

# BMJ Open Effect of medical insurance and family financial risk on healthcare utilisation by patients with chronic diseases in China: a cross-sectional study

Zhan Shu,<sup>1</sup> Yu Han,<sup>1</sup> Jinguang Xiao,<sup>1</sup> Jian Li <sup>2</sup>

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<sup>1</sup>College of Public Administration, Central China Normal University, Wuhan, China

<sup>2</sup>Institute of Medical Information, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

## Correspondence to

Dr Jian Li; [lijian7636@126.com](mailto:lijian7636@126.com)

## ABSTRACT

**Objective** To assess the joint cumulative effects of medical insurance and family health financial risk on healthcare utilisation among patients with chronic conditions in China.

**Design** A nationwide population-based case-control study with multinomial logistic regression was conducted and used to estimate the ORs of healthcare utilisation against type of medical insurance and family health financial risk using the Anderson model as a theoretical framework.

**Setting** China Family Panel Studies (CFPS) database.

**Participants** The study sample included 5260 patients with chronic conditions identified from the 2014 CFPS database.

**Main outcome measures** The participants were classified by their health insurance coverage: urban employee basic medical insurance (UEBMI), Gong Fei Medical Insurance (GFMI), new rural cooperative medical scheme (NCMS) and urban residents basic medical insurance. Healthcare utilisation was measured by assessing the care level provided by the health institutions selected by patients when they were sick. Health financial risk was measured using the cost of medical expenditures and annual family income over the past year.

**Results** Patients were more likely to choose hospital care than care from primary health centres. Patients with NCMS preferred primary healthcare, compared with patients with no medical insurance (OR 1.852, 95% CI 1.458 to 2.352). Patients with UEBMI and GFMI made use of hospital healthcare services (OR 2.654, 95% CI 1.85 to 3.81; OR 1.629, 95% CI 1.15 to 2.30, respectively). Patients who had medium or high financial risk were more likely to choose tertiary/specialised hospital care, compared with those at low financial risk (OR 1.629, 95% CI 1.15 to 2.30; OR 1.220, 95% CI 1.04 to 1.43, respectively).

**Conclusions** The majority of patients chose hospital care in our sample. There was a joint effect and relationship between degree of family health financial risk and medical insurance on healthcare utilisation.

## INTRODUCTION

As society and the economy have developed in China, chronic diseases, principally cardiovascular and cerebrovascular disorders, cancer and diabetes, have created

## Strengths and limitations of this study

- To minimise recalls and selection bias, the data in this study were collected from a nationwide survey representative of patients with chronic diseases.
- The major limitation of the study was the cross-sectional survey that limited interpretation of the results.
- Other study limitations included determining the true interaction between financial risk and healthcare selection, as the limited service capability of the primary healthcare system may affect the healthcare utilisation of chronic patients.

increasingly serious public health problems, with diagnoses in these categories reaching 260 million people. Deaths due to chronic disease account for 85% of total deaths, and 70% of the total disease burden.<sup>1</sup> Although chronic disease is the leading cause of adult morbidity and mortality in many low/middle-income and developed countries,<sup>2</sup> the prevention and treatment of chronic diseases still do not attract enough attention. This reality will seriously impede the positive effects of poverty eradication and economic development. Establishing and perfecting a chronic disease management service system combining prevention and treatment is a focus of the Chinese government.

In 2003, China initiated an improved medical insurance system and introduced a primary healthcare system at the same time. There are four basic medical insurance schemes that provide coverage for more than 1.3 billion people in China. By the end of 2014, 736 million rural residents had joined the new rural cooperative medical scheme (NCMS), 98.9% of eligible rural citizens covered by NCMS. The sources of NCMS funding are government subsidies and individual premiums. Annual premium cost per capita was raised gradually. It was ¥30 in

2003 and ¥411 in 2014. Included in the benefit package offered by NCMS are inpatient medical services and outpatient medical services for chronic diseases. Today, the government is promoting the integration of NCMS and urban residents basic medical insurance (URBMI). URBMI covers urban residents, many of whom are in the not-employed category, such as students, children and the elderly; this insurance covered 314.5 million people by the end of 2014.<sup>3</sup>

In 2014, urban employee basic medical insurance (UEBMI) covered primarily the 283.3 million employees of enterprises in urban areas. The source of UEBMI funding is 8% of annual payroll (6% from employers and 2% from employees). Annual premium cost per capita was raised gradually from ¥383 in 1998 to ¥2841 in 2014. The UEBMI benefit package includes inpatient medical service and outpatient medical service.<sup>4</sup> Finally, Gong Fei Medical Insurance (GFMI) covers employees of government offices and institutes of public affairs. This traditional scheme has been reformed and merged into the UEBMI scheme gradually.

The results of previous studies illustrate that identified gaps in insurance reimbursement were fewer with NCMS and URBMI coverage as compared with UEBMI coverage.<sup>5</sup> Out-of-pocket spending accounts for a large proportion of total healthcare expenditure, with large disparities among the different insurances schemes.<sup>6</sup> A segmented medical insurance system is not conducive to the maintenance of health rights and interests of either urban or rural residents.<sup>7</sup> Integration reforms have been piloted to address the fragmented health insurance system in China.<sup>8,9</sup> However, a number of barriers to integration reform still exist, such as the need for improvement in management systems that would reduce inequity and expand benefit coverage.<sup>10,11</sup>

12.9% of the Chinese population has catastrophic health expenditure (CHE) in 2011, higher than many countries,<sup>12</sup> such as Mongolia,<sup>13</sup> Kenya<sup>14</sup> and Turkey.<sup>15</sup> Decreasing the economic burden for families, especially for families of patients with chronic diseases, and sharing the financial burden of healthcare are significant challenges facing China.

Previous studies have demonstrated that the economic status of households is relevant to CHE. In particular, if the head of the household is employed, that circumstance is a protective factor against CHE. An increased number of people with a chronic disease in a household and an elevated number of hospitalisations are risk factors for CHE.<sup>16</sup> Medical insurance, including NCMS coverage, is an effective method of relieving CHE.<sup>17</sup> However, few studies have researched the impact of financial risk and medical insurance on health service utilisation in patients with chronic diseases.<sup>18,19</sup>

In China, the majority of people, including patients with chronic diseases, choose to use hospitals rather than primary health centres for their healthcare, most likely because the perception is that the quality of care in hospitals is superior to care provided at health centres.<sup>20</sup> In

theory, the government requires healthcare institutions at all levels to cooperate with each other to provide continuous and comprehensive health services for patients with chronic diseases. Primary healthcare institutions offer lifestyle intervention, health education and counselling, and monitoring and control of therapeutic plans. Tertiary/specialised hospitals develop professional treatment programme for patients with uncontrollable conditions or severe chronic diseases. As preventive health services are difficult to be effectively compensated, there is no significant difference between preventive health services offered by primary care centres and those offered by hospitals. However, an empirical study demonstrated that community health centres (CHCs) provided better quality primary care than secondary or tertiary healthcare facilities.<sup>21</sup> There must be other persuasive factors that affect healthcare utilisation behaviour, influencing patients to choose hospital care.<sup>22</sup>

The results of previous research indicate that integration of healthcare services can be effective in improving levels of care and quality of life for patients with chronic diseases.<sup>11</sup> Strengthening the ability of primary health organisations to provide chronic disease management is an important step towards achieving healthcare service integration. However, despite policy measures to strengthen and promote primary care, patients in China increasingly choose to access higher level hospitals.<sup>23</sup> The resultant overcrowding at these hospitals and the underutilisation of primary care centres diminishes the effects of continuing health system investment, to the detriment of the health of the population.

A qualitative study demonstrated that the severity of disease, the medical staff employed, the convenience of transport, levels of equipment and the availability of drugs were important considerations in choosing healthcare facilities in China.<sup>24</sup> Strengthening primary care may well be effective in increasing primary care utilisation by the rural population but it is less so for the urban population.<sup>25</sup> Medical insurance is also a significant factor controlling the behaviour and choices of patients with chronic diseases. Therefore, the impact of various medical insurance plans on the healthcare utilisation of patients with chronic diseases requires further exploration.

The Anderson model has been used in numerous studies about the utilisation of health services,<sup>26,27</sup> about the cost of health services,<sup>28</sup> and about reporting health-related quality of life.<sup>29</sup> The model predicts use of health services from predisposing factors (ie, age, education, gender or race), enabling factors (ie, family income, marital status, social support network) and need (ie, health status). This study used the Anderson model to analyse the effect of different medical insurance systems and to assess the cumulative joint effects of medical insurance and family health financial risk on healthcare utilisation among patients with chronic conditions in China.

## METHODS

### Study population and sampling

This study used data from the China Family Panel Studies (CFPS) survey funded by the Chinese government and created by the Institute of Social Science Survey at Peking University in 2014. CFPS data are collected using multi-dimensional, multilevel and longitudinal methods and aims to provide the most thorough, reliable and valuable data for scientific research as well as reliable evidence for state policy-making. The CFPS survey covers broad topics regarding the economic status, education, family relationships, migration and self-rated health of patients; data are collected at personal, household and community levels. The survey contained the combination of variables required for our analysis, including individual socioeconomic status, medical expenditure, medical insurance and other demographic characteristics. The survey pool encompassed 29 provinces in China that represent 95% of the Chinese population. Approximately 16 000 households and 37 147 adults (older than 16 years) were questioned in this survey, including 20 517 in rural areas and 16 630 in urban areas. Among them were 5260 adults who had suffered from a chronic disease for more than 6 months.

### Measures

The dependent variables in this study were the three healthcare choices available in China. Healthcare utilisation models (HCUMs) were self-reported by participants who answered the question: To which institute do you most often go when sick? Possible answers to this question were:

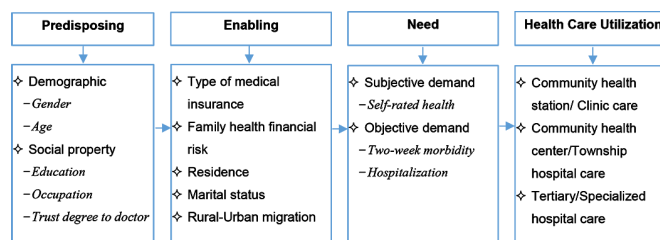
- ▶ Clinic/community health station (CHS).
- ▶ Township hospital/CHC.
- ▶ Tertiary/specialised hospital.

There are differences in the three level health service systems offered in urban and rural areas in China. The urban three level health service system includes a tertiary/specialised hospital, a CHC and a CHS/Clinic. The rural three level health service system includes a tertiary hospital, a township hospital and a clinic. Most CHCs in urban areas, like township hospitals in rural areas, can provide inpatient, outpatient and public health services for the public. CHS and clinics provide outpatient and public healthcare services. Primary healthcare refers to the basic healthcare and public health services provided by CHC/township hospital and CHS/clinics.

Medical insurance was assessed by one question: Which is your current medical insurance? There were five possible answers to this question:

- ▶ GFMI.
- ▶ UEBMI.
- ▶ URBMI.
- ▶ NCMS.
- ▶ None.

None of the patients in the sample had two types of health insurance. Because the basic medical insurance offerings cover different populations according to the



**Figure 1** Anderson theoretical model of factors influencing healthcare utilisation in patients with chronic diseases: the choice of healthcare utilisation includes community health station/clinic; community health centre/township; tertiary/specialised hospital. The predisposing factors include demographic and social property. Enabling factors include the type of medical insurance, family health financial risk. Need factor includes self-rated health, 2-week morbidity and hospitalisation.

person's type of work and residence location, almost no one can have two different basic medical insurance.

Health financial risk was measured through medical expenditure and family income. Family income was calculated from personal annual income. Total medical expenditure included outpatient expenditure and inpatient expenditure over the past year. To calculate health financial risk, medical expenditure was divided by family income. Medical expenditure/family income results  $<0.2$  indicated low health financial risk. Medium health financial risk was suggested by medical expenditure/family income  $\geq 0.2$  and  $<0.4$ . High health financial risk was indicated by medical expenditure/family income  $\geq 0.4$ . Patients with zero family income were defined by the study as having high health financial risks.

China has the largest number of internal floating migrants of any country, most of whom have moved from rural to urban areas, according to the Hukou registration system. More than 85% of these migrant patients chose NCMS in their hometown in 2014. The rural-urban migrants should get reimbursement in their hometown. It is not very convenient. This may limit their utilisation of healthcare.

Based on a standard Anderson behaviour model, this study constructed an adjusted Anderson theoretical model of healthcare utilisation from influencing factors according to the availability of information on the variables (figure 1). Predisposing variables were age, gender, occupation, education and the degree of trust in doctors. Enabling variables were the medical insurance scheme, family health financial risk, location of residence, marital status and rural-urban migration status. Measures of need were self-rated health (good, fair, bad), 2-week morbidity (the value equal one if individuals who got sick in the past 2 weeks), and occurrence of hospitalisation (the value equal one if the frequency of hospitalisations was once or more in past year).

### Data analysis

Descriptive statistics were used for family health financial risk and medical insurance scheme.



A  $\chi^2$  test was used to identify differences among groups. Continuous variables were analysed using a one-way analysis of variance (ANOVA) F-test, also used to identify significant differences among different family health financial risks and HCUMs. We selected all participants who answered 'yes' to the question: Do you have a chronic disease? All key variables were coded as multicategorical. A multinomial logistic regression was calculated to examine whether medical insurance predicted HCUMs, controlling for covariates and described as model 1. The principal effect and interaction effects between family health financial risk and medical insurance on choice of medical institutions are depicted using model 2. Finally, we tested for all effects of family health financial risk and medical insurance on HCUMs, controlling for other covariates. The OR of all effects was calculated from the product of ORs of the principal effect and interaction effects in model 3. All statistical analyses were conducted using STATA V.12.0. A  $p < 0.05$  was considered statistically significant.

### Patient and public involvement

All data in this study were derived from the CFPS database, so no patients or members of the public were involved in the study design, outcome measurement, data analysis or interpretation of results.

## RESULTS

### Descriptive analyses

The descriptive characteristics of the study sample are shown in [table 1](#). The mean age of the 5260 participants (2996 females, 56.96%) was 55.62 years. The proportions of families of patients with chronic diseases at low, medium and high health financial risk were 34.08%, 5.27% and 60.65%, respectively. The percentage of patients with chronic diseases who had basic medical insurance coverage was 93.81%; the majority of these patients had rural NCMS coverage (64.65% of total). The proportion of patients with UEBMI, URBMI and GFMI coverage were 15.48%, 9.29% and 4.39%, respectively. The proportion of patients who often received care at comprehensive or specialised hospitals was 47.76%, with only 29.33% choosing a clinic or CHS and 22.91% using a township hospital or CHC.

A greater proportion of patients with chronic diseases who were covered by NCMS preferred primary healthcare than did patients in other coverage schemes. Patients who rated their health as good were less likely to use hospitals.

For reasons of privacy, some participants did not want to answer questions about their health expenditure, education or hospitalisation history, so the total number of participant responses in each of the family health financial risk, education and hospitalisation categories is less than 5260. A few participants had difficulty answering questions about degree of trust in doctors and about self-rated health.

A one-way ANOVA was conducted to determine if there was a significant variance in the means of healthcare expenditure and family income across different models of healthcare utilisation in patients with chronic illnesses ([table 2](#)). We were able to conclude that the site where healthcare was provided (clinic/CHS, township hospital/CHC or tertiary/specialised hospital) correlates to the mean of total health expenditure ( $F(2, 5206) = 88.16, p < 0.001$ ), hospitalised expenditure ( $F(2, 1550) = 14.07, p < 0.001$ ) and family income ( $F(2, 5257) = 19.71, p < 0.001$ ). The utilisation of healthcare services is influenced by the family's capacity to pay. Generally, patients with higher family income prefer to go to higher level hospitals. Research measuring the impact of the household financial risk of patients with chronic illness on health service utilisation is described in first part of the section of multinomial logistic regressions.

### Multinomial logistic regressions

The multinomial logistic models for HCUMs are presented in [table 3](#). The models are consistent with our hypothesis: medical insurance and occurrence of hospitalisation are significantly associated with HCUMs in all models adjusted for other covariates. Due to the lack of effective integration between three level healthcare service systems, tertiary/specialised hospitals do not want discharged patients to use primary healthcare services simply to save money. Transferring from hospital to community remains difficult for a long period of time; most inpatients from tertiary/specialised hospitals continue to use higher level healthcare services.

Although basic medical insurance has increased the reimbursement rate for primary healthcare services, but it is not enough to attract patients to use primary healthcare services. Results indicate that the medical insurance system was the primary factor affecting the utilisation of healthcare services for patients with chronic diseases. However, different reimbursement schemes have a considerable impact on the flow of patients. Model 1–1 and model 1–2 reveal that the NCMS promotes the utilisation of clinics/CHS services, but UEBMI, URBMI and GFMI hinder the utilisation of Clinics/CHS services. Model 1–3 and model 1–4 reveal that the NCMS has promoted the utilisation of township hospital/CHC services significantly, URBMI has had no significant effect on patient utilisation of township hospital/CHC services, and UEBMI and GFMI do not encourage patients to use township hospital/CHC services. Model 1–5 and model 1–6 show that the NCMS did not encourage patients to use tertiary/specialised hospital services that UEBMI and GFMI encouraged patients to use those services, and that URBMI did not significantly promote the utilisation of those services.

Overall, patients with NCMS coverage are more likely to choose primary health services in models 1–3, compared with patients with other medical insurances. Patients with chronic diseases were more likely to choose healthcare centres depending on the degree of family

**Table 1** Basic characteristics of participants' healthcare utilisation

	Clinic/CHS n (%)	Township hospital/ CHC n (%)	Tertiary/specialised hospital n (%)	Total N (%)	X <sup>2</sup>	P value
Medical insurance (n=5218)					564.8735	<0.001
NCMS	1265 (82.6)	879 (73.3)	1229 (49.5)	3374 (64.7)		
UEBMI	81 (5.3)	119 (9.9)	605 (24.4)	808 (15.5)		
URBMI	73 (4.8)	109 (9.1)	302 (12.2)	485 (9.3)		
GFMI	25 (1.6)	32 (2.7)	172 (6.9)	229 (4.4)		
No insurance	87 (5.7)	61 (5.1)	174 (7.0)	322 (6.2)		
Family health financial risk (n=5249)					20.3869	<0.001
Health expenditure/family income <0.2	566 (36.7)	418 (34.8)	804 (32.1)	1788 (34.1)		
Health expenditure/family income ≥0.2 and <0.4	60 (3.9)	55 (4.6)	162 (6.5)	277 (5.3)		
Health expenditure/family income ≥0.4	915 (59.4)	728 (60.6)	1541 (61.5)	3184 (60.7)		
Gender (n=5260)					0.8205	0.663
Male	651 (42.2)	517 (42.9)	1096 (43.6)	2264 (43.0)		
Female	892 (57.8)	688 (57.1)	1416 (56.4)	2996 (57.0)		
Age (n=5260)					33.323	<0.001
39	223 (14.5)	104 (8.6)	356 (14.2)	683 (13.0)		
40–59	674 (43.7)	505 (41.9)	1069 (42.6)	2248 (42.7)		
60	646 (41.9)	596 (49.5)	1087 (43.3)	2329 (44.3)		
Education (n=4984)					199.789	<0.001
Illiterate	661 (44.9)	534 (46.4)	770 (32.6)	1965 (39.4)		
Primary	346 (23.5)	257 (22.3)	468 (19.8)	1071 (21.5)		
Junior high school	302 (20.5)	238 (20.7)	581 (24.6)	1121 (22.5)		
Senior high school	129 (8.8)	98 (8.5)	338 (14.3)	565 (11.3)		
College and above	34 (2.3)	24 (2.1)	204 (8.6)	262 (5.3)		
Job classification (n=5260)					275.8242	<0.001
Agriculture	763 (49.4)	568 (47.1)	679 (27.0)	2010 (38.2)		
Self-employed	104 (6.7)	62 (5.1)	170 (6.8)	336 (6.4)		
Employee	302 (19.6)	201 (16.7)	646 (25.7)	1149 (21.8)		
No job	374 (24.2)	374 (31.0)	1017 (40.5)	1765 (33.6)		
Degree of trust in doctor (n=5243)					21.2807	<0.001
0–3	120 (7.8)	96 (8.0)	283 (11.3)	499 (9.5)		
4–6	474 (30.9)	380 (31.7)	813 (32.4)	1667 (31.8)		

Continued

Table 1 Continued

	Clinic/CHS n (%)	Township hospital/ CHC n (%)	Tertiary/specialised hospital n (%)	Total N (%)	X <sup>2</sup>	P value
7-10	941 (61.3)	724 (60.3)	1412 (56.3)	3077 (58.7)		
Residence (n=5260)					356.4902	<0.001
Urban	472 (30.6)	492 (40.8)	1508 (60.0)	2472 (47.0)		
Rural	1071 (69.4)	713 (59.2)	1004 (40.0)	2788 (53.0)		
Marital status (n=5260)					5.4135	0.067
Married	1269 (82.2)	1004 (83.3)	2134 (85.0)	4407 (83.8)		
Unmarried	274 (17.8)	201 (16.7)	378 (15.0)	853 (16.2)		
Rural-to-urban migrants (n=5260)					2.4322	0.296
Rural-to-urban migrants	293 (19.0)	246 (20.4)	459 (18.3)	998 (19.0)		
No immigration	1250 (81.0)	959 (79.6)	2053 (81.7)	4262 (81.0)		
Health need: self-rated health (n=5258)					19.09	0.001
Good	171 (11.1)	104 (8.6)	188 (7.5)	463 (8.8)		
Fair	721 (46.7)	592 (49.1)	1172 (46.7)	2485 (47.3)		
Bad	651 (42.2)	509 (42.2)	1150 (45.8)	2310 (43.9)		
Two-week morbidity (n=5260)					0.5998	0.741
1	956 (62.0)	752 (62.4)	1586 (63.1)	3294 (62.6)		
0	587 (38.0)	453 (37.6)	926 (36.9)	1966 (37.4)		
Hospitalisation (n=5258)					208.9375	<0.001
1	268 (17.4)	320 (26.6)	964 (38.4)	1552 (29.5)		
0	1274 (82.6)	884 (73.4)	1548 (61.6)	706 (70.5)		

CHS, community health centre; GFMI, Gong Fei Medical Insurance; NCMS, new rural cooperative medical scheme; UEBMI, urban employee basic medical insurance.

**Table 2** Medical expenditure and family income of participants according to healthcare utilisation (RMB/year)

	Clinic/CHS, (%)	Township hospital/CHC, (%)	Tertiary/specialised hospital, (%)	F	P
Total medical expenditure (total medical expenditure/family income)	3460.378 (20.96)	4438.113 (23.15)	9920.078 (42.51)	88.16	<0.001
Hospitalise expenditure (hospitalise expenditure/family income)	10 104.962 (61.22)	8372.205 (43.68)	15 682.828 (67.21)	14.07	<0.001
Family income	16 507.115 (100)	19 168.702 (100)	23 333.875 (100)	19.71	<0.001

CHC, community health centre; CHS, community health station.

health financial risk. Patients at low health financial risk preferred primary healthcare centres. Age, employment status, level of education, degree of trust in doctors, residence, marital status, immigration status, self-rated health and hospitalisation affected healthcare utilisation as well. Patients with chronic disease who were older, with a rural residence, employed, with a lower education level, with better self-rated health, without hospitalisation were more likely to select primary healthcare centres. Those who lived in the countryside were married, trusted doctors to a lower degree, had higher educational levels, had poor self-rated health and were more likely to choose general hospital care.

Table 4 displays the ORs (95% CIs) calculated by the multinomial logistic models. The results demonstrate that medical insurance and family health financial risk were statistically significant factors, with an interaction effect in the case of model 2–5 with adjustment for covariates. Patients at higher health financial risk and with insurance coverage from UEBMI or GFMI tended to choose hospital care. Conversely, no particular HCUM was significantly associated with patients at high health financial risk who had insurance with NCMS or URBMI.

The multinomial logistic models for HCUMs are shown in table 5. Patients with chronic diseases covered by NCMS insurance who had low family health financial risk had the highest odds of using primary healthcare, followed by patients at high/medium family health financial risk and NCMS coverage. High financial risk individuals with URBMI insurance tended to choose community healthcare. Patients with UEBMI and GFMI insurance coverage preferred hospital care.

## DISCUSSION

This study explored the interaction between medical insurance and hospitalisation on HCUMs.

Findings of the study will help to focus the attention of policy-makers on patients with chronic disease and on the healthcare utilisation models described in this paper, encouraging the design of policies that are more specific to patients with chronic disease.

Our findings demonstrate that medical insurance and family health financial risk are connected to HCUMs. Medical insurance scheme (including NCMS, UEBMI, URBMI and GFMI), family health financial risk, and their

combined effects were significant in the choice of medical institutions for patients with chronic diseases.

Age, occupation, education, marital status, residence, self-rated health and hospitalisation also had significant impact on the HCUMs of patients with chronic diseases. Gender and 2-week morbidity did not impact HCUMs, but degree of trust in doctors did. Individuals who expressed low trust tended to waste medical resources. Previous studies have found close correlations among the doctor–patient relationship, defensive medicine behaviour and overprescription.<sup>30</sup>

Self-rated health and hospitalisation were significant influencers on choice of medical institution for patients with chronic illnesses. Patients with poor self-rated health and hospitalisations in the previous year were more inclined to choose hospital care. We found that NCMS and URBMI encourage patients with chronic diseases who have had hospital stays to choose a primary healthcare setting, whereas UEBMI and GFMI encourage hospital care in these patients. Patients covered by NCMS who have low financial risks usually do use primary healthcare. It may be that these patients do not have serious diseases and can use primary healthcare easily in rural region.

Coverage under the four insurers affects patient choice of medical institutions other than hospitals, with clinic/CHS chosen by 82.6%, 5.3%, 4.8% and 1.6% of patients with NCMS, UEBMI, URBMI and GFMI insurance, respectively. Premiums of different insurance schemes vary significantly. The UEBMI financing level of ¥2841 in 2014 is six times higher than that of NCMS (¥411 in 2014) and URBMI (¥409 in 2014); NCMS and URBMI insurance reimbursement rates are lower. Patients with NCMS and URBMI, who are more sensitive to the price of health services, are more likely to use primary healthcare services for hospitalisations.

Only 52.24% of patients with chronic diseases use primary healthcare systems regularly, 22.91% choosing township hospitals or CHCs and 29.33% using clinics or CHSs. 47.76% of patients with chronic illnesses used hospitals to receive healthcare services often.

Consistent with previous findings, hospital care is still the preferred choice for the majority of patients with chronic diseases, possibly because they trust the quality of medical care in hospitals more, despite having to wait longer to schedule a hospital appointment and having

Table 3 Multinomial logistic models of healthcare utilisation (model 1)

	Clinic/CHS			Township hospital/CHC			Tertiary/specialised hospital		
	Model 1-1	Model 1-2	Model 1-3	Model 1-4	Model 1-5	Model 1-6			
Medical insurance									
No insurance	1.00		1.00		1.00				
NCMS	1.711 (1.30, 2.26)***	1.745 (1.34, 2.39)***	1.937 (1.42, 2.64)***	1.979 (1.45, 2.70)***	0.584 (0.44, 0.77)***	0.572 (0.43, 0.76)***			
UEBMI	0.386 (0.27, 0.55)***	0.363 (0.26, 0.51)***	0.748 (0.52, 1.08)	0.733 (0.51, 1.06)	2.588 (1.80, 3.72)***	2.654 (1.85, 3.81)***			
URBMI	0.650 (0.45, 0.95)**	0.552 (0.39, 0.78)***	1.310 (0.90, 1.90)	1.306 (0.90, 1.90)*	1.538 (1.06, 2.24)	1.541 (1.06, 2.24)			
GFMI	0.407 (0.25, 0.68)***	0.410 (0.25, 0.67)***	0.671 (0.41, 1.09)	0.672 (0.41, 1.09)	2.457 (1.48, 4.08)***	1.629 (1.15, 2.30)***			
Health financial risk									
Low (<0.2)	1.00		1.00		1.00				
Medium (0.2-0.4)	0.604 (0.51, 0.97)**		0.681 (0.48, 0.96)*		1.629 (1.15, 2.30)***				
High (≥0.4)	0.889 (0.77, 1.03)*		0.813 (0.69, 0.96)*		1.220 (1.04, 1.43)***				
Predisposing									
Gender (female vs male)	0.927 (0.80, 1.07)	0.955 (0.83, 1.09)	0.912 (0.78, 1.06)	0.907 (0.78, 1.06)	1.079 (0.93, 1.25)	0.774 (0.66, 0.91)			
Age (≥60 vs <60)	1.256 (1.07, 1.47)***	1.269 (0.92, 1.44)***	1.523 (1.29, 1.80)***	1.543 (1.33, 1.86)***	0.796 (0.68, 0.94)***	0.774 (0.66, 0.91)***			
Occupation (have a job vs no job)	1.457 (1.22, 1.74)***	1.425 (1.13, 1.66)***	1.301 (1.09, 1.56)***	1.272 (1.06, 1.53)***	0.686 (0.57, 0.82)***	0.700 (0.59, 0.84)***			
Education (not illiterate vs illiterate)	0.846 (0.72, 0.99)**	0.851 (0.62, 1.10)	0.746 (0.63, 0.88)***	0.746 (0.63, 0.88)***	1.182 (1.01, 1.39)***	1.182 (1.01, 1.39)***			
Degree of trust (≥4 vs ≤3)	1.248 (0.98, 1.60)*	1.172 (0.93, 1.57)	1.239 (0.96, 1.60)*	1.245 (0.97, 1.61)	0.801 (0.63, 1.02)**	0.797 (0.62, 1.02)**			
Enabling									
Residence (urban vs rural)	0.435 (0.34, 0.56)***	0.418 (0.33, 0.62)***	0.643 (0.50, 0.83)***	0.640 (0.50, 0.83)***	2.301 (1.78, 2.98)***	2.313 (1.79, 2.30)***			
Marital status (married vs unmarried)	0.725 (0.60, 0.88)***	0.773 (0.65, 0.92)***	0.854 (0.70, 1.04)	0.859 (0.70, 1.05)	1.379 (1.14, 1.67)***	1.371 (1.13, 1.66)***			
Rural-urban migration (rural-urban migration vs local residents)	1.407 (1.06, 1.87)**	1.362 (1.04, 1.79)**	1.203 (0.91, 1.59)	1.188 (0.90, 1.57)	0.711 (0.54, 0.95)**	0.719 (0.54, 0.96)**			
Health need									
Self-rated health (fair or good vs bad)	1.313 (1.13, 1.53)***	1.238 (0.99, 1.41)*	1.375 (1.17, 1.61)***	1.353 (1.15, 1.59)**	0.761 (0.65, 0.89)***	0.775 (0.67, 0.90)***			
Two-week morbidity	0.942 (0.81, 1.10)	0.948 (0.82, 1.09)	0.987 (0.84, 1.15)	0.998 (0.85, 1.17)	1.061 (0.91, 1.24)	1.049 (0.90, 1.22)			
Hospitalisation	0.319 (0.27, 0.38)***	0.315 (0.25, 0.39)***	0.542 (0.46, 0.64)***	0.570 (0.48, 0.67)**	3.131 (2.65, 3.70)***	2.973 (2.51, 3.53)***			

Model 1-1~model 1-4 reference variable=tertiary/specialised hospital; model 1-5~model 1-6 reference variable=clinic/CHS.

\*P<0.05, \*\*P<0.01, \*\*\*P<0.001.

CHC, community health centre; CHS, community health station; GFMI, Gong Fei Medical Insurance; NCMS, New Cooperative Medical Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Residents Basic Medical Insurance.



**Table 4** ORs (95% CIs) obtained from multivariable-adjusted† multinomial logistic models (model 2)

	Model 2-1	Model 2-2	Model 2-3	Model 2-4	Model 2-5
<b>Medical insurance</b>					
No insurance	1.00				
NCMS	1.814 (1.430 to 2.302) <sup>***</sup>		1.852 (1.458 to 2.352) <sup>***</sup>		
UEBMI	0.538 (0.405 to 0.715) <sup>***</sup>		0.526 (0.396 to 0.700) <sup>***</sup>		
URBMI	0.928 (0.690 to 1.249)		0.926 (0.688 to 1.247)		
GFMI	0.517 (0.353 to 0.759) <sup>***</sup>		0.518 (0.353 to 0.760) <sup>***</sup>		
<b>Health economic risk</b>					
Low risk		1.00	1.00		
Medium risk		0.719 (0.543 to 0.952) <sup>**</sup>	0.649 (0.488 to 0.862) <sup>***</sup>		
High risk		0.882 (0.771 to 1.010) <sup>*</sup>	0.820 (0.714 to 0.941) <sup>***</sup>		
<b>Medical insurance* health economic risk</b>					
No insurance*low Risk				1.00	
NCMS*medium risk				1.067 (0.770 to 1.479)	
NCMS*high Risk				1.112 (0.961 to 1.285)	
UEBMI*medium Risk				0.134 (0.032 to 0.566) <sup>***</sup>	
UEBMI*high Risk				0.493 (0.371 to 0.655) <sup>***</sup>	
URBMI*medium Risk				0.561 (0.227 to 1.384)	
URBMI*High Risk				0.942 (0.702 to 1.263)	
GFMI*Medium Risk				0.142 (0.017 to 1.195) <sup>*</sup>	
GFMI*high Risk				0.421 (0.275 to 0.646) <sup>***</sup>	
<b>Medical insurance* hospitalisation</b>					
No insurance*no hospitalisation					1.00
NCMS*hospitalisation					1.866 (1.131 to 3.076) <sup>**</sup>
UEBMI*hospitalisation					0.897 (0.488 to 1.652)
URBMI*hospitalisation					1.948 (1.040 to 3.651) <sup>**</sup>
GFMI*hospitalisation					0.738 (0.338 to 1.611)
Model X <sup>2</sup>	883.28 <sup>***</sup>	766.93 <sup>***</sup>	896.01 <sup>***</sup>	819.64 <sup>***</sup>	786.45 <sup>***</sup>
Pseudo R <sup>2</sup>	0.1218	0.1057	0.1235	0.1130	0.1084

Continued

Table 4 Continued

	Model 2-1	Model 2-2	Model 2-3	Model 2-4	Model 2-5
Y1=primary healthcare (including clinic/CHS and township hospital/CHC). Y2=tertiary/specialised hospital healthcare. *P<0.05, **P<0.01, ***P<0.001. †All models used the same set of covariates: predisposing variables (gender, age, occupation, education, degree of trust), enabling variables (residence, marital status,immigration) and need (self-rated health, 2-week morbidity, hospitalisation). CHC, community health centre; CHS, community health station; GFMI, Gong Fei Medical Insurance; NCMS, New Cooperative Medical Scheme; NCMS, New Rural Cooperative Medical Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Residents Basic Medical Insurance.					

to travel further to attend a hospital appointment. Many patients with chronic illnesses are still reluctant to make use of primary healthcare services, perhaps because they still consider primary care ineffective and believe that primary care doctors do not have enough skills to treat their diseases. These patients may not believe that primary healthcare institutions are able to provide all of the appropriate medicine and guidance for the treatment of some serious diseases. They may worry that they will still need to go to a hospital after using primary care, and that this extra step will increase their indirect costs. As it is clear that the choices of patients with chronic illnesses are influenced by a host of factors and constraints,<sup>31 32</sup> a likely trend is that the management of chronic disease will be strengthened in primary healthcare systems in the future. The development of primary healthcare options remains essential to improving the equity and the efficiency of health services, particularly for patients with chronic disease. Although China has made remarkable progress in strengthening its primary healthcare system, but it faces many challenges.<sup>9 33</sup> Already, gatekeeper systems have been implemented in Beijing and Shenzhen city that ensure primary care system utilisation. If gatekeeper systems are built, medical insurance systems integrated, and other aspects of these influencing factors changed, the HCUMs of patients with chronic diseases, along with their family's health financial risk, will also be modified.

China is in the process of integrating the rural NCMS and URBMI schemes into the RBMI scheme in order to provide equitable rights and basic medical insurance to both urban and rural residents. In the process of medical reform, and to achieve a greater integration of medical services, the capacity of primary healthcare services should be further enhanced, the quality of primary health services should be promoted more effectively, and the insurance reimbursement system improved.<sup>34 35</sup> If the reimbursement scheme of medical insurance was to be adjusted (if the reimbursement package of primary healthcare service was increased, eg), healthcare utilisation choices would likely change.

In this study, more than 60% of families (n=3164) incur CHE (medical expenditure/family income  $\geq 0.4$ ). Of these, 68.68% have NCMS insurance and 12.61%, 8.44% and 4.55% are covered by UEBMI, URBMI and GFMI, respectively, with 5.72% having no insurance. The incidence rate of CHE without basic medical insurance was

56.2%. The incidence rates of CHE with basic medical insurance were 64.5% (NCMS), 49.4% (UEBMI), 55.2% (URBMI) and 63.2% (GFMI). Health service utilisation and out-of-pocket expenses differ significantly in households with and without members suffering from chronic disease.<sup>36</sup>

Among patients with chronic diseases in China, (in) equality in the health services provided is still largely determined by family financial capability. Current insurance schemes are insufficient to address this inequity.<sup>37</sup> Critical illness insurance that reduces the incidence of CHE was implemented in China beginning in 2012, but previous research has shown that it has a limited effect on the reduction of the incidence of CHE.<sup>38 39</sup> The critical illness insurance system requires further improvement and promotion of its increased use of primary healthcare services in patients with chronic diseases at high financial risk.

There are a number of limitations associated with this study. First, the data used in the study were part of a cross-sectional survey, limiting interpretation of the results and making it difficult to draw causal conclusions. Second, this study used the value 0.4 as the threshold of high family health financial risk (family medical expenditure/family income). Family expenses may be a better denominator than family income to evaluate financial risk.

In addition, financial risk may interact with healthcare utilisation. Medical services at hospitals might be more expensive, thus making patients who receive hospital services at high financial risk. However, results show that patients with medium or high financial risk are likely to choose tertiary/specialised hospital care, indicating that financial risk might not be one of the most important factors affecting the choices of medical services. The quality and capability of primary health institutions may be of more importance, for example, ideal primary healthcare services should provide low-cost and high-quality health management services for patients with chronic diseases, thereby reducing hospital admission rate and the economic burden of chronic disease. However, whether the urban and rural primary healthcare systems in China have the capacity to grow and achieve this deal needs to be studied further. Future longitudinal studies are required to assess policy trends. In particular, we hope to explore in the future the lagging effect of financial risk on HCUMs of patients with chronic diseases. Further

**Table 5** ORs (95% CIs) obtained from multivariable-adjusted multinomial logistic models regressing on medical insurance and health financial risk, accounting for interaction of health financial risk and medical insurance (model 3)

Health financial risk	Medical insurance				
	No insurance	NCMS	UEBMI	URBMI	GFMI
Low risk	1.00	2.265 (1.623 to 3.162) <sup>***</sup>	0.566 (0.386 to 0.829) <sup>***</sup>	0.845 (0.552 to 1.230)	0.650 (0.361 to 1.172)
Medium risk	0.587 (0.180 to 1.900)	1.669 (1.082 to 2.576) <sup>**</sup>	0.120 (0.028 to 0.520) <sup>***</sup>	0.535 (0.211 to 1.359)	0.167 (0.020 to 1.371) <sup>*</sup>
High risk	1.091 (0.706 to 1.686)	1.793 (1.297 to 2.479) <sup>***</sup>	0.469 (0.314 to 0.700) <sup>***</sup>	0.936 (0.623 to 1.407)	0.438 (0.262 to 0.730) <sup>***</sup>

<sup>\*</sup>P<0.05, <sup>\*\*</sup>P<0.01, <sup>\*\*\*</sup>P<0.001.

GFMI, Gong Fei Medical Insurance; NCMS, new cooperative medical scheme; UEBMI, urban employee basic medical insurance; URBMI, urban residents basic medical insurance.

observation of the integration effect of the medical insurance system on the behaviour of patients with chronic diseases is also suggested.

## CONCLUSIONS

The utilisation of primary health services by patients with chronic disease is still limited, although primary healthcare services can provide economical and convenient healthcare services.<sup>40</sup> Strengthening the primary health system is imperative to increasing access to and usage of primary care services, particularly for patients with chronic disease.<sup>41</sup> Medical insurance providers should encourage patients with chronic diseases to use primary healthcare to reduce family financial burden and the risk of high medical insurance expenditures. Improvement in the medical insurance system and promoting utilisation of primary healthcare services for patients with chronic diseases requires consideration in the future. NCMS is the only insurance that is effective in promoting primary healthcare utilisation for patients with chronic diseases; however, NCMS has only limited effect on the healthcare utilisation of patients with chronic diseases who are at high financial risk.

Policy-makers must be attentive to the value of primary healthcare to patients with chronic disease and at high family health financial risk in order to meet their care needs. To start, the government should advance the capability and the system of primary healthcare, improve the training of caregivers and personnel in primary healthcare, and increase capital investment to meet the needs of patients with chronic disease in order to provide equitable, accessible, high-quality healthcare services at primary health institutes. Second, the government should adjust medical insurance policies to make primary healthcare centres more attractive to patients with chronic disease, for example, adjusting of reimbursement scheme, establishing of gatekeeper system. Finally, policy-makers should focus on strengthening trust in doctors to break down any social prejudice associated with primary healthcare.

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#### ORCID iD

Jian Li <http://orcid.org/0000-0002-2156-7773>

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