

# Profile and Correlates of Health-related Quality of Life in Chinese Patients with Coronary Heart Disease

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## Abstract

**Background:** Although coronary heart disease (CHD) is one of the major cardiovascular diseases, risk factors associated with the health-related quality of life (HRQoL) of CHD patients remain unclear. The present study was designed to determine the profile and significant factors of the HRQoL in CHD patients.

**Methods:** A cross-sectional study was conducted in rural communities of Fangshan District, Beijing, China. Socio-demographic, lifestyle, and comorbidity information of CHD patients were collected by a structured questionnaire and medical records. HRQoL was measured using European Quality of Life 5-dimensions (EQ-5D) scale and EQ Visual Analog Scale (EQ-VAS). Multiple linear and logistic regressions were performed to explore the association of potential risk factors with HRQoL scores and each EQ-5D, respectively.

**Results:** Totally, 1928 CHD patients (mean age  $61.64 \pm 9.24$  years; female:male = 2.4:1) were enrolled in the study. The mean score of EQ-5D index and EQ-VAS were  $0.889 \pm 0.172$  and  $71.56 \pm 17.65$ , respectively. Multiple linear regression revealed that marital status, physical activity, moderate alcohol drinking, and family's population were positive independent correlates of EQ-VAS, whereas diabetes mellitus and stroke were negative independent correlates (all  $P < 0.05$ ). Age and stroke were negatively while physical activity, moderate alcohol drinking, family's population and household income were positively correlated with EQ-5D index (all  $P < 0.05$ ) independently. In addition, each of the five HRQoL dimensions had various specific determinants, including obesity, underweight, smoking or education.

**Conclusions:** Findings of the study highlight certain socio-demographic, lifestyle factors, and comorbid stroke or diabetes mellitus as correlates of HRQoL in Chinese CHD patients. Large-scale cohort studies should be carried out to confirm our results in the future.

**Key words:** Coronary Heart Disease; European Quality of Life 5-dimensions; Health-related Quality of Life; Risk Factor

## INTRODUCTION

Coronary heart disease (CHD) is the second leading cause of death among Chinese adults now-a-day.<sup>[1]</sup> Health-related quality of life (HRQoL) is useful for assessing the socio-economic impact and burden of illness, effectiveness of interventions and treatments, and long-term mortality among patients after a cardiac event.<sup>[2,3]</sup> So far, only a few studies assessed the HRQoL of Chinese CHD patients, yielding inconsistent results. The purpose of this study was to evaluate HRQoL outcomes of CHD patients in China using European Quality of Life 5-dimensions (EQ-5D) questionnaire and identify important HRQoL factors for this special population.

## METHODS

### Study population

This was a cross-sectional study conducted from August to October, 2010 in rural communities of Fangshan District, Beijing, China, using a stratified cluster sampling technique. Eligible subjects are native residents aged 40 years or older living locally for at least 5 years, with a confirmed diagnosis of myocardial infarction or angina by a class-two or higher hospital with electrocardiography findings, or a surgical history of coronary revascularization, coronary artery bypass or coronary stent implantation. Subjects who were unable to answer the questionnaire and take part in physical examination personally were excluded. This work was approved by the Ethics Committee of Peking University Health Sciences Center. Written informed consent was signed by each participant prior to data collection.

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## Study measures

All questionnaires were administered through personal interview, information collected on socio-demographic characteristics (age, sex, marital status, educational level, the family's population, household income per month), lifestyle factors (physical activity, cigarette smoking and alcohol consumption) and comorbidities, including hypertension, type 2 diabetes mellitus (T2DM) and stroke. Education level was categorized by whether junior high school was attended or not. Marital status is divided into married and unmarried (including single, divorced or widowed). Smokers were divided into rare/never smokers, past smokers or current smokers. Rare/never smokers were those who had smoked <100 cigarettes lifetime. Past smokers were those who had smoked more than 100 cigarettes in the past but had quit smoking during the last month. Current smokers were those who had smoked at least 100 cigarettes and had smoked during the last month. Drinking status was defined as nondrinkers, past drinkers and current drinkers. Nondrinkers were defined as those who never drank more than once a week. Past drinking was defined as consuming alcohol at least once a week in the past but not in the previous month. Current drinking was defined as drinking at least once per week and still drank at that frequency in the previous month. The average daily intake of current drinkers was calculated by dividing the total weekly amount of pure alcohol by 7 days. According to the daily intake of alcohol, current drinkers were categorized into four groups: Low, moderate, high, and very high group (for men  $\leq 40$ , 41–60, 61–100 and  $>100$  g/d, for women  $\leq 20$ , 21–40, 41–60 and  $>60$  g/d) as described in the World Health Organization's guide.<sup>[4]</sup> Physical activity was defined as performing physical exercise for at least 30 min at least once per week during the previous 6 months, not including housework or job-related work. The frequency of physical activity was measured as: Rarely/never, 1–4 times/week or  $\geq 5$  times/week. Household income per month (in renminbi, RMB) was classified as 3000 RMB or higher, 2000–2999 RMB, 1500–1999 RMB, and <1500 RMB for first- to fourth-class rural areas, respectively. Classification for body mass index (BMI) was: Underweight as BMI  $\leq 18.5$ , normal weight as BMI 18.5–24.9, overweight as BMI 25.0–29.9 and obesity as BMI  $\geq 30.0$ . Subjects were defined as having hypertension if they were taking antihypertensive medications and/or having systolic blood pressure (BP)  $\geq 140$  mmHg, or diastolic BP  $\geq 90$  mmHg. Subjects were considered as having T2DM if they had been diagnosed as T2DM in hospitals, or self-reported current treatment with insulin or oral hypoglycemic drugs. Subjects were defined as having a stroke if they had a history of language or physical dysfunction continuing for more than 24 h and diagnosed using computerized tomography or magnetic resonance imaging. Body weight was measured without heavy clothes and shoes to the nearest 0.1 kg by a calibrated weighing scale and height was measured barefoot using a fixed stadiometer to the nearest 0.1 cm. BMI is calculated as the ratio of weight to height squared ( $\text{kg}/\text{m}^2$ ).

Health-related quality of life was measured by the EQ-5D scales, developed by the EuroQol Group ([www.euroqol.org](http://www.euroqol.org)), well-validated and reliable in different cultures and various diseases including cardiac disease.<sup>[5-7]</sup> The EQ-5D descriptive system consists of five dimensions of health on mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.<sup>[8]</sup> Each dimension has three levels of response (no problems, moderate problems, and severe problems), level 1 (no problems) was coded as a “1” and level 2 (moderate problems) was coded as a “2” and level 3 (severe problems) was coded as a “3.” For example, state 11111 indicates no problems on any of the 5 dimensions. The EQ-5D index score was generated by applying societal preference weights to each of the above five health dimensions according to a Japan population-based time trade-off model<sup>[9]</sup> and was calculated by adding up the weighted scores for all five dimensions.

European Quality of Life 5-dimensions also includes a separate 20 cm EQ Visual Analog Scale (EQ-VAS) to measure self-assessed health status. Respondents were asked to indicate how good or bad his/her own health state on the day of assessment on a 100-point scale, the end-points of which were labeled “best imaginable health state” and “worst imaginable health state” anchored at 100 and 0 (rather like a thermometer), respectively.<sup>[7]</sup> This information can be used as a quantitative measure of health as judged by the individual respondents.

The compliance with drug treatment was evaluated in CHD patients by the Morisky-Green test,<sup>[5]</sup> which is a 4-item Medication Adherence Questionnaire (MAQ) containing the following questions: (1) Have you ever forgotten to take your medicines? (2) Were you careless at times about taking your medicines? (3) When you felt better, did you sometimes stop taking your medicines? (4) Sometimes, if you felt worse, did you stop taking your medicines? Score 1 for answering NO to each of four questions and 0 for choosing YES. Total scores range from 0 to 4. Score equal to four points means good compliance and score less than four points means poor compliance.

## Statistical analyses

Health quality was measured by EQ-5D index and EQ-VAS scores and compared using one-way ANOVA or *t*-test among groups defined by sex, age, education level, marital status, household income per month, family's population, BMI, physical activity, smoking status, drinking status, comorbidities, compliance with drug treatment and the five dimensions of EQ-5D. The dimensions of EQ-5D were dichotomized as “no problems” versus “moderate/severe problems.” Continuous variables were presented as the means with standard deviations, and categorical variables were presented as percentages. Stepwise multiple linear regression and unconditional logistic regression were used to explore the determinants of health quality using sex, age, education level, marital status, monthly household income, family's population, BMI, physical activity, smoking status, alcohol drinking, comorbidities, compliance with drug

treatment and duration of CHD as independent variables. Regression coefficients and standard regression coefficients were obtained from multiple linear regression models. Odds ratios (ORs) and 95% confidence intervals (CIs) were obtained from logistic regression analysis. Analyses were performed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA), a  $P < 0.05$  as statistically significant.

## RESULTS

There were 1989 eligible CHD patients, of whom 1928 completed the questionnaires, aged 40–88 (mean age  $61.64 \pm 9.24$ ) years, 29.4% men and 70.6% women, and were enrolled for further analysis, with a response rate of 96.9%. Duration of CHD ranged from 1 to 44 (median 3, 25<sup>th</sup>–75<sup>th</sup> percentiles 2–7) years.

The mean score of EQ-5D index was  $0.889 \pm 0.172$ , EQ-VAS score  $71.56 \pm 17.65$ . Among the five domains of HRQoL, anxiety/depression problem occurred in the lowest proportion of 7.9% patients, whereas pain/discomfort problem took the largest proportion of 24.3%.

Study variables and the HRQoL scores of CHD subjects were presented and compared as shown in Table 1. Although sex, comorbidity of hypertension, and compliance with drug treatment had no association with either EQ-5D index or EQ-VAS scores ( $P > 0.05$ ), significant associations were observed among other demographic and related variables ( $P < 0.05$ ).

Multiple linear regression results in Table 2 show that older age and stroke were negatively associated with a low EQ-5D index. Physical activity, household income per month, alcohol drinking, and family's population were positively related to high EQ-5D index. Diabetes mellitus and stroke were negatively associated with low EQ-VAS scores. Being married, physical activity, alcohol drinking, and family's population were positively relevant with improving EQ-VAS scores.

Logistic regression was performed for the five dimensions of EQ-5D to determine dimension-specific factors related to HRQoL. ORs, 95% CI and  $P$  values are presented in Table 3. Compared to patients of age  $< 50$  years, patients of age  $\geq 80$  years had more problems in mobility ( $OR = 3.236$ ), usual activities ( $OR = 3.440$ ), pain/discomfort ( $OR = 2.802$ ), and anxiety/depression ( $OR = 6.935$ ). Patients aged 70–79 years met with more problems in usual activities ( $OR = 2.151$ ), whereas patients of 50–59 or 60–69 years experienced more problems in anxiety/depression ( $OR = 2.934$  and  $OR = 3.379$ , respectively). Compared to patients with normal weight, obese patients ( $BMI \geq 30 \text{ kg/m}^2$ ) had more problems in mobility ( $OR = 1.632$ ) and pain/discomfort ( $OR = 1.633$ ), whereas underweight patients ( $BMI \leq 18.5 \text{ kg/m}^2$ ) had more problems in pain/discomfort ( $OR = 2.431$ ). Patients with stroke were more likely to exhibit problems in self-care ( $OR = 2.121$ ), usual activities ( $OR = 1.976$ ) and mobility ( $OR = 1.465$ ), whereas patients with diabetes mellitus were more likely to

have problems in anxiety/depression ( $OR = 1.774$ ). Physical activity had positive effects on mobility (1–4 times/week:  $OR = 0.462$ ;  $\geq 5$  times/week:  $OR = 0.495$ ), self-care (1–4 times/week:  $OR = 0.457$ ;  $\geq 5$  times/week:  $OR = 0.354$ ), usual activities (1–4 times/week:  $OR = 0.332$ ;  $\geq 5$  times/week:  $OR = 0.475$ ) and pain/discomfort (1–4 times/week:  $OR = 0.517$ ;  $\geq 5$  times/week:  $OR = 0.760$ ). Patients living with 2, 3–5 or  $> 6$  family members experienced less problems in mobility ( $OR = 0.505$ ,  $OR = 0.318$  and  $OR = 0.424$ , respectively). Past smoking had negative effects on mobility ( $OR = 1.983$ ), self-care ( $OR = 2.592$ ), usual activities ( $OR = 2.613$ ) and pain/discomfort ( $OR = 1.971$ ). Low-, medium-, and high-alcohol drinking were associated with less problems in mobility ( $OR = 0.373$ ,  $OR = 0.286$  and  $OR = 0.097$ , respectively). Past and medium alcohol drinkers had less problems in self-care ( $OR = 0.276$  and  $OR = 0.193$ , respectively). Medium alcohol drinking is relevant with better usual activities ( $OR = 0.308$ ). High education level was protective factors for self-care ( $OR = 0.575$ ). Compared to patients with monthly household income  $< 1500$  RMB, patients with 2000–2999 or  $\geq 3000$  RMB reported less problems in usual activities ( $OR = 0.505$  and  $OR = 0.430$ , respectively), those with 2000–2999 RMB suffering less pain/discomfort ( $OR = 0.544$ ).

## DISCUSSION

Several studies<sup>[10–15]</sup> indicated that smoking, increasing age, lower education level, less household income, and comorbid stroke or diabetes mellitus were related to deteriorated HRQoL of CHD patients, which was similar to our study. Our results revealed no significant gender discrepancy in overall HRQoL of CHD subjects. This is inconsistent with previous studies<sup>[16–19]</sup> which showed worse HRQoL of female CHD patients compared to male patients and may be partly due to a skewed sex ratio (male 29.4%, female 70.6%) in our study population, as a result of most skilled men working away in other cities, which is a common phenomenon in rural China.

So far, the relationship between BMI and quality of life in patients with CHD has not been particularly well-illustrated. Several studies have shown that being overweight or obese ( $BMI \geq 25 \text{ kg/m}^2$ ) was associated with greater survival in coronary artery disease patients compared to normal or “ideal” BMI, known as the “obesity paradox” or “reverse epidemiology.”<sup>[20–25]</sup> Our findings were not in line with “obesity paradox,” showing that obese patients ( $BMI \geq 30 \text{ kg/m}^2$ ) had more problems in mobility ( $OR = 1.632$ ,  $P = 0.014$ ) and pain/discomfort ( $OR = 1.633$ ,  $P = 0.006$ ), similar to previous reports<sup>[17,26]</sup> which suggested that HRQoL was impaired in CHD patients with obesity compared to patients with a normal BMI. Our results also indicated that underweight patients ( $BMI \leq 18.5 \text{ kg/m}^2$ ) reported more problems in pain/discomfort ( $OR = 2.431$ ,  $P = 0.022$ ) and exhibited the worst EQ-5D index in comparison to normal and overweight patients. This discrepancy may be attributed to different body composition among the study population, as well as effects of body fat and fat-free mass on HRQoL.

**Table 1: Relationship between study variables and HRQoL of CHD patients**

Variables	n (%)	EQ-5D index, mean (SD)	P	EQ-VAS, mean (SD)	P
Total	1928	0.889 (0.172)		71.56 (17.65)	
Sex					
Male	566 (29.4)	0.893 (0.179)	0.507	71.62 (17.98)	0.912
Female	1362 (70.6)	0.887 (0.169)		71.53 (17.52)	
Age categories, years					
<50	209 (10.8)	0.913 (0.153)	<0.001‡	72.25 (16.98)	0.116
50–59	669 (34.7)	0.902 (0.160)		72.49 (17.28)	
60–69	661 (34.3)	0.881 (0.175)		70.98 (18.06)	
70–79	344 (17.9)	0.880 (0.175)		71.22 (17.58)	
≥80	45 (2.3)	0.775 (0.273)		66.04 (19.59)	
Marital status					
Married	1598 (82.9)	0.868 (0.178)	0.031*	68.17 (18.55)	0.002†
Not married	330 (17.1)	0.893 (0.171)		71.65 (17.35)	
Education level					
< Junior high school	1107 (57.4)	0.878 (0.182)	0.002†	70.62 (17.81)	0.246
≥ Junior high school	821 (42.6)	0.903 (0.157)		71.63 (17.32)	
Household income per month					
<1500 RMB	1254 (68.5)	0.883 (0.176)	0.002†	70.60 (17.53)	0.001†
1500–1999 RMB	228 (12.5)	0.889 (0.182)		72.86 (17.33)	
2000–2999 RMB	232 (12.7)	0.917 (0.154)		74.20 (17.17)	
≥3000 RMB	117 (6.4)	0.933 (0.128)		75.28 (18.17)	
Family's population					
1	167 (8.7)	0.846 (0.176)	<0.001‡	68.97 (16.47)	0.004†
2	731 (38.0)	0.882 (0.179)		70.29 (18.15)	
3–5	937 (48.7)	0.904 (0.162)		72.96 (17.34)	
≥6	88 (4.6)	0.865 (0.188)		72.22 (17.91)	
BMI					
<18.5	39 (2.0)	0.792 (0.281)	0.001†	66.15 (21.23)	0.128
18.5–24.9	684 (35.7)	0.894 (0.173)		71.05 (17.78)	
25.0–29.9	883 (46.1)	0.897 (0.159)		72.27 (16.89)	
≥30.0	311 (16.2)	0.876 (0.167)		71.65 (18.67)	
Physical activities					
Rarely/never	627 (32.7)	0.860 (0.209)	<0.001‡	68.37 (18.33)	<0.001‡
1–4 times/week	262 (13.7)	0.917 (0.153)		70.88 (17.02)	
≥5 times/week	1030 (53.7)	0.899 (0.148)		73.73 (17.11)	
Smoking status					
Rarely/never	1347 (70.2)	0.889 (0.175)	<0.001‡	71.44 (17.57)	0.156
Past	160 (8.3)	0.844 (0.181)		69.76 (17.51)	
Current	413 (21.5)	0.908 (0.151)		72.79 (17.93)	
Alcohol drinking					
Rarely/never	1583 (83.6)	0.886 (0.174)	0.017*	71.05 (17.85)	0.002†
Past	80 (4.2)	0.868 (0.162)		70.81 (19.03)	
Low	81 (4.3)	0.915 (0.164)		75.95 (15.23)	
Medium	81 (4.3)	0.923 (0.134)		73.88 (14.47)	
High	38 (2.0)	0.953 (0.114)		80.87 (15.87)	
Very high	30 (1.6)	0.928 (0.117)		74.57 (15.58)	
Comorbidities					
Hypertension					
Yes	1558 (80.9)	0.888 (0.173)	0.458	71.67 (17.68)	0.689
No	367 (19.1)	0.895 (0.166)		71.26 (17.52)	
Diabetes mellitus					
Yes	394 (20.5)	0.868 (0.185)	0.012*	68.93 (18.61)	0.001†
No	1531 (79.5)	0.894 (0.168)		72.2 (17.33)	
Stroke					
Yes	268 (13.9)	0.850 (0.216)	0.001†	68.72 (19.98)	0.010*
No	1657 (86.1)	0.895 (0.163)		72.05 (17.20)	

Contd...

**Table 1: Contd...**

Variables	n (%)	EQ-5D index, mean (SD)	P	EQ-VAS, mean (SD)	P
Compliance with drug treatment					
Good	997 (51.7)	0.888 (0.177)	0.833	71.23 (18.03)	0.411
Poor	931 (48.3)	0.890 (0.166)		71.90 (17.25)	
HRQoL dimension					
Mobility					
No problem	1582 (82.1)	0.949 (0.104)	<0.001‡	74.21 (16.30)	<0.001‡
With problem	346 (17.9)	0.617 (0.158)		59.36 (18.52)	
Self-care					
No problem	1744 (90.5)	0.926 (0.125)	<0.001‡	73.02 (16.79)	<0.001‡
With problem	184 (9.5)	0.543 (0.171)		57.50 (19.51)	
Usual activities					
No problem	1629 (84.5)	0.942 (0.108)	<0.001‡	73.88 (16.39)	<0.001‡
With problem	299 (15.5)	0.600 (0.165)		58.81 (18.90)	
Pain/discomfort					
No problem	1460 (75.7)	0.962 (0.101)	<0.001‡	74.46 (16.51)	<0.001‡
With problem	468 (24.3)	0.662 (0.148)		62.46 (18.05)	
Anxiety/depression					
No problem	1775 (92.1)	0.914 (0.145)	<0.001‡	73.03 (16.84)	<0.001‡
With problem	153 (7.9)	0.599 (0.194)		54.24 (17.83)	

\* $P < 0.05$ ; † $P < 0.01$ ; ‡ $P < 0.001$ . BMI: Body mass index; HRQoL: Health-related quality of life; CHD: Coronary heart disease; EQ-5D: European Quality of Life 5-dimensions; SD: Standard deviation; EQ-VAS: European Quality of Life Visual Analog Scale.

**Table 2: Stepwise multiple linear regression analysis for the determinants of HRQoL in CHD patients**

Dependent variables	Independent variables	B	SE. B	β	P
EQ-VAS	Physical activities	3.104	0.484	0.161	<0.001‡
	Alcohol drinking	1.581	0.396	0.100	<0.001‡
	Family's population	2.150	0.614	0.088	<0.001‡
	Marital status	2.597	1.196	0.055	0.030*
	Diabetes mellitus	-3.709	1.084	-0.086	<0.001‡
	Stroke	-3.082	1.257	-0.062	0.014*
EQ-5D index	Age	-0.017	0.005	-0.094	<0.001‡
	Physical activities	0.021	0.005	0.112	<0.001‡
	Alcohol drinking	0.012	0.004	0.080	0.001†
	Family's population	0.013	0.006	0.053	0.049*
	Household income per month	0.012	0.005	0.067	0.012*
	Stroke	-0.041	0.012	-0.083	0.001†

\* $P < 0.05$ ; † $P < 0.01$ ; ‡ $P < 0.001$ . B: Regression coefficient; β: standard regression coefficient; SE. B: Standard error of regression coefficient; HRQoL: Health-related quality of life; CHD: Coronary heart disease; EQ-VAS: European Quality of Life Visual Analog Scale; EQ-5D: European Quality of Life 5-dimensions.

Previous studies have demonstrated a J- or U-shaped association between alcohol drinking and the risk of CHD. However, not all the studies replicated such type of association.<sup>[27,28]</sup> In our study, certain alcohol drinking was related to better HRQoL, as patients with medium or high drinking had less problems in mobility, self-care and usual activities, consistent with previous reports.<sup>[29,30]</sup> A recent study revealed that moderate alcohol intake related to improved HDL-cholesterol, fibrinogen and markers of glucose metabolism, implicating reduced CHD risk of moderate drinkers. Heavy and binge drinking were also associated with favorable levels of CHD biomarkers,<sup>[31]</sup> and this may be a possible explanation for the negative relationship between alcohol drinking and CHD risk.

Several limitations can be noted in the present study. First, the study used a cross-sectional design and could not show the effects of changes in demographic and related factors over time on HRQoL and provide causal information. We focused on the quality of life of CHD patients and a control group without CHD was not included. Thus, the results may not be specific for this special population. Second, because of data availability, we were unable to obtain treatments received for CHD, cardiac function, revascularization method and other clinical factors that may influence HRQoL. Third, there are more women than men in our study and selection bias may occur since generally men are affected more by CHD than women.

**Table 3: Logistic regression analysis for dimension-specific factors related to HRQoL in CHD patients**

Dimensions	Independent variables	OR	95% CI	P
Mobility	Age, years			0.040*
	<50 (reference)	1		
	50–59	0.890	0.533–1.485	0.655
	60–69	1.096	0.662–1.814	0.721
	70–79	1.196	0.692–2.066	0.521
	≥80	3.236	1.295–8.084	0.012*
	BMI			0.012*
	<18.5	2.176	0.911–5.197	0.080
	18.5–24.9 (reference)	1		
	25.0–29.9	0.971	0.705–1.336	0.855
	≥30.0	1.632	1.103–2.416	0.014*
	Stroke			
	No (reference)	1		
	Yes	1.465	1.012–2.121	0.043*
	Physical activities			<0.001‡
	Rarely/never (reference)	1		
	1–4 times/week	0.462	0.289–0.740	0.001†
	≥5 times/week	0.495	0.368–0.667	<0.001‡
	Family's population			<0.001‡
	1 (reference)	1		
	2	0.505	0.329–0.776	0.002†
	3–5	0.318	0.205–0.492	<0.001‡
	>6	0.424	0.192–0.941	0.035*
	Smoking status			0.037*
	Rarely/never (reference)	1		
	Past	1.983	1.170–3.358	0.011*
	Current	1.063	0.730–1.548	0.750
Alcohol drinking			0.002†	
Rarely/never (reference)	1			
Past	0.555	0.253–1.216	0.141	
Low	0.373	0.150–0.924	0.033*	
Medium	0.286	0.109–0.748	0.011*	
High	0.097	0.013–0.729	0.023*	
Very high	0.147	0.019–1.111	0.063	
Self-care	Stroke			
	No (reference)	1		
	Yes	2.121	1.380–3.260	0.001†
	Education level			
	< Junior high school (reference)	1		
	≥ Junior high school	0.575	0.392–0.843	0.005†
	Physical activities			<0.001‡
	Rarely/never (reference)	1		
	1–4 times/week	0.457	0.257–0.814	0.008†
	≥5 times/week	0.354	0.241–0.520	<0.001‡
	Smoking status			0.010*
	Rarely/never (reference)	1		
	Past	2.592	1.396–4.811	0.003†
	Current	1.146	0.714–1.839	0.572
	Alcohol drinking			0.027*
	Rarely/never (reference)	1		
	Past	0.276	0.079–0.959	0.043*
Low	0.377	0.112–1.266	0.114	
Medium	0.193	0.045–0.827	0.027*	
High	0.378	0.084–1.697	0.204	
Very high	0.256	0.033–1.953	0.189	

Contd...

Table 3: Contd...

Dimensions	Independent variables	OR	95% CI	P
Usual activities	Age, years			0.036*
	<50 (reference)	1		
	50–59	1.356	0.722–2.546	0.343
	60–69	1.398	0.737–2.652	0.305
	70–79	2.151	1.080–4.285	0.029*
	≥80	3.440	1.234–9.586	0.018*
	Stroke			
	No (reference)	1		
	Yes	1.976	1.364–2.863	<0.001‡
	Education level			
	< Junior high school (reference)	1		
	≥ Junior high school	0.729	0.516–1.031	0.074
	Physical activities			<0.001‡
	Rarely/never (reference)	1		
	1–4 times/week	0.332	0.193–0.570	<0.001‡
	≥5 times/week	0.475	0.348–0.648	<0.001‡
	Household income per month			0.026*
	<1500 (reference)	1		
	1500–1999	0.868	0.555–1.359	0.537
	2000–2999	0.505	0.287–0.889	0.018*
	≥3000	0.430	0.192–0.964	0.040*
	Smoking status			0.001†
	Rarely/never (reference)	1		
	Past	2.613	1.552–4.401	<0.001‡
	Current	1.092	0.737–1.620	0.661
	Alcohol drinking			0.049*
	Rarely/never (reference)	1		
Past	0.787	0.371–1.667	0.531	
Low	0.457	0.184–1.138	0.093	
Medium	0.308	0.116–0.814	0.018*	
High	0.233	0.052–1.039	0.056	
Very high	0.621	0.174–2.216	0.463	
Pain/discomfort	Age, years			0.027*
	<50 (reference)	1		
	50–59	1.094	0.698–1.714	0.695
	60–69	1.474	0.948–2.291	0.085
	70–79	1.458	0.901–2.358	0.125
	≥80	2.802	1.242–6.324	0.013*
	BMI			0.006†
	<18.5	2.431	1.135–5.209	0.022*
	18.5–24.9 (reference)	1		
	25.0–29.9	1.090	0.830–1.431	0.536
	≥30.0	1.633	1.153–2.311	0.006†
	Physical activities			0.005†
	Rarely/never (reference)	1		
	1–4 times/week	0.517	0.340–0.785	0.002†
	≥5 times/week	0.760	0.588–0.984	0.037*
	Household income per month			0.032*
	<1500 (reference)	1		
	1500–1999	0.838	0.582–1.208	0.344
	2000–2999	0.544	0.356–0.833	0.005†
	≥3000	0.745	0.444–1.251	0.266
Smoking status			0.015*	
Rarely/never	1.344	0.992–1.822	0.057	
Past	1.971	1.235–3.146	0.004†	
Current (reference)	1			

Contd...

Table 3: Contd...

Dimensions	Independent variables	OR	95% CI	P
Anxiety/depression	Age, years			0.017*
	<50 (reference)	1		
	50–59	2.934	1.144–7.527	0.025*
	60–69	3.379	1.328–8.601	0.011*
	70–79	2.212	0.804–6.087	0.124
	≥80	6.935	2.061–23.339	0.002†
	Diabetes mellitus			
	No (reference)	1		
	Yes	1.774	1.196–2.630	0.004†
	Physical activities			0.057
Rarely/never (reference)	1			
1–4 times/week	0.710	0.396–1.273	0.250	
≥5 times/week	0.628	0.428–0.923	0.018*	

\* $P < 0.05$ ; † $P < 0.01$ ; ‡ $P < 0.001$ . HRQoL: Health-related quality of life; CHD: Coronary heart disease; BMI: Body mass index; OR: Odds ratio; CI: Confidence interval.

The strength of our study lies in its focus on the HRQoL of CHD patients in China and was carried out in representative residents of the rural Northern Han Chinese. Our data will be useful for future research in this field, and may provide more valuable information on HRQoL in patients with CHD when combined with other questionnaires, for example, questionnaires of Seattle Angina Questionnaire, Social Support Scale, and Self-rating Depression Scale.

In summary, this study suggests that older age, comorbid diabetes mellitus and stroke, obesity, underweight, less income, living alone, smoking, less physical activity, and lower education level are negative correlates of impairment of HRQoL in CHD patients. Being married, having more physical activity, moderate alcohol drinking and big family are protective factors for HRQoL in CHD patients. Clinicians could pay more attention to CHD patients with these characteristics so as to optimize care and improve quality of life in this special population. Further large-scale cohort studies should be conducted to confirm our results in the future.

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