The impact of chronic diseases and primary care access on health status among elderly populations in rural China

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Abstract

Objective This study aimed to examine the patterns of chronic conditions and the role of primary care access on health status among rural elderly.

Methods 6451 elderly aged ≥ 60 years from 5540 households in 116 villages in western rural areas of China were randomly selected and assessed the their health status using the EQ-5D-3L instrument. EQ-5D descriptive system and visual analogue scale (VAS) score were descriptive analyses by patterns of chronic conditions. We identified the impact of multimorbidity and primary care access on health status using multilevel linear model.

Results 55% of the pooled sample reported at least one chronic condition, and 30.2% had more than one. Hypertension, rheumatoid arthritis and chronic bronchitis were the most frequently reported conditions. After adjustment for sociodemographic status and patterns of chronic conditions, primary care access significantly associated with health status for the elderly in late life.

Conclusion Primary care access and health services should take priority action for rural elderly, especially elderly with multimorbidity in lower household income, living in mountainous areas where distance to township hospital is long.

Introduction

Non-communicable diseases (NCDs) are the leading health challenges globally in the twenty-first century (Alwan, 2011). In China, NCDs provide an estimate of 82% of total deaths and 70% of disability-adjusted life years loss (Y. Wu, 2011). In recent decades, NCDs have emerged at a much faster rate in China than in Western countries (Stuckler & Siegel, 2011). It is predicted that the tendency will rise rapidly with population ageing and increasing life expectancy (Yang et al., 2008). The increasing crisis in NCDs has become a top public health issue and need to take priority actions for policymakers.

Chronic diseases not only lead to heavy economic burden on the individual, family, and society, but also seriously affect patients' quality of life (Tan et al., 2013). Health-related quality of life (HRQoL) is a subjective and multidimensional experience that comprises the physical, functional, social and well-being domains [5]. It mainly reflects on the individual's life rather than the length of survival, and adequately evaluates health status and its development over time in population health studies. With disease epidemiological pattern has shifted from acute infectious diseases to the NCDs (Yang, et al., 2008) and increasing proportion of persons living with ill-health, HRQoL has become more adequately evaluated health status of population than traditional monitoring indicators. Consequently, HRQoL has been widely used in monitoring and management chronic illness, health care research, policy decision and health source allocation.

Primary health care plays a critical role for the NCDs in diagnosis, management, prevention and follow-up assessment (Atun et al., 2013; Beaglehole et al., 2008; Epping-Jordan, Pruitt, Bengoa, & Wagner, 2004). In rural China, township hospital and village clinic as primary care system at the bottom of the three-tiered health care delivery system to make great contribution for the NCDs in management. Previous studies found that 45% of patients and 40% of the elderly in rural China firstly choose township hospital to seek healthcare due to preference for local doctors (P. H. Brown & Theoharides, 2009). Patients insured by the Rural Cooperative Medical System, especially elderly patients, were more likely to utility health care services from village or township clinic than general hospital (Xu et al., 2004). As a result, the primary care system has been the most effective approach for diagnosis, management and prevention of the NCDs in rural China. However, a little known whether healthcare access as a key contextual factor is suited to face the challenge with increasing burden of chronic diseases in rural areas.

Traditionally, previous studies have focused on identifying influence of the NCDs based on aggregate analyses at an individual level (F. Wu et al., 2015). However, as social cognitive theory illustrates, the NCDs do occur in the personal, cultural and environmental context. An individual who comes from the same community would share the same contextual or health care source. In previous researches, contextual features in community have been identified significant association with the NCDs such as coronary heart disease (Diez-Roux et al., 1997), hypertension (Morenoff et al., 2007), cancer (Freedman, Grafova, & Rogowski, 2011), chronic obstructive pulmonary disease (Stahl et al., 2005) and other chronic conditions (A. F. Brown, Ang, & Pebley, 2007). While we make policies on promoting health care for the NCDs, it should take components at the micro (patient and family), meso (healthcare organization and community) and macro (policy) levels into account (Epping-Jordan, et al., 2004). Multilevel analytic approach provides a useful solution for simultaneously examining the effects of individual-level and contextual-level variables on health status of patient with the NCDs.

Guangxi Zhuang Autonomous Region in southern china is official western undeveloped region. The region is one of the four regions with a high centenarian ratio in China (S. Wang, Luo, & Liu, 2015). Life expectancy at birth in the region has extended from 71.2 years in 2000 to 75.1 years in 2010, and the number of elderly population (aged ≥ 60 years) reached 6.03 million, accounting for 13.1% of total population [16]. Although previous data suggested that certain subgroups attain good longevity, little data is available on prevalence of chronic diseases and multimorbidity in population because of limited surveillance system in this region.

The purpose of this study, therefore, was to examine relationship among primary health care access, chronic diseases, health status among rural elderly. We hypothesized that inequality in primary care access would remain independently effect on health status. This study tries to answer the following research questions: (1) what is impact of chronic disease and patterns of co-morbidity on health status of the elderly? (2) To extent which the effect of availability of healthcare at township level on health outcomes among rural elderly.

Materials And Methods

Study design, subjects, and sampling techniques

We conducted a cross-sectional community-based survey in rural areas of Guangxi from June to November in 2016. Multi-stages stratified randomly sampling method was employed to select sample in this study. Based on the indicator of rural individual income from Year book published in 2016 these counties in

Guangxi were classified into three groups such as high ($\geq 7,000$ Yuan), middle (5,001–6,999 Yuan) and low ($\leq 5,000$ Yuan) income areas. Then, we randomly selected one township per county from each of these three groups, yielding a total of 15 selected townships. Each township was divided into three blocks based on the size of population and adjacent geographical location. In each of the 45 blocks, in order to guarantee a sufficient representative sample size, at least 2-3 villages in each block were chosen from the list of villages based on probability proportional to size. A total of 116 villages were selected in the final reckoning. Finally, we obtained a list of the officially registered the elderly aged ≥ 60 years from the village administrative committee in each selected village. Eligible individuals from each village were randomly selected using simple random sampling.

Measurement of the variables

Health outcome measurement

HRQoL was assessed using the European Quality of Life-5-Dimensions-3-Levels (EQ-5D-3L), which is a standardized measure of health status and consists of two parts: five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) and visual analog scale (VAS) (Szende, Janssen, & Cabases, 2014). Each dimension has three responses levels (no problems, some problems, extreme problems). VAS allows respondent evaluate their current health status on a scale range from 0 (representing worst health status) to 100 (representing best health status). Most studies have identified that the EQ-5D is not only applicable for evaluating health status among general populations (Sun et al., 2011a, 2011b) but also useful for population with the NCDs such as cardiovascular diseases (Dyer, Goldsmith, Sharples, & Buxton, 2010), chronic obstructive pulmonary disease (Chen, Wong, McGhee, Pang, & Yu, 2014), chronic heart failure (Iqbal, Francis, Reid, Murray, & Denvir, 2010), rheumatic diseases (Wolfe, Michaud, Li, & Katz, 2010) and cataract visual impairment (Polack, Kuper, Mathenge, Fletcher, & Foster, 2007). It is feasible to apply in large-scale face-to-face health surveys and low literate population (H. Wang, Kindig, & Mullahy, 2005). The Chinese version of EQ-5D has acceptable construct validity and moderate test-retest reliability in previous studies (Chang et al., 2007; Luo et al., 2003; H.-M. Wang et al., 2012).

Classification of chronic diseases and measurement

The eligible elderly was asked “Have you ever been diagnosed with chronic disease by the health professional last year?” At the same time, a table to display a list of chronic diseases in term of International Classification of Disease (ICD-10) which includes ten common chronic diseases selected based on the prevalence of NCDs from National Health Service Survey (NHSS) of China in 2008.

Individual-level independent variables

The socio-demographic variables of the elderly considered in this study included age (years), gender, marital status and educational attainment and average annual household income

Contextual-level independent variables

Availability of healthcare at contextual level included village clinic, distance (kilometer) and time (hour) to nearest township hospital by minibus or motorcycle, and geographic setting of village (flatland, hilly and mountainous area).

Data collection

A structured questionnaire was used to obtain information on the elderly and household by individually face-to-face interview. All participants were interviewed at their home using their local language or dialect by trained interviewers who were recruited from Guilin Medical University. The interviewers attended a workshop on how to use the questionnaire in the fieldwork. Information on healthcare accesses in contextual variables was collected from the local administrative committee.

Subjects who had been selected under the above-mentioned process were given a full explanation of the research purpose before being invited to participate. After obtaining written informed consent, a face-to-face interview was conducted. For quality control, the supervisors checked to ensure the completeness of each questionnaire before concluding the interview.

Statistical analysis

The characteristics of respondents were summarized in terms of frequency and percentage for categorical variable, or mean and standard deviation for continue variable. Considering large ceiling effects in Chinese population using EQ-5D, we transformed the original responses of three levels (no problem, some problems and extreme problems) into two categories (no problem and any problem) in the EQ-5D dimension. Odds ratio of individuals with chronic diseases reported any problem against no problem in each EQ-5D dimensions was analyzed by multilevel binary logistic model.

We employed multi-level linear regression models to examine independent effects of different chronic illness and multimorbidity, socio-demographic variables and health care access. We fitted two multi-level linear models due to multicollinearity between chronic diseases and multimorbidity should be considered in the fit. Individual characteristics and contextual variable were set at the first and second level, respectively. The p-value of likelihood ratio chi-square was used as a guide to the model's goodness of fit. Statistical significant decisions were based on two-tailed in this study. Data analysis was done using R software (R version 3.5.3) with lme4 and sjPlot packages.

Ethical considerations

The protocol of this study was approved by the Institute Ethics Committee of Guilin Medical University, Guilin, Guangxi Zhuang Autonomous Region, China before the research was carried out. The consent form was listed on the first page of the questionnaire. All participants were informed using their local

language or dialect by trained interviewers and written informed consent to participate in the study.

Results

Characteristics of the subjects

In total, 6,993 of eligible elderly agreed to join the survey giving a response rate of 93%. Sociodemographic characteristics of respondents by gender were presented in Table 1. Age of respondents ranged from 60 to 105 years, and most were aged 60-69 years. 72% of them was married and 55% had education attainment of primary school and above. 42% of participants had average yearly household income lower than 3,000 Yuan. Almost of all participants were insured by medical care. More than second-third respondents used primary health care services from village clinic. However, half of them reside in mountainous where distance to nearest township hospital was more than 10 kilometers.

Table 1 sociodemographic characteristics of respondents by gender

Variables	Man <i>n</i> (%)	Women <i>n</i> (%)	Total <i>n</i> (%)
Age mean (sd), years	71(8.2)	71.7(8.8)	71.4(8.5)
Age group			
60-69	1,417(46.0)	1,483(43.2)	2,900(44.5)
70-79	1,113(36.1)	1,174(34.4)	2,292(35.2)
≥ 80	551(17.9)	768(22.4)	1,319(20.2)
Marital status			
Single	77 (2.5)	37 (1.1)	114 (1.8)
Married	2,420 (78.5)	2,254 (65.7)	4,674 (71.8)
Divorced or widowed	584 (19.0)	1,139 (33.2)	1,723 (26.5)
Social economic status			
Educational attainment			
illiterate	811 (26.3)	2,095 (61.1)	2,906 (44.6)
Primary school	1,623 (52.7)	1,154 (33.6)	2,777 (42.7)
Junior high school and over	647 (21.0)	181 (5.3)	828 (12.7)
Annual income (Yuan)			
≥ 10,000	150 (4.9)	142 (4.1)	292 (4.5)
5,000-9,999	328 (10.6)	375 (10.9)	703 (10.8)
3,000-4,999	995 (32.3)	1,053 (30.7)	2,048 (31.5)
1,001-2,999	1,276 (41.4)	1,448 (42.2)	2,724 (41.8)
≤1,000	332 (10.8)	412 (12.0)	744 (11.4)
Health insurance	3,035 (98.5)	3,397 (99.0)	6,432 (98.8)
Contextual variables			
Village clinic	2,144 (69.6)	2,358 (68.7)	4502 (69.1)
Distance (kilometers)			
≤5	747 (24.2)	888 (25.9)	1,635 (25.1)
5.1-9.9	928 (30.1)	1,057 (30.8)	1,985 (30.5)
≥10	1,406 (45.6)	1,485 (43.3)	2,891 (44.4)
Time (hours)			
≤0.5	1,884 (61.1)	2,092 (61.0)	3,976 (61.1)
0.6-2.9	922 (29.9)	1,043 (30.4)	1,965 (30.2)
≥3	275 (8.9)	295 (8.6)	570 (8.8)
Geography			
Flatland	914 (29.7)	1,024 (29.9)	1,938 (29.8)
Hilly	600 (19.5)	706 (20.6)	1,306 (20.1)
Mountainous	1,567 (50.9)	1,700 (49.6)	3,267 (50.2)

Proportion of chronic diseases and multimorbidity

Table 2 show proportion of the elderly with and without chronic condition. 55% of the pooled sample reported at least one chronic condition, and 30.2% had more than one. The top five NCDs were hypertension, rheumatoid arthritis, chronic bronchitis, hemicranias, and cataract visual impairment. Proportion of hypertension among the elderly aged 80-89 group was the highest of 29%; however, the lowest was at age group of 85 years and older. Meanwhile, prevalence of rheumatoid arthritis increase stably with advancing age. Proportion of the elderly with multimorbidity was higher at 70-79 and 80-89 age groups compared with elderly aged 60-69 years.

Table 2 Distribution of the elderly with NCDs and multimorbidity by age group

Chronic diseases	Age group				
	Total	60-69	70-79	80-84	85+
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Hypertension	1,617 (24.8)	621 (21.4)	632 (27.6)	337 (29)	27 (17.4)
Rheumatoid arthritis	1,045 (16.1)	398 (13.7)	387 (16.9)	230 (19.8)	30 (19.4)
Chronic bronchitis	225 (3.5)	78 (2.7)	94 (4.1)	49 (4.2)	4 (2.6)
Hemicrania	197 (3.0)	74 (2.6)	62 (2.7)	50 (4.3)	11 (7.1)
Cataract	169 (2.6)	45 (1.6)	66 (2.9)	52 (4.5)	6 (3.9)
Coronary heart disease	161 (2.5)	55 (1.9)	72 (3.1)	32 (2.7)	2 (1.3)
Diabetes	113 (1.7)	61 (2.1)	37 (1.6)	14 (1.2)	1 (0.6)
Cerebrovascular disease	105 (1.6)	30 (1.0)	50 (2.2)	25 (2.1)	1(0.5)
Tumour	30 (0.5)	9 (0.3)	11 (0.4)	10 (0.9)	1(0.3)
Stroke	21 (0.3)	8 (0.3)	10 (0.4)	3 (0.3)	1 (0.2)
Multimorbidity					
None	3,615 (55.5)	1,788 (61.7)	1191 (52)	550 (47.3)	86 (55.5)
One	2,235 (34.3)	882 (30.4)	839 (36.6)	457 (39.3)	57 (36.8)
Two	544 (8.4)	195 (6.7)	208 (9.1)	129 (11.1)	12 (7.7)
≥ Three	114 (1.8)	33 (1.1)	53 (2.3)	28 (2.4)	1(0.5)
<i>Na</i>	3				

Distribution of the elderly with problems and EQ-VAS by multimorbidity

Table 2 describes the distribution of the elderly reported any problem in the EQ-5D dimensions and VAS by number of co-morbidity. Across the five dimensions, problems in pain/discomfort was the most reported among the rural elderly. Patients with the conditions reported more problems than those without the conditions, and reported problems rise stably with increase mutilmorbidity in all EQ-5D dimensions. EQ-VAS, however, had lower score in person with chronic illness than those without. The lowest score of VAS was individual with more than 3 kinds of chronic diseases. EQ-VAS scores significantly decline with increasing multimorbidity.

Table 3 Percentage of the elderly reported problems in the dimensions and VAS scores by number of chronic diseases

ED-5D	Number of chronic diseases			
	None	One	Two	≥Three
ED-5D				
Mobility	12.6	22.3	30.1	45.6
Self-care	5.3	8.1	10.5	21.0
Usual Activities	11.3	17.8	21.0	30.7
Pain/Discomfort	28.5	38.8	41.3	50.0
Anxiety/Depression	19.3	24.9	21.7	30.7
EQ-VAS				
Median(IQR)	70 (65,75)	70 (60,75)	70 (60,77)	60 (50,70)

Odds ratio of the elderly with chronic disease reported problems in the EQ5D

Table 4 shown odds ratio of the elderly with chronic disease and co-morbid reported problems on each EQ5D dimension. After adjustment for age, gender, educational attainment, marital status and household income, mobility was more likely to be found in subgroup with the NCDs such as coronary heart disease, stroke, rheumatoid arthritis, chronic bronchitis and cerebrovascular disease. Meanwhile, patient with chronic illness such as stroke, chronic bronchitis, cerebrovascular disease and cataract had more likelihood of problem with self-care than without condition. Patient with rheumatoid arthritis was more likely to risk in both pain/discomfort and anxiety/depression dimensions. Compare with individual with one condition, increasing likelihood of problems with mobility, self-care and usual activities dimensions with increasing number of co-morbid.

Table 4 Odds ratio of elderly with NCDs on each EQ-5D dimension after adjusted for age, gender, education, marital status and income.

Chronic diseases	Mobility			Self-care			Usual activities			Pain/discomfort			Anxiety/depression		
	OR	95% CI	p	OR	95% CI	p	OR	95%CI	p	OR	95% CI	p	OR	95% CI	p
Hypertension	1.3	1.1–1.7	0.01	1.3	0.9–1.8	0.14	1.2	0.9–1.5	0.26	1.1	0.9–1.3	0.73	0.9	0.8–1.2	0.56
Coronary heart disease	1.6	1.1–2.4	0.01	1.5	0.8–2.5	0.19	1.5	0.9–2.3	0.06	1.3	0.9–1.9	0.09	1.2	0.8–1.7	0.32
Stroke	3.7	1.5–9.6	0.01	4.9	1.6–13.5	0.01	2.2	0.8–5.8	0.11	1.2	0.5–2.9	0.72	1.3	0.5–3.3	0.55
Diabetes	1.5	0.9–2.3	0.13	1.3	0.6–2.7	0.49	1.4	0.8–2.4	0.18	0.9	0.6–1.4	0.72	0.9	0.5–1.4	0.63
Rheumatoid arthritis	2.0	1.6–2.5	0.01	1.3	0.9–1.8	0.14	1.2	0.9–1.6	0.14	1.3	1.1–1.6	0.01	0.7	0.6–0.9	0.01
Chronic bronchitis	1.7	1.2–2.3	0.01	1.9	1.2–3.1	0.01	1.5	1.2–2.2	0.04	0.9	0.7–1.3	0.62	1.3	0.9–1.8	0.12
Cerebrovascular disease	3.6	2.4–5.6	0.01	2.9	1.6–5.2	0.01	2.5	1.6–4.0	0.01	1.0	0.7–1.6	0.91	1.3	0.8–2.0	0.25
Hemicrania	1.2	0.8–1.7	0.32	1.1	0.8–1.6	0.86	0.7	0.5–1.1	0.16	1.0	0.8–1.4	0.83	1.1	0.8–1.6	0.41
Cataract	1.2	0.8–1.8	0.28	2.1	1.3–3.5	0.01	1.4	0.9–2.0	0.15	1.1	0.8–1.5	0.64	0.9	0.7–1.4	0.89
Tumour	0.8	0.1–6.5	0.86	2.5	0.1–4.4	0.47	0.9	0.1–7.3	0.89	2.5	0.8–19.7	0.32	2.2	0.3–13.6	0.41
Co-morbid: ref.=None															
One	1.9	1.7–2.2	0.01	1.6	1.2–2.1	0.01	1.6	1.4–1.9	0.01	1.45	1.3–1.6	0.01	1.5	1.3–1.7	0.01
Two	3.1	2.4–3.7	0.01	1.9	1.4–2.8	0.01	2.0	1.6–2.6	0.01	1.55	1.3–1.9	0.01	1.2	0.9–1.5	0.10
≥Three	6.2	4.2–9.3	0.01	5.1	2.9–8.3	0.01	3.4	2.1–5.3	0.01	1.97	1.3–2.9	0.01	2.0	1.3–3.0	0.01

Base line category: No-chronic diseases; OR: odds ratio; 95%CI: 95% confidence interval

Influence of primary care access on health status

Table 5 illustrated influence of primary care access on health status. After adjustment for sociodemographic variables and chronic diseases, significant different in health status were observed in primary care access such as the distance and geography setting of village at contextual level. Intraclass correlation coefficients (ICC) at the contextual level was 18%, which indicating that the elderly with chronic diseases in the same village shared the primary health care from the same township hospital.

Table 5 predicting influence of primary care access on health status after adjustment for sociodemographic variable and chronic conditions

Coefficients	Model 1			Model 2		
	β	95%CI	p	β	95%CI	p
Fixed part						
Chronic disease						
Hypertension	-1.2	-1.7 – -0.6	0.01			
Coronary heart disease	-3.0	-4.5 – -1.4	0.01			
Stroke	-4.5	-8.7 – -0.3	0.03			
Diabetes	-2.6	-4.4 – -0.7	0.01			
Rheumatoid arthritis	-0.2	-0.9 – 0.5	0.56			
Chronic bronchitis	-0.7	-2.0 – 0.6	0.31			
Cerebrovascular disease	-6.6	-8.5 – -4.7	0.01			
Hemicranias	-0.8	-2.2 – 0.6	0.26			
Cataract	-0.4	-1.9 – 1.1	0.56			
Tumors	-4.7	-13.3 – 3.9	0.28			
Multimorbidity: ref.= None						
One				-1.5	-2.0 – -0.9	0.01
Two				-1.6	-2.6 – -1.1	0.02
≥Three				-6.6	-8.4 – -4.7	0.01
Social economic status						
Education level: ref.= illiterate			0.02			0.01
Primary school	0.8	0.2 – 1.4		0.7	0.1 – 1.3	
Junior high school	2.1	1.3 – 3.0		2.0	1.1 – 2.8	
Annual income: ref.= ≤1,000			0.01			0.01
≥10,000	5.2	3.7 – 6.7		5.3	3.8 – 6.8	
5,000-9,999	4.9	3.9 – 6.0		5.0	3.9 – 6.1	
3,000-4,999	2.4	1.5 – 3.2		2.5	1.7 – 3.4	
1,001-2,999	2.1	1.3 – 2.9		2.1	1.3 – 2.9	
Contextual variables						
Village clinic	-0.7	-2.5 – 1.1	0.45	-0.7	-1.4 – 1.5	0.47
Distance: ref.= ≤5 km			0.02			0.02
5-9.9	-1.4	-3.3 – 0.5		-1.4	-3.4 – 0.5	
≥10	-3.2	-5.1 – -1.3		-3.1	-5.0 – -1.3	
Time: ref.= ≤0.5 hour			0.08			0.06
0.6-2.9	0.5	-1.0 – 2.1		0.5	-1.0 – 2.1	
≥3	0.2	-1.8 – 2.1		0.1	-1.8 – 2.1	
Geography ref.= Flatland			0.03			0.04
Hilly	-1.9	-4.1 – 0.2		-1.9	-4.1 – 0.3	
Mountainous	-2.3	-4.1 – -0.5		-2.3	-4.1 – -0.5	
Random part						
N	116			116		
ICC	0.18			0.18		
R^2	0.19			0.18		

ICC: intraclass correlation coefficient; CI: confidence interval; N: number of village

Discussion

In our study, proportion of the elderly with chronic diseases and multimorbidity were 44.5% and 10.2%, respectively. Percentage with reported problems in all EQ-5D increased stably; VAS scores, however, decreased dramatically with multimorbidity. Individual with chronic condition had higher likelihood of the problems reported in mobility, self-care and usual activities dimensions than individual without. After adjustment for sociodemographic variables, primary care access at contextual level is significantly associated with health status of the elderly.

In this study, proportion of the respondents reported at least one chronic disease (45%) was higher than that from NHSS in 2008 (43.8%). Our findings that the top five chronic disease were hypertension, rheumatoid arthritis, chronic bronchitis, hemicranias and cataract is consistent with previous study from NHSS (China, 2008). The variation in the rate of chronic illnesses and multimorbidity might be attributed to be longevity and difference in eating behaviors such as high salt diets, high rates of male smoking and alcohol consumption in the region. Additionally, the proportion might be underestimated due to almost of them had lower educational level, particularly nearly half participations with illiterate (S.-C. Wu, Li, & Ke, 2000). Evidence from this study suggest that health professional should pay more attention increasing awareness and knowledge related the illness, strengthening primary prevention and disease screening in the early stage.

Our findings that presence with chronic disease or multimorbidity was negatively associated with health outcome of the elderly is consistent with previous studies (L.-J. Liu & Guo, 2008; Tan, et al., 2013; H. Wang, et al., 2005). The most common chronic diseases such as hypertension, cardiac disease, chronic bronchitis, neurological disease and cancer, especially cataract disease for the elderly are the key determinants of health status in late life (N. Liu, Zeng, Li, & Wang, 2013). Number of chronic diseases or multimorbidity might contribute to lower physical health, limited activities and lower social support. In this study, individual with chronic condition or co-morbid had higher likelihood of the problems reported in mobility, self-care and usual activities dimensions than individual without illness. Previous studies support our findings identified pain/discomfort for the elderly with chronic illness is the most common problem (Szende, et al., 2014). Hence, pain/discomfort due to chronic diseases might be considered as a global priority domain in the prevention of health status deterioration.

In this study, individuals with lower socioeconomic status had worse health status. Western studies support our findings have demonstrated that household income was significantly positive association with health status (Hosseinpoor et al., 2012; F. Wu, et al., 2015). Chronic diseases have brought a heavy financial burden to rural households because of poverty has still a significant social issue in rural China (Shi et al., 2010). The overall incidence of household catastrophic health payment and household impoverishment due to hypertension was 8.9% and 4.1%, respectively (Le, Zhankun, Jun, & Keying, 2012). Our findings suggest that increasing knowledge of self-management, and proportion of payment for chronic diseases needs to be emphasized. The financial assistance needs to be specially given to rural elderly households with a greater proportion of chronic illness, and the current health schemes should address the specific health needs for the target population with chronic diseases.

In the present study, after adjustment for sociodemographic variables, primary care access at contextual level negative association with health status of the elderly. The association has also been observed in previous population health studies from Western county (Freedman, et al., 2011) and Chinese (Gu, Zhang, & Zeng, 2009). The reason might be explained by increasing distance between residents and health care providers to decrease the utilization of health care or to impede providing of healthcare for rural residents. Recent study found that longer distance from provider does reduce health services utilization (Nemet & Bailey, 2000). The distance is also a surrogate for location in web of relations between residents and their local communities. Additionally, our study yielded no evidence supporting any association of village clinic with health status. Village clinic seemed to be a less important measure in relation to health status compared with other primary care access indicators in the study. This finding implies that rural elderly with NCDs need more primary care from township hospital and poor rural communities should be priority target populations for policy makers to improve health care services and increase access to affordable medications.

Limitations

Despite its large sample size and high response rate, information was collected by face-to-face interviews. The participants' chronic diseases was reported-self, prevalence might be underestimated. Finally, the relationship between health status and its predictors may not be causal due to the cross-sectional nature of the study.

Conclusions

Our findings enhance the understanding of primary care access in health status among the elderly with chronic diseases in western rural China. Primary care access and health services should take priority action for rural elderly, especially elderly with multimorbidity in lower household income, living in mountainous areas where distance to township hospital is long.

Declarations

List of abbreviations

CI: Confidence interval; EQ-5D-3L: 3-level EQ-5D; EQ-VAS: EQ-visual analog scale; HRQoL: Health-related quality of life; ICC: Intraclass Correlation Coefficients; SES: Socioeconomic status.

Ethics approval and consent to participate

The protocol of this study was approved by the Institute Ethics Committee of Guilin Medical University, Guilin, Guangxi Zhuang Autonomous Region, China before the research was carried out before the research was carried out.

Consent to publish

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Competing interests

All of the authors have no competing interests.

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Authors' contributions

WS and ZQ conceptualized the study, outlined the design and supervised data analysis, as well as manuscript writing. YX and TZ worked out details and led field study, and analysis of the data and manuscript preparation. DG, ZG and JL took part in the survey for acquisition of data. All authors have read and approved the final manuscript.

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