that the coefficient of ct (county) is positive. In this study, variable of county is a dummy variable, the coefficient is positive means people living in Wulateqian County will bear more economic burden of the disease. Because the mean of household income of Wulateqian County is relatively lower than Wuyuan County, accordingly, the residents' individual income in Wulateqian County is relatively lower than Wuyuan County. If people often go to the hospital, they will spend more money and hence their economic burden will increase.

- The regression analysis shows that the coefficients of the individual income 1, 2 and 3 are negative values; this means the rural residents who have higher income level will bear less economic burden of the disease. There are probably two reasons; in rural area that have individual with relatively higher incomes and can afford high medical expenditure, they prefer to receive treatment in other special facilities when they suffer from chronic disease. Rural residents have relatively

higher individual income and can eat better food; it might improve their health and decrease their burden of disease.

- The regression analysis shows that the coefficients of the medical institution 1 (Village clinic) and 2 (Township health center) are negative values; it means that people who went to medical institution 1 and 2 will bear less economic disease burden. In China, the health care resource which includes medical personnel and equipment as well as the quality of services provision in village clinic is relatively lower when compared to others. Therefore, more of the patients often go to higher level healthcare facilities, and access professional treatment, so the economic burden of the disease is less in medical institution 1 and 2 in this study.

- The regression analysis shows that the coefficient of the occ (occupation) is a negative value. Because the variable of occupation is dummy variable which 1 is famer and 0 for others such as unemployed, student, teacher and technicist and more. Negative value means that with increase of farmers, the economic burden of the disease decreases. This is because, the farmers who have the disease engage in regular farm work which is healthy for their body and as such their visit to the outpatient hospitals decreases, leading to decreased economic burden of the disease.

When the dependent variable in this model is number of visits in outpatient department, the result shows that there are twelve significant coefficients which are bed, cd1, cd2, ct, dis, edu, fs, gen, mi1, mi2, ms and occ. The value of R square is 0.130210 which means 13.0210 percent of dependent variable can be explained by independent variables. The R square of this regression equation is relatively low and

we can say that absence of some relevant independent variables contributed to this low value.

- The regression analysis shows that the coefficient of bed is positive; it means that as health care facility provide more beds to such units like emergency and others, the number visits to the outpatient department will increase. In general, as health care facilities increase their number of beds, they correspondingly increase the number of medical personnel. It is easy to understand that more medical personnel will provide more health services, corresponding to patients often receiving health care services in outpatient department in this study.
- The results indicate that chronic disease 1 and 2 are negative; it means that if more people get chronic disease 1 and 2, the number of visits to the outpatient department will decrease. Chronic disease 1 is circulatory system disease and chronic disease 2 is Endocrine, Nutritional and Metabolic, Immune system disease and Respiratory system disease. This is so because, in sample area, there are more professionals in the inpatients department when compared to the outpatients. Patients like to visit where they will get more professional services, hence the decreased visit to the out patients department.
- The regression analysis shows that the county is negative; it means if the patient is living in Wulateqian County, the number of visits of patient going to the outpatient department will decrease. The county variable is a dummy, where 1 is Wulateqian county and 0 is Wuyuan County. In 2011 as at the time of this data collection, the GDP of Wuyuan county is higher than that of Wulateqian County, that make the individual income of Wulateqian County lower than that of

Wuyuan county. Therefore, the patients in Wulateqian County will visit the outpatient services less often than Wuyuan county patients. Hence there will be decreased visit among Wulateqian county patients.

- The results indicate that distance is positive; it means the more patients' house from the nearest medical institution is less than 1 kilometer, the number of visits to the outpatient department will increase. The more the medical institution are near to the houses, the more will be availability of health care. So in this study, the people can often go to outpatient to receive treatment.

- The regression analysis shows that education is positive; it means for the patients who have higher education level, the number of visits to the outpatient department will increase. In this study education is a dummy variable where education 1 is more than primary education and 0 is illiteracy. It is quite easy to understand, that the patients who have higher education, will get a good job and earn more money. So they can afford medical expenditure, so they can usually go to outpatient in this study.

- The results indicate that family size is positive; it means patients who have many family members, the number of visits to the outpatient department will increase. The family who have many family members, have higher probability of more persons with paid jobs in the family, and more people might earn more money, so the number of visits to outpatients for such families is more. Also, children are prone to falling sick more often, so for families where there are children, they will tend to often go to outpatient department.

- The regression analysis shows that gender is negative; it means with increase in number of female, the number of visits to the outpatient department will increase. Gender is a dummy variable in this study which 1 is male and 0 is female. In rural area, the work force is more of male in families. The job of female is domestic. In general, male fall ill less, because they are healthier. By contrast, the female are very prone to disease, so they go to the outpatient department more frequently.

- The results indicate that medical institution 1 and 2 is positive; it means with increase in the number of medical institution 1 and 2, the number of visits to the outpatient department will increase. In this study, the medical institution 1 is Village clinic and medical institution 2 is Township health center. These two health care facilities majorly provide primary health service, so an increase in the number of primary heath institutions might promote availability and efficiency of health care so patients usually go to outpatient department. Another reason has to do with the location of the health facilities, because more of the medical institutions 1 and 2 are near the patients' house, they tend to visit the outpatients department more.

- The regression analysis shows that the marital status is positive; it means increase number of patient who are married, the number of visits to the outpatient department will increase. In this study, 88 percent of the people are married. And because with marriage comes children, and children are vulnerable to being ill often, hence, visit to outpatient services will increase.

- The results indicate that occupation is negative; it means increase unemployment, student, teacher and technicist, the number of visits to the outpatient department will increase. The reason is same to previous, the teacher and technicist earn more money, and they can spend more money on healthcare services of outpatient. So in this study, they can often go to outpatient.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

6.1 Summary

In this study, there are three objectives, firstly, to research the factors which affect health service utilization among rural residents in Bayan Nur city, China. Secondly, use concentration index and concentration curve to estimate health equality of outpatient and inpatient. Finally, to use concentration index and concentration curve to evaluate health equality of eight villages. This study's data came from Inner Mongolia Medical University, and the data was collated in July 10, 2011 to July 14, 2011 which included 2,004 household, there are 522 residents with chronic diseases who are diagnosed by doctors.

Through data description, we can see the female group, age group which from 50 to 80 years old, illiteracy group, income group which is between 1,046 and 23,035, distance which less than 1 kilometer, chronic disease which circulation system disease and residents who live in Wulateqian County have the higher percentages in each group.

This study uses multiple regression and count model to measure factors which effect health services utilization. This study has six models, and dependent variables are outpatient medical expenditure, inpatient medical expenditure, number of visits, number of days, $\frac{\mathbf{OE}}{\mathbf{HI}}$ and $\frac{\mathbf{IE}}{\mathbf{HI}}$.

When the dependent variable is outpatient medical expenditure, there are six significant variables. Age is significant, its coefficient is positive. Bed is significant, its coefficient is positive. Chronic disease 1 is significant, its coefficient is negative.

County is significant, its coefficient is positive. And the medical institution 1 and 2 are significant, their coefficients are both negative.

When the dependent variable is number of visits in outpatient department, there are twelve significant variables. Bed is significant, its coefficient is positive. Chronic disease 1 and 2 are significant, their coefficients are both negative. County is significant, its coefficient is negative. Distance is significant, its coefficient is positive. Education 1 and 2 are significant, their coefficients are both positive. Family size is significant, its coefficient is positive. Gender is significant, its coefficient is negative. Marital status is significant, its coefficient is positive. Occupation is significant, its coefficient is negative. And the medical institution 1 and 2 are significant, and their coefficient are both positive.

When the dependent variable is $\frac{\mathbf{OE}}{\mathbf{HI}}$, there are twelve variables which are significant. Age is significant, its coefficient is positive. Bed in health care facility is significant, its coefficient is positive. Chronic disease 1 and 2 are significant, their coefficients are both negative. County which patients are living is significant, its coefficient is positive. The individual income 1, 2 and 3 are significant, their coefficient are negative. Medical facility 1 and 2 are significant, their coefficients are negative. Patients' occupation is significant, its coefficient is negative.

When the dependent variable is number of days in inpatient department, there have seven significant variables. Age is significant, its coefficient is negative. Chronic disease 1 is significant, its coefficients are positive. County which residents living is significant, its coefficient is negative. The individual income 2 is significant, their coefficient is positive. Marital status is significant, its coefficient are both positive.

Occupation is significant, its coefficient is positive. And the medical institution 1 is significant, its coefficient is negative and medical institution 3 is significant, their coefficients are positive.

When the dependent variable is$\frac{IE}{HI}$, there have four variables are significant. The individual income 1, 2 and 3 are significant, their coefficients are negative.

This study used concentration index and concentration curve to estimate the equality of outpatient and inpatient department health services utilization, the health services utilization is used as health variables. This result indicates that the inpatient's health services utilization has more inequality than outpatients'.

This study also used concentration curve and concentration index to measure the equality of prevalence rate of chronic disease in eight townships, the result shows that the Baiyanhua township which in Wulateqian county has more inequality than others.

6.2 Recommendation

Education is an important sector to help rural resident have more knowledge about health and health care which indirectly helps to improve ability of preventing and perceiving disease. Continuation of primary and middle education in rural areas will help rural residents' correct attitudes to treat disease.

In this study, the result shows that the outpatient department's health services utilization has more equality than inpatients' in Bayan Nur city, so this study suggest ministry of health of Inner Mongolia to make available more capital for hospitalization subsidy. In addition, Baiyanhua township has more inequality than others, this township belong to Wulateqian county, furthermore, Wulateqian county

is not the rich county in Bayan Nur city, not to mention in the of whole Inner Mongolia, so this study suggest that the government put more money to relatively poor counties for health care services.

6.3 limitation of this study

This study researches the health services utilization among rural residents with chronic disease in Bayan Nur city, China. Because of data limitation, this study only focuses on residents with chronic disease who live in rural areas.

This study used household income per adult equivalent scale instead of individual income, however, this may not reflect accurate individual income. This is so because the data available only specifies income at household levels and not individual levels. Because there are children in some of these households studied, and children are known not to contribute income, it becomes imperative to use household income per adult equivalent scale.

6.4Suggestion and Further Study

This study is not without its limitations. The retrospective data available for this study is rural areas information, as such; it limits the application of the outcomes of this study to rural settings. It is therefore suggested that further studies should be explored to include urban areas as this will allow for comparison between the health services utilization in rural and urban areas. This will inform future planning and better help policy makers to put in place policies and measures that address the specific needs of different groups of disadvantaged people as it concerns chronic diseases in the society.

APPENDICES

Appendix A

Multiple regression results of factors affecting health service utilization in outpatient.

Dependent Variable: LNOE
Method: Least Squares
Date: 04/20/14 Time: 22:01
Sample: 1 410
Included observations: 410

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.388945	1.737070	0.799590	0.4244
LNAGE	1.014956	0.367147	2.764442	0.0060
LNBED	0.417359	0.112881	3.697353	0.0002
CD1	-0.839281	0.217144	-3.865092	0.0001
CD2	-0.484530	0.289300	-1.674833	0.0948
CT	0.433940	0.149279	2.906900	0.0039
DIS	0.000258	0.145763	0.001771	0.9986
EDU	0.147979	0.145320	1.018296	0.3092
LNFS	0.206321	0.163853	1.259183	0.2087
GEN	-0.274476	0.150155	-1.827953	0.0683
INC1	0.443349	0.691783	0.640878	0.5220
INC2	0.518631	0.701842	0.738956	0.4604
INC3	0.168452	0.712209	0.236520	0.8132
MI1	-2.002713	0.169436	-11.81989	0.0000
MI2	-1.092680	0.177751	-6.147256	0.0000
MS	-0.129491	0.222130	-0.582950	0.5603
SM	0.197338	0.162772	1.212355	0.2261
OCC	-0.185227	0.163988	-1.129521	0.2594

R-squared	0.439727	Mean dependent var	5.736929
Adjusted R-squared	0.415430	S.D. dependent var	1.748591
S.E. of regression	1.336924	Akaike info criterion	3.461529
Sum squared resid	700.6472	Schwarz criterion	3.637848
Log likelihood	-691.6135	Hannan-Quinn criter.	3.531286
F-statistic	18.09761	Durbin-Watson stat	1.825730
Prob(F-statistic)	0.000000		

Appendix B

Multiple regression results of factors affecting health service utilization in outpatient.

Dependent Variable: LNOE_II
Method: Least Squares
Date: 04/13/14 Time: 00:32
Sample: 1 410
Included observations: 410

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.984202	1.856803	-3.761412	0.0002
LNAGE	1.447467	0.392454	3.688250	0.0003
LNBED	0.389459	0.120661	3.227711	0.0014
CD1	-1.018457	0.232111	-4.387797	0.0000
CD2	-0.678400	0.309241	-2.193756	0.0288
CT	0.466576	0.159569	2.923978	0.0037
DIS	0.118483	0.155810	0.760432	0.4475
EDU	0.156370	0.155337	1.006652	0.3147
LNFS	-0.063315	0.175147	-0.361497	0.7179
GEN	-0.177798	0.160505	-1.107744	0.2687
INC1	-1.841592	0.739466	-2.490434	0.0132
INC2	-2.894095	0.750219	-3.857666	0.0001
INC3	-4.051780	0.761301	-5.322180	0.0000
MI1	-1.985941	0.181115	-10.96510	0.0000
MI2	-0.987535	0.190003	-5.197473	0.0000
MS	0.182110	0.237441	0.766972	0.4436
OCC	-0.390692	0.175291	-2.228821	0.0264
SM	0.113903	0.173992	0.654644	0.5131

R-squared	0.501945	Mean dependent var	-3.900019
Adjusted R-squared	0.480345	S.D. dependent var	1.982429
S.E. of regression	1.429076	Akaike info criterion	3.594842
Sum squared resid	800.5647	Schwarz criterion	3.771161
Log likelihood	-718.9426	Hannan-Quinn criter.	3.664599
F-statistic	23.23888	Durbin-Watson stat	1.902439
Prob(F-statistic)	0.000000		

Appendix C

Poisson regression results of factors affecting health service utilization in outpatient.

Dependent Variable: NV
Method: ML/QML - Poisson Count (Quadratic hill climbing)
Date: 04/13/14 Time: 08:43
Sample: 1 410
Included observations: 410
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.200865	0.454057	0.442379	0.6582
AGE	0.001288	0.003218	0.400307	0.6889
BED	0.008094	0.000872	9.278231	0.0000
CD1	-0.295896	0.091508	-3.233560	0.0012
CD2	-0.440872	0.131617	-3.349653	0.0008
CT	-0.257629	0.075301	-3.421337	0.0006
DIS	0.237950	0.069516	3.422946	0.0006
EDU	0.294578	0.064219	4.587080	0.0000
FS	0.103053	0.023052	4.470426	0.0000
GEN	-0.493399	0.072147	-6.838770	0.0000
INC1	-0.139327	0.362997	-0.383824	0.7011
INC2	-0.348604	0.368822	-0.945183	0.3446
INC3	-0.033780	0.375085	-0.090060	0.9282
MI1	0.320645	0.080567	3.979876	0.0001
MI2	0.556952	0.078658	7.080663	0.0000
MS	0.457880	0.113317	4.040699	0.0001
OCC	-0.235507	0.072498	-3.248440	0.0012
SM	0.121342	0.073818	1.643794	0.1002

R-squared	0.130210	Mean dependent var	2.731707
Adjusted R-squared	0.092490	S.D. dependent var	4.999875
S.E. of regression	4.763048	Akaike info criterion	5.579420
Sum squared resid	8893.156	Schwarz criterion	5.755739
Log likelihood	-1125.781	Hannan-Quinn criter.	5.649177
Restr. log likelihood	-1310.361	LR statistic	369.1591
Avg. log likelihood	-2.745808	Prob(LR statistic)	0.000000

Appendix D

Multiple regression results of factors affecting health service utilization in inpatient

Dependent Variable: IE
Method: Least Squares
Date: 04/20/14 Time: 21:42
Sample: 1 112
Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21606.80	16751.70	1.289827	0.2003
AGE	-284.3044	160.4707	-1.771691	0.0797
BED	21.51002	56.57275	0.380219	0.7047
CD1	4616.297	5162.314	0.894230	0.3735
CD2	1734.725	5778.595	0.300198	0.7647
MI1	-1607.697	5338.036	-0.301178	0.7640
MI2	-35.29288	4538.359	-0.007777	0.9938
MI3	11876.79	5029.273	2.361531	0.0203
SM	-3298.935	4271.997	-0.772223	0.4419
MS	530.3254	4575.860	0.115896	0.9080
OCC	-3280.332	3390.725	-0.967443	0.3358
CT	-1233.490	3968.326	-0.310834	0.7566
DIS	-1495.025	3643.697	-0.410304	0.6825
EDU	-4338.953	3635.971	-1.193341	0.2358
FS	-437.6275	1335.145	-0.327775	0.7438
GEN	6163.276	3472.041	1.775116	0.0792
INC1	836.0999	9701.778	0.086180	0.9315
INC2	1041.791	10114.48	0.103000	0.9182
INC3	-1935.700	11229.93	-0.172370	0.8635

R-squared	0.210758	Mean dependent var	8197.339
Adjusted R-squared	0.058001	S.D. dependent var	16398.87
S.E. of regression	15916.19	Akaike info criterion	22.34145
Sum squared resid	2.36E+10	Schwarz criterion	22.80262
Log likelihood	-1232.121	Hannan-Quinn criter.	22.52856
F-statistic	1.379697	Durbin-Watson stat	1.967030
Prob(F-statistic)	0.160466		

Appendix E

Multiple regression results of factors affecting health service utilization in inpatient.

Dependent Variable: IE_II
Method: Least Squares
Date: 04/12/14 Time: 22:19
Sample: 1 112
Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.83279	2.742005	4.315381	0.0000
AGE	-0.023968	0.026267	-0.912497	0.3639
BED	0.000541	0.009260	0.058429	0.9535
CD1	-0.367285	0.844994	-0.434660	0.6648
CD2	-0.619138	0.945870	-0.654570	0.5144
CT	-0.153075	0.649556	-0.235660	0.8142
DIS	-0.115459	0.596419	-0.193587	0.8469
EDU	-0.056752	0.595154	-0.095357	0.9242
FS	-0.202702	0.218543	-0.927515	0.3561
GEN	0.515202	0.568321	0.906533	0.3670
INC1	-8.205745	1.588037	-5.167226	0.0000
INC2	-9.318786	1.655589	-5.628682	0.0000
INC3	-9.656910	1.838173	-5.253537	0.0000
MI1	-0.767263	0.873757	-0.878119	0.3821
MI2	0.273364	0.742862	0.367988	0.7137
MI3	1.448700	0.823217	1.759802	0.0817
MS	0.122916	0.749000	0.164106	0.8700
OCC	-0.284274	0.555011	-0.512195	0.6097
SM	-0.977236	0.699262	-1.397524	0.1656

R-squared	0.353205	Mean dependent var	1.307413
Adjusted R-squared	0.228019	S.D. dependent var	2.965138
S.E. of regression	2.605243	Akaike info criterion	4.906315
Sum squared resid	631.2180	Schwarz criterion	5.367489
Log likelihood	-255.7537	Hannan-Quinn criter.	5.093428
F-statistic	2.821438	Durbin-Watson stat	1.944431
Prob(F-statistic)	0.000611		

Appendix F

Poisson regression results of factors affecting health service utilization in inpatient.

Dependent Variable: ND
Method: ML/QML - Poisson Count (Quadratic hill climbing)
Date: 04/13/14 Time: 00:13
Sample: 1 112
Included observations: 112
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	3.052791	0.287487	10.61890	0.0000
AGE	-0.006628	0.002611	-2.538306	0.0111
BED	0.000329	0.000866	0.379813	0.7041
CD1	0.338651	0.088669	3.819274	0.0001
CD2	0.049846	0.101280	0.492163	0.6226
CT	-0.445649	0.064027	-6.960330	0.0000
DIS	-0.018247	0.059974	-0.304246	0.7609
EDU	-0.099341	0.056964	-1.743915	0.0812
FS	-0.034761	0.022437	-1.549279	0.1213
GEN	-0.104924	0.055236	-1.899545	0.0575
INC1	0.323037	0.188224	1.716233	0.0861
INC2	0.409842	0.192495	2.129104	0.0332
INC3	0.355719	0.208947	1.702441	0.0887
MI1	-0.289242	0.092445	-3.128819	0.0018
MI2	0.065100	0.071574	0.909546	0.3631
MI3	0.183024	0.076677	2.386942	0.0170
MS	0.018201	0.074558	0.244113	0.8071
OCC	-0.511540	0.055217	-9.264212	0.0000
SM	0.333511	0.064735	5.151907	0.0000

R-squared	0.244734	Mean dependent var	15.75893
Adjusted R-squared	0.098554	S.D. dependent var	13.31479
S.E. of regression	12.64167	Akaike info criterion	10.82278
Sum squared resid	14862.49	Schwarz criterion	11.28395
Log likelihood	-587.0756	Hannan-Quinn criter.	11.00989
Restr. log likelihood	-704.2261	LR statistic	234.3009
Avg. log likelihood	-5.241747	Prob(LR statistic)	0.000000

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VITA

PERSONAL DATA

Name	Zhihui Wang
Date of birth	April 9, 1990
Place of birth	Inner Mongolia, China
Email	527521556@qq.com

EDUCATION AND TRAINING

2008-2013	Bachelor of public health care management
	Inner Mongolia University
	Huhhot
	Inner Mongolia, China

JOB EXPERIENCE

2013	Trainee
	Ministry of health, Inner Mongolia
	Huhhot, Inner Mongolia, China