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Assessment of Rural Residents' Health-Related Quality of Life in Liangcheng County, China

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Abstract

This is a cross sectional descriptive study conducted in Liangcheng County, China. This study aims to assess rural residents' health-related quality of life. Using face-to-face interviews, Data on 948 households were collected. The main findings of this study are that the female group, elderly group, low educational level group and low income level group have a hig her proportion of problems on each EQ-5D dimension. Educational level, annual househol d income, housing space, employment status, chronic disease, two-week disease, age, alcohol consumption and accessibility of health service have a significant relationship with health-related quality of life. According to the results of the study, health-related quality of life has a positive relationship with educational level, annual household income, housing space, employment status and alcohol consumption at the 5% significance level, while health-related quality of life has a negative relationship with chronic disease, two-week disease, age and accessibility of health service at the 5% significance the level.

Keywords: Health-related Quality of Life, Assessment, Rural Resident, Liangcheng County, China

1. Introduction

China has been going through a period of dramatic economic growth with social and political transitions since its reform and opening up policy were launched in the late 1970s. During the past 30 years, China's GDP has grown from 406,260 million yuan in 1979 to 34,050,690 million yuan in 2009 (NBSC, 2010). The dramatic socio-economic transitions during the past three decades have had major impacts on overall health, the Chinese live longer and are healthier, average life expectancy increased from 66.7 years in 1979 to 73.1 years in 2009 (WHO, 2010). Although a big improvement has been made, it has occurred faster in urban areas than rural areas. Health inequalities between urban residents and rural residents are increasing.

According to the 2005 and 2008 China human development report, first of all, life expectancy in rural areas was significantly lower than that in urban areas. Secondly, from 2000 to 2005 under- five mortality rates and maternal mortality rates were always much higher rural areas than urban areas. Finally, in term of the inequalities in medical service, the number of rural hospital beds was 0.81 per 1000 people in 2006, while in the urban the number was 2.54 per 1000 people in 2006. Number of rural and urban medical personnel per 1000 people was in the same circumstances, and they were 1.16 per 1000 people and 3.59 per 1000 people in 2006, respectively. Those health inequalities are considered an extremely serious problem and may influence heavily China's future development.

To solve health inequality, the central government of China started medical and health system reform in term of "Opinions on Deepening Pharmaceutical and Healthcare System Reform" since 2009. Chinese healthcare reform focuses on four areas: healthcare financing, care delivery, drug supply and hospital reforms (see Figure 6). The target of health care reform is "By 2020, the basic health care system covering urban and rural residents shall have been fundamentally established. We shall have set up, across the country, a fairly complete public health service system and health care service system, a comparatively sound medical security system, a secured and relatively well regulated pharmaceutical supply system, a comparatively sound health care institution management and operational system, a multi-sponsored medical configuration shall be formed, everyone shall have access to the basic health care services, the multi-layer demands of the people for health care services shall be met preliminarily, and the health level of the people shall be further enhanced (NDRC, 2009)."

In addition, Population health studies have mostly used "hard data" in China, such as mortality and life expectancy as health indicators. However, mortality and life expectancy may not be enough to reflect health, because with the rapid development of economy, the change of lifestyle of Chinese people has caused significant changes of Chinese disease pattern which was changed from

communicable diseases to chronic non-communicable diseases (Zhao and Chen, 2001), and the percentage of population living with ill-health are increasing. Mortality and life expectancy indicators do not take health status into account, for example, when population mortality decreases, some people living with bad health status may increase at the same time.

Consequently, by analyzing EQ-5D score and its affecting factors of rural residents, it is easy to investigate health status of different populations' rural residents, this study will show which population has major problems and we can target. This valuable information will provide some suggestions for China medical and health system reform. Moreover, EQ-5D is a standardized instrument used as a measure of health outcome; it is good to reflect people's health status. Policy maker use EQ-5D scores as health outcome, it is beneficial for making policy.

2. Objectives

2.1 General Objective

To describe current situation of health-related quality of life in Liangcheng County, China, analyze the different factors affecting health-related quality of life.

2.2 Specific Objectives

- To describe the health-related quality of life in different subgroups, such as age group and sex and socio-economic status.
- To analyze the potential influential factors of health-related quality of life, such as socio-economic, demographic characteristics and clinical characteristics especially.

3. Literature Review

3.1 Quality of Life and Health-Related Quality of Life

3.1.1 Quality of Life

Use of the term "quality of life" has become widespread in recent year, but unfortunately there is no universally accepted definition (Aaronson, 1992). However, it is generally agreed that quality of life is a multidimensional concept (Siegrist and Junge, 1989).

There is a definition of quality of life in term of taxonomy. They are global definitions, component definitions, focused definitions and combination definitions (Farquhar, 1995).

First of all, global definitions are the most common definition, and they describe quality of life in term of the degree of satisfaction with life. For example,

quality of life defined as a combination of both life conditions and satisfaction. (Borthwick-Duffy, 1992).

Secondly, component definitions mean that quality of life is decomposed into different dimensions. For example, quality of life has been conceived in four different ways: as satisfaction with life; as satisfaction of defined needs; as happiness; and as self-realization and growth (Maeland, 1989).

Thirdly, focused definitions refer to one or a small number of dimensions of quality of life. For example, quality of life encompasses the concept of health-related quality of life (HRQOL) and other domains such as environment, family, and work. HRQOL is the extent to which one's usual or expected physical, emotional, and social well-being are affected by a medical condition or its treatment (Ware and Dewey, 2000).

Finally, combination definitions include global definitions and component definitions. For example, quality of life is defined as a combination of life conditions and satisfaction and it should take personal values, aspirations, and expectations into account. (Felce and Perry, 1995).

3.1.2 Health-Related Quality of Life

Health-related quality of life is also lack of a hard and fast definition. But after years of study, conceptualization of health-related quality of life has made progress since the last two decades.

Health-related quality of life is some aspects of quality of life and is related to health or health care. It represents those elements of quality of life (QoL) directly affect an individual's health, these aspects are physical, psychological, social, spiritual and role functioning, as well as general well-being (Spilker and Revicki, 1996).

As we know, health refers to as "state of complete physical, mental and social well-being and not merely the absence of disease (WHO, 1947)." The concept of health-related quality of life (HRQL) is a multi-factorial construction that describes individuals' perceptions of their physical, psychological and social functioning (Schipper, Clinch and Olweny, 1996). Similarly, HRQoL should include physical, social and role function. The other essential dimensions are mental health and general health perception. Vitality, pain and cognitive function are also important domains of HRQOL (Wilson and Cleary, 1995).

3.2 The European Quality of Life (EQ-5D)

EQ-5D is a standardized health-related quality of life questionnaire developed by the EuroQol Group in order to provide a simple, generic measure of health for clinical and economic appraisal (EuroQol Group, 1990). The EQ-5D includes two parts: the first part is called the 'descriptive system'. Descriptive system is consisting of five

dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) each of which can take one of three responses. The responses record three levels of severity (no problems/some or moderate problems/extreme problems) within a particular EQ-5D dimension. It defines a total of 243 health states. The second part is be known as EQ-5D visual analogue scale (EQ-5D VAS), which is a standard vertical 20 cm visual analogue scale (similar to a thermometer), with endpoints of 100 "best imaginable health state" and 0 labeled "worst imaginable health state", respectively (Roset, Badia and Nancy, 1999).

3.2.1 EQ-5D Value Set

EQ-5D's five health states can be converted into a utility index (the EQ-5D index score) by applying the scores from value sets elicited from general population. Value sets have been derived for EQ-5D in several countries using the EQ-5D visual analogue scale (EQ-5D VAS) valuation technique or the time trade-off (TTO) valuation technique (see Table 1).

3.2.1.1 EQ-5D VAS Valuation Technique

The Visual Analogue Scale (VAS) also calls the Rating Scale or the Category Scaling. Using VAS technique, the subjects are asked to the best health state and the worst state, which may or may not be death. Then the subjects are asked to locate the other states on the rating scale. The range of rating scale is 0 to 1. Preference score can be got, if death is judged to be the worst state and death placed at 0 on the rating scale; the preference value for other states is simply replaced by the scale value. If death is not judged to be the worst state but death is placed at some middle point of the scale (the point says d), the preference values for other stated are given by the formula (x-d)/(1-d), where x is the scale placement of the health state (Drummond et al., 2007).

3.2.1.2 EQ-5D TTO Valuation Technique

The TTO method is originally developed as a simple instrument that gave comparable scores to the standard gamble (Torrance, 1976). TTO technique is used on a double-sided time board, with one side for ill health states (i) regarded as better than death, and the other side for states regarded as perfect healthy. The subjects are offered two alternatives. One is ill health states (i) for time t followed by death, the other is perfectly healthy for time x < t followed by death. Time x is varied until the subject is not different between two alternatives, so preference score can be obtained which is for ill health state (i) which is $ish_i = \frac{x}{t}$ (Drummond et al., 2007).

Table 1 List of Available EQ-5D Value Sets

Country	N	Valuation
Belgium	722	EQ-5D VAS
Denmark	1686	EQ-5D VAS
Denmark	1332	TTO
Europe	8709	EQ-5D VAS
Finland	1634	EQ-5D VAS
Germany	339	EQ-5D VAS
Germany	339	TTO
Japan	621	TTO
Netherlands	309	TTO
New Zealand	1360	EQ-5D VAS
Slovenia	733	EQ-5D VAS
Spain	300	EQ-5D VAS
Spain	1000	TTO
UK	3395	EQ-5D VAS
UK	3395	TTO
US	4048	TTO
Zimbabwe	2440	TTO

Source: Cheung et al., 2009. User Guide Basic Information How to Use EQ-5D. p. 11.

The best known preference weights for utility measures were derived from samples of the UK general population in early 1990. The UK-based preference weights are applied to other populations when country specific weights are not available (Huang et al., 2007).

3.2.2 EQ-5D VAS Score and EQ-5D Index Score

Due to the EQ-5D includes two parts: the first part is called the 'descriptive system' and the second part is EQ-5D visual analogue scale, we can get two scores to measure health-related quality of life. They are EQ-5D VAS score and EQ-5D index score, respectively.

3.2.2.1 EQ-5D VAS Score

EQ-5D VAS score can be obtained from EQ-5D visual analogue scale. Interviewers would ask the respondents how good or bad a health state is, and give the respondents a scale (rather like a thermometer) which display the best state you can imagine is marked 100 and the worst state you can imagine is marked 0. For example, if a respondent mark the point which is 85 on the scale, and the EQ-5D VAS score is 85.

3.2.2.2 EQ-5D Index Score

EQ-5D five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) can be converted to EQ-5D index score through EQ-5D value set. For example, a respondent report EQ-5D five dimensions "22131" (1 = no problems, 2 = some or moderate and 3 = problems/extreme problems) which indicate no problems with usual activities and anxiety/depression, moderate problem with mobility and self-care and extreme problem with pain/discomfort. Then use UK EQ-5D value set. The table 2 shows the computation process of this example. As we can know, EQ-5D five dimensions "22131" can be converted to EQ-5D index score 0.295.

Table 2 The Computation Process of EQ-5D Index Score

EQ-5D Value Set		EQ-5D Five Dimensions (22131)	EQ-5D Index Score
Full health	1	✶	1
At least one 2 or 3	-0.155	✶	-0.155
At least one 3	-0.215	✶	-0.215
Mobility 2	-0.071	✶	-0.071
Mobility 3	-0.182		
Self-care 2	-0.093	✶	-0.093
Self-care 3	-0.145		
Usual activities 2	-0.031		
Usual activities 3	-0.081		
Pain/discomfort 2	-0.084		
Pain/discomfort 3	-0.171	✶	-0.171
Anxiety/depression 2	-0.063		
Anxiety/depression 3	-0.124		0.295

Source: Author.

3.2.3 The Validity and Reliability of EQ-5D in Chinese Population

The EQ-5D instrument has been used for measuring population health status in many countries. An EQ-5D study in Beijing was performed among 2,994 individuals whose age are 12 year and older, which is from the 2000 Beijing Household Health Survey. The results show EVGFP rating[1] and EQ-5D has a strong relationship. When respondents self-report health status reduce from Excellent to Poor,

[1] EVGFP rating: A 5-Point Categorical Rating Scale, which measures the health status, is classified as Excellent. Very good, Good, Fair, and Poor.

the proportion of problems on any EQ-5D dimension goes up and the mean of VAS decreases. Moreover, the results indicate EQ-5D has the expected association with demographic factors, socioeconomic factors and other health related indicators. In short, the EQ-5D is valid for measuring health related quality of life among the Chinese population (Wang, Kindig and Mullahy, 2005).

In addition, a study evaluated the reliability and validity of the EQ-5D in a general population sample in urban China, which chose 2800 respondents in HangZhou. The results indicate that there is a stronger relationship between EQ-5D and SF-36 which is in comparable dimensions. Moreover, test-retest reliability is carried out in this study, and the results show Kappa value were form 0.35-1.0. In summary, "the Chinese version of the EQ-5D demonstrated acceptable construct validity and fair to moderate levels of test-retest reliability in an urban general population in China (Wang et al., 2012)."

3.3 Previous Researches about Health-Related Quality of Life Determinants

Most researches have performed a multivariate analysis in health-related quality of life (HRQoL), for example, U.S., Vietnam, Sweden, China, Spain, South Africa and Japan. Table 3 shows the factors associated with health-related quality of life, which include how to measure HRQoL, what are significant variables, the size of sample, method analysis and source.

Table 3 The Factors Associated with Health-Related Quality of Life

Measure	Significant Variables	Sample	Method of Analysis	Authors
HRQoL is measured using SF-36	Age, Gender, Education and Economic status	400 community residents of Tehran aged 65 years old and over	Multiple logistic regression	Tajvar, Arab and Montazeri, (2008)
HRQoL is measured using EQ-5D	Socioeconomic factors	2873 people aged 60+ living rural Vietnam	Multilevel-multivariate linear regression	Hoi, Chuc and Lindholm, (2010)
HRQoL is measured using SF-36	Age, employment status, chronic medical conditions, hospitalization, emotional abuse, sexual abuse, mental health problems, physical abuse, the use of sedatives, the	145 opiate users at enrollment into low-threshold methadone maintenance programs	ANOVA, Correlational analyses and Stepwise regression	Millson et al., (2006)

Table 3 The Factors Associated with Health-Related Quality of Life (continued)

Measure	Significant Variables	Sample	Method of Analysis	Authors
	use of cocaine, the number of days of cocaine use, sedative use and multiple substance use			
HRQoL is measured using EQ-5D	Socio-demographic (age, sex, race/ethnicity, income and education) factors and clinical conditions	13,646 adults in U.S.	OLS regression	Lubetkin et al., (2005)
HRQoL is measured using EQ-5D	socioeconomic status	1159 residents of a socially and ethnically diverse suburb of Cape Town, South Africa	Multiple linear regression	Jelsma and Ferguson, (2004)
HRQoL is measured using EQ-5D	Socio-economic status	2994 respondents whose age are 12 years and older in Beijing, China	Multiple linear regression	Wang, Kindig and Mullahy, (2005)
HRQoL is measured using EQ-5D	Socio-economic status and disease group	495 respondents whose age 20-88 year in Stockholm County, Sweden	Multiple regression	Burstrom, Johannesson and Diderichsen, (2001)
HRQoL is measured using EQ-5D	Socio-economic status and clinical characteristics	National Health Services Survey 2008 (n = 120,703) China	Multiple regression	Sun et al., (2011)
HRQoL is measured using SF-36	Education level	9984 persons whose age 15 years or older residing Spain	OLS regression	Regidor et al., (1999)
HRQoL is measured using EQ-5D	Age, unemployed or retired, feel severe stress and chronic conditions	915 adults from Takamatsu, Japan	Multivariate regression	Fujikawa et al., (2010)

Table 3 The Factors Associated with Health-Related Quality of Life (continued)

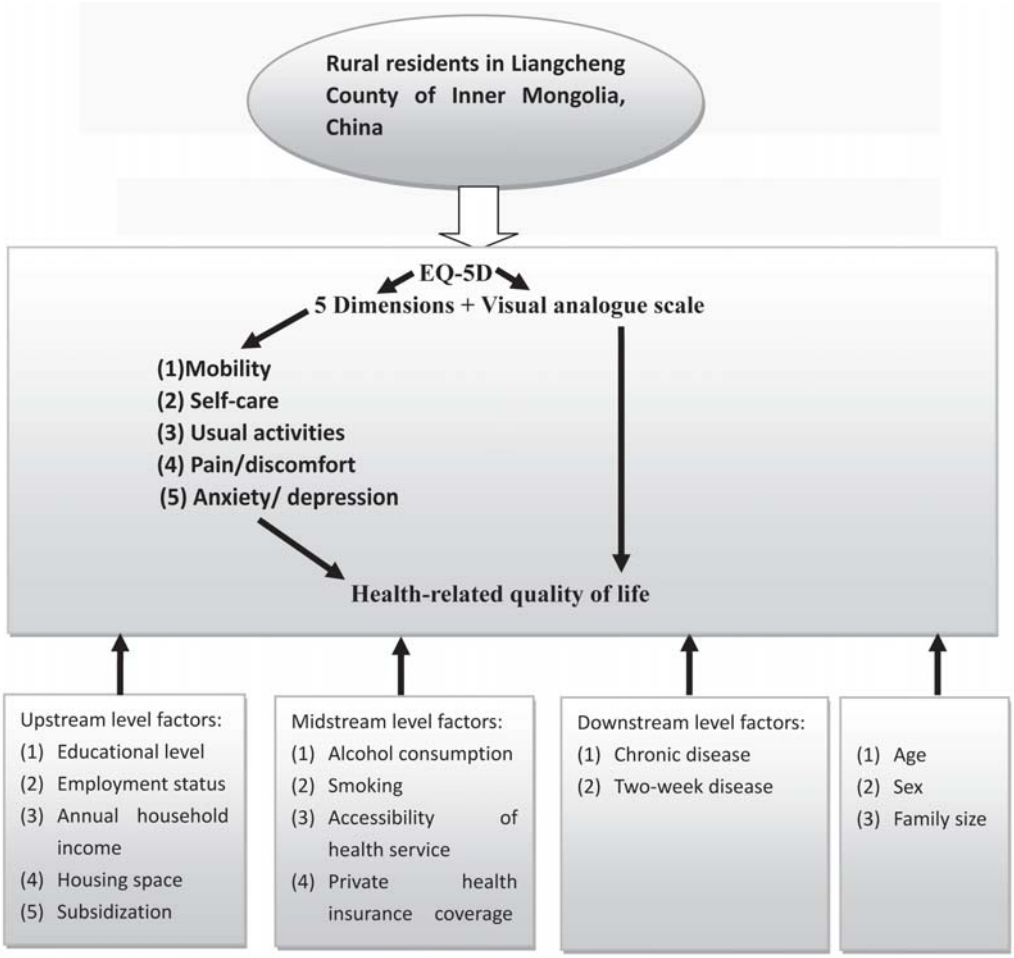
Measure	Significant Variables	Sample	Method of Analysis	Authors
HRQoL is measured using EQ-5D	Height in adult life	14 416 adults (aged > 18 years) in England	OLS regression	Christensen et al., (2007)
HRQoL is measured using SF-8	Demographic characteristics, living conditions, and violent and traumatic events	1228 adults in town of Juba, Southern Sudan	Multivariate regression	Roberts et al., (2010)
HRQoL is measured using HUI	Income and education	13682 adults (aged>20) in Canada	Growth curve analysis	Ross et al., (2010)

Source: Author.

In summary, variables significantly associated with HRQoL score are socioeconomic factors, demographic characteristics, health behavior factor medical utilization and clinical characteristics and so on. Specifically, socioeconomic factors include income level, education level, living conditions and family size. Demographic characteristics include gender, age, employment status and race. Health behavior factors include smoking, alcohol consumption and drug abuse. Medical utilization includes hospitalization and visiting doctor. Clinical characteristics include chronic disease and two-week disease.

4. Research Methodology

4.1 Conceptual Framework



4.2 Research Design

The study is a cross-sectional descriptive design. The study was carried out in 9 villages of Liangcheng County, China in 2009. Health-related quality of life is measured by EQ-5D.

4.3 Sources of Data

The secondary data are used in this study, which collected from College of Health Management, Inner Mongolia Medical University. The data were collected during 04-08 August 2009. It is a face-to-face interview and was conducted by trained interviewers. This survey used the questionnaire. The questionnaire included more than 170 questions, on acute diseases and injuries, chronic and other diseases, hospitalization, health-related behavior, educational level, family income and employment status, social relations, safety and security, medical care fees, accessibility (distance and time) and satisfaction with health service, insurance coverage, and EQ-5D.

4.3.1 Target Population

The target population is all rural residents in Liangcheng County of Inner Mongolia, China.

4.3.2 Sampled Population

The study is conducted in nine villages of Liangcheng County of Inner Mongolia, China; altogether 948 households were collected.

4.3.3 Sample

Table 4 The Situation of Sample

Townships	Villages	Number of Households	Sampled Households
Maihu Tu	Jinxing	753	223
	Maisheng	507	150
	Qingfeng	278	81
Daihai	Mafang Tan	459	137
	Jinggou	455	136
	Songshu Gou	126	42
Caonian Manzu	Shengcheng Yao	98	35
	Jiuhao	65	27
	Changhan Ying	381	117
Total		**3122**	**948**

Source: Author.

4.3.4 Sampling Technique

948 households are sampled by using a two-stage stratified cluster random sampling. In the first sample stage, 7 townships are stratified based on population size to sample 3 townships. In the second stage, 55 villages in the 3 townships are stratified based on population size sample 9 villages. In 9 villages, 948 households are randomly selected, and all family members in a sampled household are interviewed individually. EQ-5D is asked among persons aged 15 years and over, and no upper-age limit is applied.

4.4 Data Analysis

All descriptive analyses are performed stratified by sex, age, educational level and income level. First of all, age groups: 15-44 years, 45-64 years and 65+ are used for age categorization. Secondly, educational level: illiterate, primary education, middle school education, secondary education and university or postsecondary

education were used for educational level categorization. Finally, income level: low level (0-3000 yuan), low middle level (3001-11500), high middle level (11501-20000 yuan) and high level (20001+ yuan) are used for income level categorization. Calculations of frequency of respondents reporting problems in each EQ-5D dimension, VAS score (mean). To test the statistical significance of the difference between groups in the frequency of reported problems, $\chi 2$ tests are used.

Multiple regression analyses are performed in Eviews 6.0. Multiple regression analyses are used to estimate how health-related quality of life varied with age, family size, and annual household income. Dummy variables are created for health risk behaviors, educational level, sex and clinical characteristics and so on.

4.4.1 Definition of Dependent Variables

For dependent variable health-related quality of life (HRQoL), scores for the five health states can be converted into a utility index (the EQ-5D index score) by applying the scores from UK EQ-5D value set. This variable is used in the multiple regression model.

For dependent variable health-related quality of life (HRQoL) can be measured by EQ-5D VAS score. This variable is used in the multiple regression model.

As a result, there are two dependent variables.

4.4.2 Definition of Independent Variables

More information about variables can be found in Table 5, which shows variables' abbreviation, how it is measured and its expected sign and source.

Table 5 Variables' Abbreviation, Measurement, Expected Sign and Source

Abbreviation	Variable	Measure as	Expected Sign	Source
HRQoL	Health-Related Quality of Life	EQ-5D index score		Secondary
HRQoL1	Health-Related Quality of Life	EQ-5D VAS score		Secondary
INC	Annual Household Income	Monetary terms in 10000 Chinese yuan	+	Secondary
EDU	Educational Level	Dummy EDU_1:1 = Complete Primary Education 0 = Otherwise EDU_2:1 = Complete Middle School Education	+	Secondary

Table 5 Variables' Abbreviation, Measurement, Expected Sign and Source (continued)

Abbreviation	Variable	Measure as	Expected Sign	Source
		0 = Otherwise EDU_3:1 = Complete Secondary Education 0 = Otherwise EDU_4:1 = Complete University or Postsecondary Education 0 = Otherwise If all EDU_1, EDU_2, EDU_3, EDU_4 = 0 it means illiterate		
HS	Housing Space	Square measure in square meter	+	Secondary
S	Governmental subsidies pay to the poor	Monetary terms in 10000 Chinese yuan	+	Secondary
AC	Alcohol Consumption	Dummy 1 = Have alcohol consumption 0 = Do not have alcohol consumption	__	Secondary
SK	Smoking	Dummy 1 = Smoke 0 = Do not smoke	__	Secondary
AHS	Accessibility of Health Service[2]	Time unit in minutes	__	Secondary
CD	Chronic Disease	Dummy 1 = Suffer from diagnoses of chronic disease 0 = Do not suffer from diagnoses of chronic disease	__	Secondary

[2] Accessibility of Health Service: It means how long people use transport from home to the nearest health care facility.

Table 5 Variables' Abbreviation, Measurement, Expected Sign and Source (continued)

Abbreviation	Variable	Measure as	Expected Sign	Source
TWD	Two-Week Disease	Dummy 1 = Suffer from two-week disease 0 = Do not suffer from two-week disease	__	Secondary
AGE	Age	Measure in years	__	Secondary
SEX	Sex	Dummy 1 = Male 0 = Female		Secondary
FS	Family Size	Measure in the number of the household	__	Secondary
ES	Employment status Level	Dummy ES_1:1 = Employed 0 = Otherwise ES_2:1 = Retired 0 = Otherwise ES_3:1 = Students 0 = Otherwise If all ES_1, ES_2, ES_3 = 0 it means unemployed	+/-	Secondary

Source: Author.

4.4.3 Model Specification

4.4.3.1 Multiple Regression Analyses using Ordinary Least Squares

In this model, dependent variable is HRQoL or HRQoL 1. There are eleven independent variables as follow: EDU, INC, HS, S, AC, SK, AHS, PHI, CD, TWD, AGE, SEX, FS.

HRQoL = f (EDU1, EDU2, EDU3, EDU4, INC, HS, S, AC, SK, AHS, PHI, CD, TWD, AGE, SEX, FS, ES1, ES2, ES3)

HRQoL 1 = f (EDU1, EDU2, EDU3, EDU4, INC, HS, S, AC, SK, AHS, PHI, CD, TWD, AGE, SEX, FS, ES1, ES2, ES3)

Estimation equation:

$$HRQoL = \beta_0+\beta_1 EDU1+\beta_2 EDU2+\beta_3 EDU3+\beta_4 EDU4+\beta_5 INC+\beta_6 HS+\beta_7 S+\beta_8 AC+\beta_9 SK+\beta_{10} AHS+\beta_{11} PHI+\beta_{12} CD+\beta_{13} TWD+\beta_{14} AGE+\beta_{15} SEX+\beta_{16} FS+\beta_{17} ES1+\beta_{18} ES2+\beta_{19} ES3+\varepsilon$$

$$HRQoL1 = \beta_0+\beta_1 EDU1+\beta_2 EDU2+\beta_3 EDU3+\beta_4 EDU4+\beta_5 INC+\beta_6 HS+\beta_7 S+\beta_8 AC+\beta_9 SK+\beta_{10} AHS+\beta_{11} PHI+\beta_{12} CD+\beta_{13} TWD+\beta_{14} AGE+\beta_{15} SEX+\beta_{16} FS+\beta_{17} ES1+\beta_{18} ES2+\beta_{19} ES3+\varepsilon$$

4.5 Hypothesis

H_1: Educational level is expected to have positive relationship on health-related quality of life

H_2: Annual household income hopes to be positively associated with health-related quality of life

H_3: Age is hope to have negative association with health-related quality of life

H_4: Accessibility of health service has a negative impact on health-related quality of life

H_5: Rural residents have alcohol consumption hopes to be negatively associated with health-related quality of life

H_6: Rural residents who smoke are expected to have negative relationship on health-related quality of life

5. Results and Discussion

According to the research methodology discussed in the previous chapter, this chapter illustrates results and discussion with the objectives of study set in the first chapter.

5.1 Descriptive Analysis

In order to get a better understanding of the results, it is important to know the main characteristics of the sample used in the research. It provides a brief description of the sample in term of different criteria as following. This study collected 948 households, 2058 individuals. Complete data for EQ-5D five dimensions are available for 1770 respondents (86%) who are over 15 years old. In addition, complete data for EQ-5D visual analogue scale (EQ-5D VAS) are 1755 respondents among 1770 individuals. Table 6 provides the profile of the 1770 individuals in term of different characteristics.

Table 6 The Distribution of 1770 Individuals

	Total(1170) Frequency	**Percent**
Sex		
Female	869	40.1%
Male	901	50.9%
Age		
15-44 years old	555	31.4%
45-64 years old	924	52.2%
More than 65 years old	291	16.4%
Education level		
Illiterate	478	27%
Primary Education	602	34%
Middle School Education	500	28.2%
Secondary Education	179	10.1%
University or Postsecondary Education	11	0.7%
Private Health Insurance		
Yes	87	4.9%
No	1683	95.1%
Chronic Disease		
Yes	733	41.4%
No	1038	58.6%
Two-Week Disease		
Yes	769	43.4%
No	1001	56.6%
Smoking		
Yes	658	37.2%
No	1112	62.8%
Alcohol Consumption		
Yes	227	12.8%
No	1543	87.2%
Accessibility of Health Service		
No more than 10 mins	1048	59.2%
Between 11 to 20 mins	303	17.1%
Between 21 to 30 mins	216	12.2%
More than 31 mins	203	11.5%

Table 6 The Distribution of 1770 Individuals (continued)

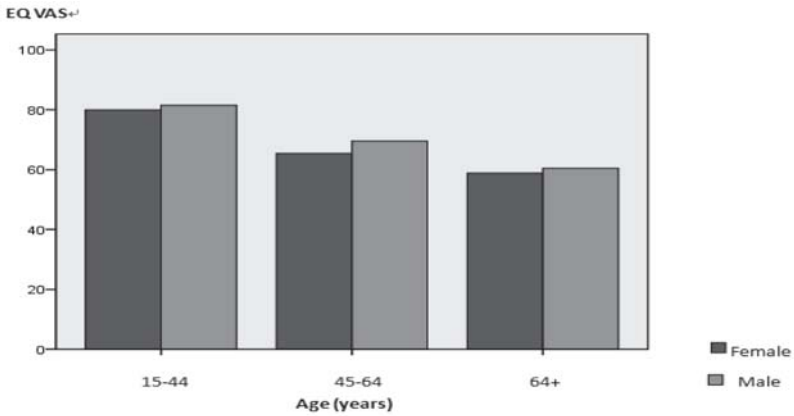
	Total(1170) Frequency	**Percent**
Governmental Subsidization		
Yes	605	34.2%
No	1165	65.8%
Employment Status		
Employed	1387	78.4%
Retried	14	0.8%
Students	113	6.4%
Unemployed	256	14.4%
Income Level		
Low level	175	9.9%
Low middle level	936	52.9%
High middle level	452	25.5%
High level	208	11.7%

Source: Author.

In Liangcheng County, the mean EQ-5D VAS score equals to 70.4. Female is 69.5 and male is 71.3. According to Analysis Report of National Health Services Survey in China, 2008, the mean EQ-5D VAS score is 80.1 in China (79.3 for urban residents, and 80.4 for rural residents) (MOH, 2009). Obviously, rural residents in Liangcheng County have significantly lower the mean EQ-5D VAS score than the national average ($p<0.0001$). When this study employs UK EQ-5D value set, the mean EQ-5D index score is 0.83. Female is 0.82 and male is 0.85. The Pearson correlation coefficient between EQ-5D VAS score and EQ-5D index score is 0.62 ($p<0.0001$).

Specifically, the mean EQ-5D VAS data from 1755 individuals are presented in Figure 1.

Figure 1 Mean Population EQ-5D VAS Ratings



Source: Author.

As can be seen, the mean EQ-5D VAS ratings decrease with increasing age. Moreover, male of three age groups report higher EQ-5D VAS ratings than female. This difference between male and female is the largest in 45-64 years old group.

Table 7, 8, 9 and 10 are made by the frequency and proportion of reported problems in each level for each dimension, which present as a health profile. These tables are categorized in term of sex, age, educational level and income level.

Table 7 Frequency and Proportion of Reported Problems by Dimension and Sex

EQ-5D DIMENSION		SEX		TOTAL	Chi-Square Tests
		Male	Female		
MOBILITY	Level 1	739	688	1427	Value = 4.327
		82.0%	79.2%	80.6%	
	Level 2	142	167	309	df = 2
		15.8%	19.2%	17.5%	
	Level 3	20	14	34	P = 0.115
		2.2%	1.6%	1.9%	
SELF-CARE	Level 1	841	785	1626	Value = 5.497
		93.3%	90.3%	91.9%	
	Level 2	47	68	115	df = 2
		5.2%	7.8%	6.5%	
	Level 3	13	16	29	P = 0.064
		1.5%	1.9%	1.6%	
USUAL ACTIVITIES	Level 1	726	681	1407	Value = 1.457
		80.6%	78.4%	79.5%	
	Level 2	135	142	277	df = 2
		15.0%	16.3%	15.6%	
	Level 3	40	46	86	P = 0.483
		4.4%	5.3%	4.9%	
PAIN/ DISCOMFORT	Level 1	625	528	1153	Value = 15.759
		69.4%	60.8%	65.1%	
	Level 2	226	291	517	df = 2
		25.1%	33.5%	29.2%	
	Level 3	50	50	100	P = 0.000
		5.5%	5.7%	5.7%	
ANXIETY/ DEPRESSION	Level 1	762	708	1470	Value = 3.035
		84.6%	81.5%	83.1%	
	Level 2	119	137	256	df = 2
		13.2%	15.8%	14.5%	
	Level 3	20	24	44	P = 0.219
		2.2%	2.7%	2.4%	

Source: Author.

First of all, the female group has a higher proportion of problems[3] on each EQ-5D dimension than male group.

[3] This study dichotomizes the EQ-5D level in to "no problems" (response level 1) and "problems" (response level 2 and 3).

The dimension pain/discomfort is reported the most problems in male group and female group, and the proportions are 30.6% (25.1%+5.5%) in male group and 39.2% (33.5%+5.7%). Inversely, the dimension self-care is reported the least problems in male group and female group, and the proportions are 6.7% (5.2%+1.5%) in male group and 9.7% (7.8%+1.9%) in female group.

Table 8 Frequency and Proportion of Reported Problems by Dimension and Age Group

EQ-5D DIMENSION		**AGE GROUPS**			**TOTAL**	**Chi-Square Tests**
		15-44	45-64	65+		
MOBILITY	Level 1	532	752	143	1427	Value = 271.485
		95.9%	81.4%	49.1%	80.6%	
	Level 2	19	160	130	309	df = 4
		3.4%	17.3%	44.8%	17.5%	
	Level 3	4	12	18	34	P = 0.000
		0.7%	1.3%	6.1%	1.9%	
SELF-CARE	Level 1	542	852	232	1626	Value = 83.618
		97.7%	92.2%	79.7%	91.9%	
	Level 2	8	59	48	115	df = 4
		1.4%	6.4%	16.5%	6.5%	
	Level 3	5	13	11	29	P = 0.000
		0.9%	1.4%	3.8%	1.6%	
USUAL ACTIVITIES	Level 1	524	730	153	1407	Value = 236.721
		94.4%	79.0%	52.6%	79.5%	
	Level 2	21	166	90	277	df = 4
		3.8%	18.0%	30.9%	15.6%	
	Level 3	10	28	48	86	P = 0.000
		1.8%	3.0%	16.5%	4.9%	
PAIN/ DISCOMFORT	Level 1	465	569	119	1153	Value = 168.230
		83.8%	61.6%	40.9%	65.1%	
	Level 2	77	291	149	517	df = 4
		13.9%	31.5%	51.2%	29.2%	
	Level 3	13	64	23	100	P = 0.000
		2.3%	6.9%	7.9%	5.6%	
ANXIETY/ DEPRESSION	Level 1	493	765	212	1470	Value = 34.862
		88.8%	82.8%	72.9%	83.1%	
	Level 2	54	135	67	256	df = 4
		9.7%	14.6%	23.0%	14.5%	
	Level 3	8	24	12	44	P = 0.000
		1.4%	2.6%	4.1%	2.5%	

Source: Author.

Secondly, the proportion of problems reported in EQ-5D five dimensions increase with age. For example, the proportions of problems reported in the dimension mobility are 4.1% (3.4%+0.7%) in 15-44 year old group, 18.6% (17.3%+1.3%) in 45-64 years old group and 50.9% (44.8%+6.1%) in 65+ years old group.

The dimension pain/discomfort is reported the most problems in three age groups, and the proportions are 16.2% (13.9%+2.3%) in 15-44 year old group, 38.4% (31.5%+6.9%) in 45-64 years old group and 59.1% (51.2%+7.9%) in 65+ years old group. On the contrary, the dimension self-care is reported the least problems in three age groups, and the proportions are 2.3% (1.4%+0.9%) in 15-44 year old group, 7.8% (6.4%+1.4%) in 45-64 years old group and 20.3% (16.5%+3.8%) in 65+ years old group.

Table 9 Frequency and Proportion of Reported Problems by Dimension and Educational Level

EQ-5D DIMENSION		**EDUCATIONAL LEVEL[4]**					**TOTAL**	**Chi-Square Tests**
		I	PE	MS	SE	UE		
MOBILITY	Level 1	308	491	446	172	10	1427	Value = 134.976
		64.4%	81.6%	89.2%	96.1%	90.9%	80.6%	
	Level 2	152	102	48	6	1	309	df = 12
		31.8%	16.9%	9.6%	3.4%	9.1%	17.5%	
	Level 3	18	9	6	1	0	34	P = 0.000
		3.8%	1.5%	1.2%	0.5%	0%	1.9%	
SELF-CARE	Level 1	399	560	480	176	11	1626	Value = 71.995
		83.5%	93.0%	96.0%	98.3%	100%	91.9%	
	Level 2	65	35	12	3	0	115	df = 12
		13.6%	5.8%	2.4%	1.7%	0%	6.5%	
	Level 3	14	7	8	0	0	29	P = 0.000
		2.9%	1.2%	1.6%	0%	0%	1.6%	
USUAL ACTIVITIES	Level 1	310	478	438	170	11	1407	Value = 125.255
		64.9%	79.4%	87.6%	95.0%	100%	79.5%	
	Level 2	116	104	50	7	0	277	df = 12
		24.3%	17.3%	10.0%	3.9%	0%	15.6%	
	Level 3	52	20	12	2	0	86	P = 0.000
		10.9%	3.3%	2.4%	1.1%	%	4.9%	

[4] Educational Level: I: Illiterate, PE: Primary education, MS: Middle school, SE: Secondary education and UE: University education.

Table 9 Frequency and Proportion of Reported Problems by Dimension and Educational Level (continued)

EQ-5D DIMENSION		EDUCATIONAL LEVEL[4]					TOTAL	Chi-Square Tests
		I	PE	MS	SE	UE		
PAIN/ DISCOMFORT	Level 1	238	370	385	149	11	1153	Value = 123.124
		49.8%	61.5%	77.0%	83.2%	100%	65.1%	
	Level 2	203	194	98	22	0	517	df = 12
		42.5%	32.2%	19.6%	12.3%	0%	29.2%	
	Level 3	37	38	17	8	0	100	P = 0.000
		7.7%	6.3%	3.4%	4.5%	0%	5.6%	
ANXIETY/ DEPRESSION	Level 1	360	497	447	155	11	1470	Value = 42.574
		75.3%	82.6%	89.4%	86.8%	100%	83.1%	
	Level 2	101	87	44	24	0	256	df = 12
		21.1%	14.5%	8.8%	13.4%	0%	14.5%	
	Level 3	17	18	9	0	0	44	P = 0.000
		3.6%	3.0%	1.8%	0%	0%	2.5%	

Source: Author.

Thirdly, in general, the proportion of problems reported in most EQ-5D dimensions decrease with increasing educational level. But the proportion of problems reported in the dimension anxiety/depression does not follow increasing educational level. Secondary education group (13.4%) has a higher proportion of problems than middle school education group (10.6%).

The dimension pain/discomfort is reported the most problems in four educational level groups, and the proportions are 50.2% (42.5%+7.7%) in illiterate group, 38.5% (32.2%+6.3%) in primary education group, 23.0% (19.6%+3.4%) in middle school education group and 16.8% (12.3%+4.5%) in secondary education group. Moreover, the dimension mobility is reported the most problems in university or postsecondary education group, and the proportion is 9.1%. Inversely, the dimension self-care is reported the least problems in four educational level groups, and the proportions are 16.5% (13.6%+2.9%) in illiterate group, 7.0% (5.8%+1.2%) in primary education group, 4.0% (2.4%+1.6%) in middle school education group and 1.7% (1.7%+0%) in secondary education group. In addition, the university or postsecondary education group response no problems in dimensions self-care, usual activities, pain/discomfort, anxiety/depression.

Table 10 Frequency and Proportion of Reported Problems by Dimension and Income Level

EQ-5D DIMENSION		**INCOME LEVEL[5]** LL	LML	HMLl	HL	**TOTAL**	**Chi-Suare Tests**
MOBILITY	Level 1	93	735	406	193	1427	Value = 135.787
		53.1%	78.6%	89.8%	92.8%	80.6%	
	Level 2	76	183	37	13	309	df = 6
		43.4%	19.6%	8.2%	6.3%	17.5%	
	Level 3	6	17	9	2	34	P = 0.000
		3.4%	1.8%	2.0%	1.0%	1.9%	
SELF-CARE	Level 1	138	855	432	201	1626	Value = 59.831
		78.9%	91.4%	95.6%	96.6%	91.9%	
	Level 2	32	63	17	3	115	df = 6
		18.3%	6.7%	3.8%	1.4%	6.5%	
	Level 3	5	17	3	4	29	P = 0.000
		2.8%	1.9%	0.6%	2.0%	1.6%	
USUAL ACTIVITIES	Level 1	91	730	397	189	1407	Value = 137.368
		52.0%	78.1%	87.8%	90.9%	79.5%	
	Level 2	54	167	43	13	277	df = 6
		30.9%	17.9%	9.5%	6.3%	15.6%	
	Level 3	30	38	12	6	86	P = 0.000
		17.1%	4.1%	2.7%	2.9%	4.9%	
PAIN/ DISCOMFORT	Level 1	85	573	341	154	1153	Value = 58.610
		48.6%	61.3%	75.4%	74.0%	65.1%	
	Level 2	71	308	92	46	517	df = 6
		40.6%	32.9%	20.4%	22.1%	29.2%	
	Level 3	19	54	19	8	100	P = 0.000
		10.8%	5.8%	4.2%	3.9%	5.6%	
ANXIETY/ DEPRESSION	Level 1	122	775	387	186	1470	Value = 37.310
		69.7%	82.9%	85.6%	89.4%	83.1%	
	Level 2	41	142	56	17	256	df = 6
		23.4%	15.2%	12.4%	8.2%	14.5%	
	Level 3	12	18	9	5	44	P = 0.000
		6.9%	1.9%	2.0%	2.4%	2.5%	

Source: Author.

[5] Income level: LL: Low level, LML: Low middle level, HML: High middle level and HL: High level.

Finally, broadly speaking, the proportion of problems reported in most EQ-5D dimensions decrease with increasing income level. However, the proportion of problems reported in the dimension pain/discomfort does not follow increasing income level. High level income group (26.0%) has a higher proportion of problems than high middle income group (24.6%).

The dimension pain/discomfort is reported the most problems in four income level groups, and the proportions are 51.4% (40.6%+10.8%) in low level income group, 38.7% (32.9%+5.8%) in low middle level income group, 24.6% (20.4%+4.2%) in high middle level income group and 26.0% (22.1%+3.9%) in high level income group. On the contrary, the dimension self-care is reported the least problems in four income level groups, and the proportions are 21.1% (18.3%+2.8%) in low level income group, 8.6% (6.7%+1.9%) in low middle level income group, 4.4% (3.8%+0.6%) in high middle level income group and 3.4% (2.0%+1.4%) in high level income group.

As expected, health status decreased with age and women report much worse health status than men. In addition, socio-economic status (educational level and income level) is positive with health status. These results are in the line with EQ-5D population studies in other 15 countries (Szende and Williams, 2004) and previous EQ-5D population studies in China (Wang, Kindig and Mullahy, 2005 and Sun et al., 2011). This suggests that the EQ-5D instrument is a good tool to describe rural residents' health status.

It is notable that 933 respondents (52.7%) report good health status (report no problem on all EQ-5D five dimensions) and 841 respondents (47.9%) report more than 80 on EQ-5D visual analogue scale (100 represents perfect health). There are two possibilities: first, most rural residents are healthy. Second, rural residents do not really understand the instrument EQ-5D. For example, when interviewers use the EQ-5D visual analogue scale, they will ask rural residents: "we would like you to indicate on this scale how good or bad your own health is today, in your opinion." We know that most rural residents are less educated, so they cannot really understand definition of health. In their mind, health is the absence of significant illness. It could lead to overestimating their health status. When using EQ-5D five dimensions to measure health status, there are some problems of sensitivity in this study. The simple reason is that the responses record three levels of severity (no problems/some or moderate problems/extreme problems) within a particular EQ-5D dimension. Moreover, this is a face-to-face interview conducted by trained interviewers, so interviewers might not clearly explain the EQ-5D to rural residents or rural residents are too optimistic when they answer interviewers' questions face to face.

5.2 Multiple Regression Analysis

In order to guide policy maker to make appropriate policies, this study considers the factors affecting health-related quality of life. Ordinary Least Square was used to estimate values of coefficients and other indicators. This study chooses two different dependent variables to represent health-related quality of life, and they are EQ-5D index score and EQ-5D VAS score, respectively.

The resulting output for the first model is shown in Table 11. The dependent variable in the model is EQ-5D index score. First of all, this equation has 10 significant coefficients. They are constant term, educational level 1, educational level 2, annual household income, housing space, chronic disease, two-week disease, age, employment status 1 and employment status 3. Next, value of R square is 0.361624 that means 36.1624% of dependent variable can be explained by independent variables. The R square of this equation is slightly low, because the selected independent variables may not be good variables that can explain this dependent variable. Finally, value of F test is 52.17528 ($p<0.05$), it means that coefficients of the significant variable in regression equation are not equal to 0, simultaneously.

Table 11 Multiple Regression Results of Factors Affecting Health-Related Quality of Life (1)

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	0.797814	0.034299	23.26035	0.0000*
EDU1	0.032006	0.012215	2.620189	0.0089*
EDU2	0.045737	0.013941	3.280655	0.0011*
EDU3	0.034286	0.020082	1.707318	0.0879
EDU4	0.064108	0.058609	1.093828	0.2742
INC	0.019972	0.005820	3.431750	0.0006*
HS	0.000250	0.000115	2.184394	0.0291*
S	0.163284	0.123324	1.324020	0.1857
AC	0.010489	0.014720	0.712591	0.4762
SK	0.010607	0.012478	0.850017	0.3954
AHS	-7.45E-05	0.000114	-0.654011	0.5132
PHI	-0.004210	0.028925	0.028925	0.8843
CD	-0.089136	0.012009	-7.422717	0.0000*
TWD	-0.129059	0.011717	-11.01422	0.0000*
AGE	-0.001011	0.000419	-2.410041	0.0161*
SEX	-0.013949	0.012410	-1.124050	0.2611
FS	-0.003961	0.003450	-1.148097	0.2511
ES1	0.142582	0.014601	9.765097	0.0000*
ES2	0.102324	0.052266	1.957751	0.0504
ES3	0.146884	0.033949	4.326574	0.0000*

R-squared	0.361624		
Adjusted R-squared	0.354693	N	1770
F-statistic	52.17528	Prob (F-statistic)	0.000000

*Significant Coefficients at 5%

The regression analysis shows that the coefficients of the educational level 1 and educational level 2 are positive values, this means that rural residents who complete primary education and middle school education will lead to the increasing rural residents' EQ-5D index score. This result is consistent with previous studies listed in literature review. Education is associated with good health status in rural areas, for two reasons. First, well educated rural residents are more likely to master advanced agricultural knowledge, and get high income. Second, well educated rural residents have healthier lifestyles. They are more likely to receive medical care, to drink less alcohol, and less likely to smoke.

The regression analysis also shows that the coefficient of annual household income shows a positive value, this means that the high annual household income by rural residents will lead to the increasing their EQ-5D index score. This result is in

line with previous studies listed in literature review. Moreover, it is widely recognized that poverty is accompanied by ill health. There are probably two reasons in rural areas. First, higher income rural resident can have better food, a better living environment, and some entertainments. Second, higher income rural resident are more likely to access health care.

The result indicates that the coefficient of housing space is positive. It means that rural residents obtain much larger living area, and the EQ-5D index score will increase. There might be two reasons in rural areas. The smaller housing space stands for overcrowding. On the one hand, overcrowding may increase vulnerability to airborne infections. On the other hand, overcrowding does not help to keep an excellent mood.

The regression analysis shows that the coefficient of employment 1 and employment 3 reveal positive values. It means that rural residents who are employed or student will increase EQ-5D index score. This result is accord with previous studies listed in literature review. In rural areas, people employed means that people do farm work. Employed is correlated with health status, there might be two reasons: first of all, a good amount of farm works are equal to physical exercise. Next, farm works are collectively laboring, and people can feel social support and keep a good mood. Rural residents are students who associated with healthier, and it is easy to be explained. First, students are getting education, and they belong to well educated people. Second, students are young people. As is well known, young people have better health status.

In addition, the result of regression analysis reveals that the coefficients of chronic disease and two-week disease are negative values. It means that rural residents suffer chronic disease or two-week disease, which will result in the decreasing EQ-5D index score. This result is consistent with previous studies listed in literature review. It is easy to be understood, because two-week disease or chronic disease has a direct effect on individual's physical and mental health.

The regression analysis also figures that the coefficient of age is negative. It means that elderly rural residents will give rise to the decreasing EQ-5D index score. This result is consistent in line with previous studies listed in literature review. The simple reason is that as rural resident grow older; they raise the risk of disease (especially, chronic disease) and earn less.

The results for the second equation are presented in Table 12. The dependent variable in the equation is EQ-5D VAS score. First of all, this equation has 11 significant coefficients. They are constant term, educational level 1, educational level 2, annual household income, alcohol consumption, accessibility of health service, chronic disease, two-week disease, age, employment status 1 and employment status 3. Next, value of R square is 0.320373 that means 32.0373% of dependent variable can be explained by independent variables. The R square of this equation is slightly low,

because the selected independent variables may not be good variables that can explain this dependent variable. Finally, value of F test is 43.04580 ($p<0.05$), it means that coefficients of the significant variable in regression equation are not equal to 0, simultaneously.

Table 12 Multiple Regression Results of Factors Affecting Health-Related Quality of Life (2)

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	81.98205	3.158923	25.95253	0.0000*
EDU1	2.791229	1.114892	2.503587	0.0124*
EDU2	3.676143	1.245202	2.952246	0.0032*
EDU3	2.379320	1.805963	1.317480	0.1879
EDU4	8.497715	5.423315	1.566886	0.1173
INC	1.785494	0.531089	3.361946	0.0008*
HS	0.006888	0.010602	0.649652	0.5160
S	-9.474381	11.14270	-0.850277	0.3953
AC	3.838146	1.296181	2.961118	0.0031*
SK	0.132937	1.134868	0.117139	0.9068
AHS	-0.042174	0.010542	-4.000746	0.0001*
PHI	2.293802	2.186815	1.048924	0.2944
CD	-13.44473	0.964140	-13.94480	0.0000*
TWD	-4.793425	0.922632	-5.195384	0.0000*
AGE	-0.216394	0.037680	-5.742898	0.0000*
SEX	-1.609277	1.090481	-1.475749	0.1402
FS	0.055408	0.320140	0.173075	0.8626
ES1	3.554763	1.335152	2.662440	0.0078*
ES2	6.555566	4.798381	1.366204	0.1721
ES3	6.533865	2.820273	2.316749	0.0206*
R-squared	0.320373			
Adjusted R-squared	0.312930		N	1755
F-statistic	43.04580		Prob (F-statistic)	0.000000

* Significant Coefficients at 5%

The result of the second equation is different with the first equation as following:

The regression analysis shows that the coefficient of alcohol consumption shows a positive value, this means that rural residents have alcohol consumption will lead to the increasing of their EQ 5D VAS score. However, this result is opposite with the hypothesis. The potential reason is that this study employs whether rural residents drink alcohol to measure alcohol consumption. It should give a more specific

classification: daily alcohol consumption, five days a week alcohol consumption, three days a week alcohol consumption, occasional alcohol consumption and no alcohol consumption.

The regression analysis also figures that the coefficient of accessibility of health service is negative. It means that difficult accessibility of health service will give rise to the decreasing EQ-5D VAS score. In this study, accessibility of health service means how long people use transport from home to the nearest health care facility. Short time shows that rural residents can easily get health care, especially, in emergency.

In the second equation, the variable housing space is not significant. But it is significant in the first model.

6. Conclusion and Recommendation

6.1 Summary

The aim of this study is to explain the factors that determine health-related quality of life in Liangcheng County, China.

This study gets data from College of Health Management, Inner Mongolia Medical University, and the data were conducted in 04-08 August 2009. 948 households were collected.

Through data description, this study finds out that female group, elderly group, low educational level group and low income level group have the higher proportion of problems on each EQ-5D dimension. The dimension pain/discomfort is reported the most problems, and the dimension self-care is reported the least problems. In addition, the mean EQ-5D VAS ratings decrease with increasing age and male of three age groups report higher EQ-5D VAS ratings than female.

This study uses multiple regression analysis to estimate determinants of health-related quality of life. It build two models, and the dependent variables are EQ-5D index score which is converted by UK EQ-5D VAS value set and EQ-5D VAS score.

When EQ-5D index score is dependent variable, this model has 10 variables which are significant. First of all, not all educational levels are significant in this regression model, and educational level 1 and educational level 2 are significant. Annual household income, housing space and employment status 1 and employment status 3 are significant. These variables are positive with health-related quality of life. Secondly, for clinic characteristic factor, chronic disease and two-week disease are significant. Age is significant in this model. These variables have a negative relationship with health-related quality of life.

However, when EQ-5D VAS score is dependent variable, this model has 11 variables which are significant. It is different with the previous model. First, alcohol consumption is significant, but the coefficient of alcohol consumption shows a positive value. This result is opposite with the hypothesis. Second, accessibility of health service is significant, which is negative with health-related quality of life. Third, housing space is not significant in this model.

It is more reliable by comparison of Adjusted R-squared in equation 1 (the dependent variable is EQ-5D index score) than equation 2 (the dependent variable is EQ-5D VAS score) in Liangcheng County, China.

6.2 Recommendation

In 2008, the EQ-5D was included in the National Health Services Survey (NHSS) for the first time. NHSS is carried out every five years and expected to start in 2013. From the results of this study, there are some recommendations, regarding EQ-5D in NHSS to MOH.

First of all, the responses record three levels of severity (no problems/some or moderate problems/extreme problems) within a particular EQ-5D dimension, which is called EQ-5D-3L. When using EQ-5D-3L five dimensions to measure health status, there are some problems of sensitivity in this study. It leads to most people's tend to report "no problems". Hence, policy maker in MOH should employ EQ-5D-5L in 2013 NHSS. Unlike the EQ-5D-3L, EQ-5D-5L each dimension now has 5 levels: no problems, slight problems, moderate problems, severe problems and extreme problems. EQ-5D-5L could significantly increase reliability and sensitivity (discriminatory power) (Rabin et al., 2011).

Secondly, because people may not understand EQ-5D visual analogue scale, it leads to overestimating their health status. Therefore, policy maker in MOH should add some notes beside EQ-5D visual analogue scale considering the actual local conditions. And let respondents really understand what is the definition of health.

Finally, due to there is an increasing interest in applying the EQ-5D instrument to China, policy maker in MOH should estimate an EQ-5D value set for Chinese. If Chinese EQ-5D value set is available, it will help to develop cost-utility analysis in China. In my opinion, NHSS and estimating an EQ-5D value set should be performed at the same time. It can save a lot of labors, materials and funds.

In this study, female group, elderly group, low educational level group and low income level group have the higher proportion of problems on each EQ-5D dimension. Moreover, educational level, annual household income and age are significant variables in regression equations. Policy maker in Inner Mongolia should target female, elderly, low educational level people and low income level people. Some recommendations are:

- Continue to strengthen and popularize nine year compulsory education in rural areas.
- Improve the policy system that supports and benefits farmers; raise rural residents' income level earnestly.
- Government should build the project of physical examination and focuses on the elderly and women.

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