

Does China's new cooperative medical scheme promote rural elders' access to healthcare services in relation to chronic conditions?

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Background: This study examined use of healthcare services by elderly people with a long-term condition living in rural China and participating in that country's New Cooperative Medical Scheme (NCMS).

Methods: Data were taken from the 2009 China Health and Nutrition Survey.

Results: The study results showed that education level and annual income were low among rural elders (aged ≥ 65 years); the illiteracy rate was 58.0% (200/345) and 67.6% (92/136) had an annual income of less than 5000 Chinese yuan renminbi. The elders had low rates of treatment and use of preventive healthcare services while the prevalence of chronic disease was highest among them when compared to other age groups. Among the few elders who received preventive healthcare, most received it at village clinics.

Conclusions: Preventive healthcare services and chronic disease management are urgently needed by rural elders in China. NCMS should initiate payments to township health centers to enable them to undertake community outreach and education campaigns among rural residents, and train village doctors in standard chronic condition management and prevention, with prioritization of the provision of prevention and management of chronic conditions by village clinics.

Keywords: China, Chronic condition, Elderly, New Cooperative Medical Scheme (NCMS), Rural

Introduction

Chronic disease is the leading cause of death in China, accounting for an estimated 80% of deaths and 70% of disability-adjusted life-years lost.¹ A chronic condition is a long-term, non-communicable illness, disease or symptom complex or disability, such as heart disease, stroke, cancer, chronic respiratory disease or diabetes; such conditions are often of long duration and generally slow progression.² Elders (individuals ≥ 65 years of age) are a high-risk population in terms of the morbidity and mortality associated with chronic disease. In recent years, ageing of the population in China has substantially increased the prevalence of chronic diseases, resulting in a heavy disease burden and associated healthcare costs.^{3–5} When compared with other age groups, elders have the highest rates of chronic disease prevalence (64.54%) and associated hospitalization (15.32%).⁴ In 2011, the number of elders in China had reached 120 million, accounting for 9.1% of the total population.⁶ It is estimated that the number of elders will increase to 450 million by 2050, representing nearly one-third of the total population.⁷ In China, more than 60% of elders live in rural areas, where they are the primary remaining residents as increasing numbers of young laborers move into urban areas with their wives and children.^{8–13}

Public policy in China has for some time had a strong urban bias, with rural residents having much lower socio-economic status and poorer access to healthcare services.^{14–16} A survey carried out in 2008 found that more than 67.6% of rural elders had a middle or low income, and rural elders were more likely not to seek medical treatments when ill than rural residents in other age groups.¹⁷ Additionally, rural areas bear the brunt of the negative environmental impacts of industrialization and changes in land use, and reports of the pollution of soil and water in rural areas by industrial waste have substantially increased in recent decades.^{18,19} Environmental degradation has led to an increase in chronic disease prevalence rates among the rural elderly population.^{20–22} Chronic disease prevalence rates among people aged ≥ 55 years have been reported as lower in rural than in urban areas, however, in view of the more common risk exposure and less effective community health services in rural areas, reported low chronic disease prevalence rates probably result from under-diagnosis, under-reporting or selective mortality because of the limited access to healthcare.^{15,17,20}

The New Cooperative Medical Scheme (NCMS), a public health insurance program that aims to promote rural residents' health status and prevent poverty caused by illness, is the basic health security system in rural China. It has operated in rural

areas since 2003 and by 2011 covered 2678 counties and 836 million rural residents.²³ NCMS funds are raised from central government, regional government, local government, village committees and the participants, with rural residents' voluntary enrollment.²⁴ The average sum raised per person increased from 30 Chinese yuan renminbi (RMB) per person in 2003 (US\$1=8.2774 RMB in 2003) to 246 RMB per person in 2011 (US\$1=6.4588 RMB in 2011), with hospitalization reimbursements reaching >70% in 2011. It has been reported that NCMS has substantially improved rural residents' use of healthcare services, with a 23% increase in outpatient visits and a 27% increase in inpatient episodes, but it has not reduced out-of-pocket expenses per outpatient visit or inpatient spell.^{25,26} Special considerations for rural elders were encouraged, such as premiums remission and free check-ups.^{16,25,27} For example, in Jiangsu, local governments have paid for rural elders to participate in NCMS, and annual check-ups paid for by NCMS will be available to participants. NCMS is proven to increase the use of healthcare services by rural elders, who have reported a significantly higher satisfaction with NCMS than other age groups.^{25,27,28}

Chronic disease has been found to be strongly associated with a decline in household income, and having a chronic disease is one of most important factors leading to poverty in China.²⁹⁻³¹ Studies showed that NCMS participants with a high income benefited more from NCMS than those with middle and low incomes,²⁴ and elders in rural areas with middle and low incomes have been found to be disadvantaged in their access to healthcare services.^{20,32} As the prevalence rates of chronic disease increase in the rural elderly population, more and more rural elders fall into poverty.

Although chronic conditions are among the most common and costly of all health problems, they are also among the most preventable. Effective prevention can limit the initial onset of chronic diseases, by embracing early detection efforts, such as screening at-risk populations (e.g., elders), and developing strategies for the appropriate treatment of existing diseases and related complications.³³ Previous studies have shown that, among elders at high risk of developing chronic conditions, prevention is as important as treatment in improving quality of life and reducing the risk of medical complications.³⁴⁻³⁷

NCMS needs to take measures to tackle the problems associated with chronic conditions and increase rural elders' access to healthcare services. Just how to further improve provider payments, in order to achieve better health outcomes, has become the pressing issue for the sustainability of NCMS in the next decades. Although there is an extensive literature on NCMS and chronic conditions, empirical research on rural elders' access to healthcare services in relation to chronic conditions is limited and there is little empirical information available to NCMS to inform the development of effective measures. In this study, I examined the use of healthcare services for chronic conditions by rural elderly participants in NCMS, with the aim of providing information for policy-makers wishing to develop effective ways of improving rural elders' access to healthcare services in relation to chronic conditions.

Methods

Study design and sampling

Data were derived from the China Health and Nutrition Survey (CHNS), covering the provinces of Guangxi, Guizhou, Heilongjiang,

Henan, Hubei, Hunan, Jiangsu, Liaoning and Shandong. These nine provinces vary substantially in geography, economic development, public resources and health indicators. A multistage, random cluster process was used to draw the samples surveyed in each of the provinces. Counties in the nine provinces were stratified by income (low, middle and high) and a weighted sampling scheme was used to randomly select four counties in each province. In addition, the provincial capital and a lower-income city were selected when feasible; in two provinces, another large city rather than the provincial capital had to be selected. Villages and townships within the counties, and urban and suburban neighborhoods within the cities, were selected randomly.

After the first round of the CHNS conducted in 1989, seven additional panels were added in 1991, 1993, 1997, 2000, 2004, 2006 and 2009. From 1989 to 1993 there were 190 primary sampling units: 32 urban neighborhoods, 30 suburban neighborhoods, 32 towns (county capital city) and 96 rural villages. Since 2000, the primary sampling units have increased to 216: 36 urban neighborhoods, 36 suburban neighborhoods, 36 towns and 108 villages. The same households were surveyed over time whenever possible and newly formed households were included from 1993. A complete household roster was used as a reference for subsequent blocks of questions on individual, household, and community infrastructure. Detailed information on study design, sampling and data collection can be found at the CHNS website.³⁸

Data collection

The survey was conducted by an international team of researchers whose backgrounds include nutrition, public health, economics, sociology, Chinese studies and demography. The survey took place over a 3-day period to draw a sample of about 4400 households with a total of 26 000 individuals in the 9 provinces. The CHNS collected information on all individuals in each household, including details of income, employment, education, health and demography. The health section of the survey included questions on insurance coverage, availability of medical facilities, curative care and illness, use of family planning and other preventive services.

Written consent was obtained from the participants for their information to be stored in the database and used for research.

This study selected the latest NCMS survey data for 2009. All adults (individuals aged ≥ 18 years) interviewed during the 2009 survey were candidates for inclusion in the study sample. Exclusion criteria were: 1. lack of information on, for example, an individual's age, gender, education level; 2. non-participation in NCMS or uncertainty about personal health insurance status.

Since the inception of CHNS in 1989, extensive quality-control measures have ensured the collection of high-quality data. These measures included a detailed protocol for the training of field staff in data collection and of office staff in data entry and the proper checking and cleaning of data. Internal quality-control measures have been based on the collecting measures of selected factors from multiple perspectives and then using these data to refine measurement. For example, income can be approximated from the survey in three ways: through responses to direct questions about income, the summation of net receipts from all reported activities and responses to questions about expenditures. Full income from market and non-market activities can be derived. This detailed estimation of income represents a significant advance in the measurement of income in China.

Inclusion of non-monetary government subsidies, such as state-subsidized housing, is another especially important advance.

Data analysis

Sub-databases of individuals were sorted by the wave of survey year. The sub-databases of 2009 were selected and merged into one total database by the key variables (household and individual ID). Descriptive analysis was conducted, using SPSS V.15.0 for Windows (Chicago, IL, USA).

Results

Participant characteristics

A total of 4454 NCMS participants with a mean age of 46.2 (± 12.8) years (range 18–83 years) were randomly interviewed with samples sizes ranging from 397 to 613 respondents across the 9 sample provinces (Table 1). Table 1 also presents detailed characteristics of the sample, including current 'hukou' status (see Table footnote), gender and age.

The ratio of male to female was 1.28 (2502/1952), and elders accounted for 7.7% of the sample (345/4454). Most participants were married (89.4%; 3980/4454). Most were educated to middle school level or lower (89.7%; 3995/4454), with 22.2% (990/4454) illiterate; only 0.4% (19/4454) graduated from community college and above (Table 2).

To show more clearly the socio-economic status of rural elders, NCMS participants' characteristics are presented by age group. The ratio of male to female was 1.56 (210/135) among those aged ≥ 65 years, of whom 18.8% (65/345) were single (Table 3). The illiteracy rate was 3.3% (26/790) among those aged 18–34 years, while it was 58.0% (200/345) among those aged ≥ 65 years, 55.1% (162/294) among those aged 65–74 years and 74.5% (38/51) among those ≥ 75 years of age. The

constituent ratio of the highest education level of elderly NCMS participants was statistically significantly lower than of other age groups ($\chi^2=994.490$; $p<0.001$), and bivariate analysis showed the highest educational level to be negatively associated with age group ($R=-0.385$; $p=0.000$). Of elders who responded to the question on annual income, 67.6% (92/136) reported an annual income of $<RMB5000$, and only 6.6% (9/136) reported an annual income of $>RMB15001$.

Prevalence rates of chronic conditions among NCMS participants

CHNS provided the NCMS participants' history of chronic conditions (e.g., hypertension, diabetes and asthma), including detailed information of when and where the participant was diagnosed as having a chronic conditions (Table 4). The data showed that the prevalence rates of hypertension in the age groups 18–34 years, 35–44 years, 45–54 years, 55–64 years and ≥ 65 years were, respectively, 0.63%, 3.62%, 8.71%, 12.25% and 17.68%. The prevalence rates of diabetes in the age groups 18–34 years, 35–44 years, 45–54 years, 55–64 years and ≥ 65 years were, respectively, 0.25%, 0.47%, 1.47%, 1.8% and 2.61%. Similarly, the prevalence rate of asthma in the age groups 18–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years and ≥ 75 years were, respectively, 0.0%, 0.16%, 0.52%, 1.35%, 3.4% and 5.88%.

Treatment of chronic conditions among NCMS participants

CHNS investigated the treatment of hypertension and diabetes among those who had reported a history of hypertension or diabetes (Table 5). Among those who had a history of hypertension, 68.6% (221/322) were taking antihypertensive drugs. Those who were taking antihypertensive drugs accounted for 60% (3/5),

Table 1. Data on a sample of participants in China's New Cooperative Medical Scheme, distributed across nine provinces and interviewed in 2009

Province	n (%)		Hukou status ^a		Gender		Age (years)	
			Urban	Rural	Male	Female	<65	≥ 65
Liaoning	400	9.0	34	366	221	179	382	18
Heilongjiang	493	11.1	3	490	293	200	479	14
Jiangsu	459	10.3	40	419	239	220	395	64
Shandong	483	10.8	56	427	267	216	449	34
Henan	537	12.1	14	523	316	221	504	33
Hubei	499	11.2	20	479	277	222	465	34
Hunan	397	8.9	46	351	231	166	359	38
Guangxi	573	12.9	4	569	323	250	545	28
Guizhou	613	13.8	5	608	335	278	531	82
Total	4454	100.0	222	4232	2502	1952	4109	345

^a Hukou status: the formal name for China's system of household registration is 'hukou'. Within the hukou system a 'hukou' is the registered residency status of an individual, and officially identifies a person as a resident of an area; the registration record includes identifying information such as name, parents, spouse and date of birth.

Table 2. Characteristics of 4454 participants in China's New Cooperative Medical Scheme, interviewed in 2009

Characteristics	n (%)
Age (years)	
18–34	790 (17.7)
35–44	1270 (28.5)
45–54	1159 (26.0)
55–64	890 (20.0)
65–74	294 (6.6)
≥75	51 (1.1)
Gender	
Male	2502 (56.2)
Female	1952 (43.8)
Marital status	
Single	474 (10.6)
Married	3980 (89.4)
Highest education level	
Illiterate	990 (22.2)
Primary school graduate	1115 (25.0)
Middle school graduate	1890 (42.4)
High school graduate	440 (9.9)
≥Community college graduate	19 (0.4)
Annual income ^a	
≤RMB5000	685 (15.4)
RMB5001–10000	402 (9.0)
RMB10001–15000	307 (6.9)
RMB15001–20000	154 (3.5)
≥RMB20001	188 (4.2)
Data missing	2718 (61.0)

^a US\$1=6.831 Chinese yuan renminbi (RMB) in 2009.

59% (27/46), 59.4% (60/101), 78.0% (85/109), 76% (41/54) and 71.4% (5/7) in the age groups 18–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years and ≥75 years, respectively.

CHNS investigated seven treatments for diabetes that may be used in China, including special diet, weight control, oral medicine, insulin injection and traditional Chinese medicine. Among those who had a history of diabetes, 43% (21/49) were treated with special diet, 20% (10/49) by weight control and 71% (35/49) by oral medicine. Elders treated with special diet, weight control and oral medicine accounted for 33% (3/9), 11% (1/9) and 66.7% (6/9), respectively. Those who were simultaneously received two or more treatments accounted for 47% (23/49), and only 14% (7/49) were treated simultaneously by special diet, weight control and oral medicine.

Preventive healthcare services received by NCMS participants

CHNS did not investigate the prevention of some specific chronic conditions, but provided data on the 'preventive healthcare services received in the past 4 weeks', which included physical

examination, blood test, blood pressure test, tumor test, vision examination and hearing test, gynecological and other examinations. In this study, I analyzed the use of preventive healthcare services for chronic conditions among NCMS participants by using the data regarding the 'preventive healthcare services received in the past 4 weeks'.

Those who had received preventive healthcare services were NCMS participants who came into contact with healthcare facilities for various reasons and had been screened for chronic conditions. Only 2.6% (117/4454) NCMS participants had received preventive healthcare services in the past 4 weeks (Table 6). Those who had received preventive healthcare services in the past 4 weeks accounted for 2.5% (20/790), 2.9% (37/1270), 2.8% (33/1159), 1.9% (17/890), 2.3% (7/294) and 5.9% (3/51) in the age groups 18–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years and ≥75 years, respectively.

Among those who received preventive health care services in the past 4 weeks, 31.6% (37/117), 23.9% (28/117) and 23.1% (27/117), respectively, received physical examination, blood test and blood pressure test. Elders who had received preventive healthcare services in the past 4 weeks accounted for only 2.9% (10/345), of whom 20% (2/10) received physical examination and 70% (7/10) received a blood pressure test. Meanwhile, among those aged ≤64 years who had received preventive healthcare services in the past 4 weeks, 32.7% (35/107), 26.2% (28/107) and 18.7% (20/107), respectively, received physical examination, blood test and blood pressure test.

Most NCMS participants who had been screened in township level and above health institutions had sought healthcare services for various health problems. Among those who had received preventive healthcare interventions in the past 4 weeks, the proportions attending a village clinic, township health center, county hospital or municipal hospital were, respectively, 26.5% (31/117), 36.8% (43/117), 14.5% (17/117) and 12.0% (14/117). Among 10 elders who had received preventive healthcare services in the past 4 weeks, had attended a village clinic, two had attended township or above healthcare facilities and one was seen at home. Meanwhile, among those aged ≤64 years who had received preventive healthcare services in the past 4 weeks, more than 75% (83/107) had attended township and above healthcare facilities.

Discussion

Most chronic conditions are lifelong diseases of insidious onset that progress slowly; usually diagnosis is delayed, there is delayed healing and a poor prognosis. Patients often develop serious complications, which lead to a high level of disability and a high fatality rate.³⁹ For example, patients with later-stage hypertension often experience serious complications and die of cerebrovascular disease, coronary heart disease and hypertensive heart disease. Diabetes is also an extremely harmful chronic disease; common complications, which are the main reasons for premature death, include diabetic foot disease (foot gangrene, amputation), kidney disease (renal failure, uremia), eye disease (blurred vision, blindness), encephalopathy (cerebral vascular disease), heart disease and skin disease. A survey of diabetic patients, conducted in 30 municipal and above hospitals in China in 2001, reported that more than 73% of patients had various complications; of these, 60% had hypertension and

Table 3. Characteristics of 4454 participants in China's New Cooperative Medical Scheme interviewed in 2009, by age-group

Characteristics	Age (years)						Total (n=4454)
	18-34	35-44	45-54	55-64	65-74	≥75 ^a	
Gender							
Male	462	693	618	519	175	35	2502
Female	328	577	541	371	119	16	1952
Marital status							
Single	240	41	48	80	51	14	474
Married	550	1229	1111	810	243	37	3980
Highest education level ^b							
Illiterate	26	152	238	374	162	38	990
Primary school graduate	145	361	251	268	83	7	1115
Middle school graduate	491	666	477	211	41	4	1890
High school graduate	116	86	191	37	8	2	440
≥Community college graduate	12	5	2	0	0	0	19
Annual income ^c							
≤RMB5000	90	123	195	185	79	13	685
RMB5001-10000	98	119	109	54	20	2	402
RMB10001-15000	90	102	68	34	11	2	307
RMB15001-20000	44	50	42	16	2	0	154
≥RMB20001	41	65	58	17	6	1	188
Data missing	427	811	687	584	176	33	2718

^a The constituent ratios of the highest education level of NCMS participants, compared to other age groups by χ^2 test ($\chi^2=994.490$; $p<0.001$).

^b Bivariate analysis found that the highest educational level was negatively associated with age group ($R=-0.385$; $p=0.000$).

^c US\$1=6.831 Chinese yuan renminbi (RMB) in 2009.

Table 4. History of a chronic condition among 4454 participants in China's New Cooperative Medical Scheme, interviewed in 2009, by age-group

History of a chronic condition ^a	Age (years)						χ^2 test/ Fisher's exact test	p-value
	18-34	35-44	45-54	55-64	65-74	≥75		
Hypertension							171.137	0.000
Yes	5	46	101	109	54	7		
No	785	1222	1056	777	240	43		
Data missing	0	2	2	4	0	1		
Diabetes							25.706	0.000
Yes	2	6	17	16	9	0		
No	788	1263	1140	872	284	50		
Data missing	0	1	2	2	1	1		
Asthma							64.050	0.000
Yes	0	2	6	12	10	3		
No	788	1268	1152	878	284	47		
Data missing	2	0	1	0	0	1		

^a History of chronic condition: ascertained the question 'Has a doctor ever told you that you have hypertension, diabetes, or asthma?'

Table 5. Numbers receiving treatment for chronic conditions, by age-group, based on survey responses by 4454 participants in China's New Cooperative Medical Scheme, interviewed in 2009

Treatment of chronic conditions ^a	Age (years)						Total
	18-34	35-44	45-54	55-64	65-74	≥75	
Taking antihypertensive drugs ^b							
Yes	3	27	60	85	41	5	221
No	2	19	41	24	13	2	101
Treatment of diabetes ^c							
Special diet							
Yes	0	3	11	4	3	0	21
No	2	3	5	12	6	0	28
Weight control							
Yes	0	0	4	5	1	0	10
No	2	6	12	11	8	0	39
Oral medicine							
Yes	0	3	14	12	6	0	35
No	2	3	2	4	3	0	14
Insulin injection							
Yes	0	1	0	1	1	0	3
No	2	5	16	15	8	0	46
Traditional Chinese medicine							
Yes	2	0	1	1	0	0	4
No	0	6	15	15	9	0	45
Folk prescription							
Yes	0	0	4	0	0	0	4
No	2	6	12	16	9	0	45
Qigong therapy							
Yes	0	0	0	0	0	0	0
No	2	6	16	16	9	0	49

^a Treatment of chronic conditions ascertained by the question 'Are you taking any kind of the following treatments to treat or control your hypertension/ diabetes?'.

^b 322 survey participants reported that they had been told by a doctor that they had hypertension.

^c 49 survey participants reported that they had been told by a doctor that they had diabetes.

cardiovascular and cerebrovascular disease, more than 30% diabetic nephropathy and about 30% diabetic retinopathy.² Chronic diseases are a heavy burden on rural residents, especially rural elders, of whom more than 67.6% had a middle or low income.¹⁷

In recent decades, accelerating urbanization has been viewed as an important instrument for economic development and sustained economic growth in China,^{40,41} and many rural residents' hukou status has changed from rural to urban. As shown in the present study, 5.0% of NCMS participants had their hukou status changed from rural to urban. The controversy about whether urbanization brings economic growth to rural areas is ongoing, however, the consensus is that the negative impact of urbanization on the environment causes serious environmental problems in rural China.^{18,19,41} Environmental factors play a major part in the etiology of chronic conditions such as diabetes and environmental degradation brought by rapid urbanization had increased the prevalence rates of chronic conditions among rural elders.²¹ Although urbanization can create jobs for rural residents and increase their income, the frailty and age of rural elders exclude them from such benefits. Similar to the study results of the fourth National Health Care Service Survey conducted in China in 2008, this study found that most rural elders had a middle

or low income, with 67.6% having an annual income of <RMB5000.¹⁷ High chronic condition prevalence rates together with middle and low incomes among rural elders in China lead to poverty.²⁹⁻³¹

Studies have showed that social health insurance can protect patients from the financial consequences of chronic conditions by focusing on primary prevention of chronic conditions.⁴² For example, the prevalence of diabetes in the French population is estimated at 6%. Diabetes is a leading cause of adult blindness, amputation and dialysis in France, and has the highest prevalence among all chronic conditions covered 100% by France's statutory health insurance (SHI). Although the number of patients with diabetes covered by SHI has doubled in the past 10 years, France has been successful in protecting patients from the financial consequences of diabetes through its SHI coverage.⁴² In view of the heavy burden of chronic conditions on rural elders in China, NCMS has initiated chronic disease management to increase access to healthcare services in recent years.

However, the chronic disease management called for by NCMS amounts only to special reimbursements for the outpatient expenses of those diagnosed as having the few chronic conditions designated by local NCMS committees and NCMS offices, and

Table 6. Numbers receiving preventive healthcare services, by age-group, based on survey responses by 4454 participants in China's New Cooperative Medical Scheme, interviewed in 2009

Preventive health care services ^a	Age (years)						Total
	18-34	18-34	18-34	18-34	18-34	18-34	
Receiving preventive health care services in past 4 weeks							
Yes	20	37	33	17	7	3	117
No	767	1233	1126	873	287	48	4334
Data missing	3	0	0	0	0	0	3
Preventive healthcare service items received in past 4 weeks							
Physical examination	8	9	11	7	2	0	37
Blood test	2	8	12	6	0	0	28
Blood pressure test	2	8	7	3	4	3	27
Tumor test	2	0	1	0	0	0	3
Vision examination and hearing test	0	1	0	0	0	0	1
Gynecological examination	6	6	2	0	0	0	14
Other examinations	0	5	0	0	1	0	6
Data missing	0	0	0	1	0	0	1
Location of preventive health care service provided in last 4 weeks							
Village clinics	4	10	7	3	4	3	31
Township health center	7	8	21	6	1	0	43
County hospital	4	6	1	6	0	0	17
Municipal hospital	3	5	4	1	1	0	14
At home	0	0	0	0	1	0	1
Other place	1	8	0	0	0	0	9
Data missing	1	0	0	1	0	0	2

^a Use of preventive healthcare services ascertained by the questions 'Did you receive any kind of preventive health care services in past 4 weeks?', 'What kind of preventive health care service did you receive in past 4 weeks?' 'Where did you receive the preventive health care service in past 4 weeks?'.

there is evidence that the financial protection of NCMS remains limited for rural elders, for whom affordability is still the common barrier to accessing quality healthcare services.^{17,43-45} To make matters worse, rural elders, because of their low income and unawareness of their need for chronic condition-related healthcare services, may delay dealing with their health problems until the problems are severe enough to qualify for the reimbursements. Such delays undermine the use of less costly prevention and health promotion services and put rural elders at high risk of developing chronic conditions, because they miss the optimal period of health intervention. Studies showed that delayed diagnosis and failure of early health intervention to slow the progression of chronic conditions have resulted in a predominantly young population with chronic conditions in developing countries.⁴⁶ As the number of rural elders with chronic conditions increases, chronic conditions have put NCMS into a dilemma and challenged the sustainability of NCMS in the coming decades.

Chronic conditions have become the leading threat to public health in China, and as a result community healthcare service centers in urban China have taken measures to initiate chronic disease management. Today, prevention and health promotion services for a few chronic conditions (e.g., hypertension and diabetes), especially for elders, are provided by physicians in some

urban communities. However, few prevention and health promotion services for chronic conditions are available to rural elders. In 2009 China's Ministry of Health initiated basic public health service projects, and health files, health education and chronic disease management were required to be provided free of charge to rural elders. However, studies showed that, because of an acute lack of health financing, most rural primary healthcare facilities (township and lower level) could only provide elders with free health files; they were unable to provide for free either prevention and health promotion services or disease management.⁴⁷ As is shown in this study, only 2.9% of rural elders received preventive healthcare services in the 4 weeks prior to the survey, and fewer than 80% of those with hypertension (75.4%) and diabetes (66.7%) received treatment (e.g., antihypertensive drugs, oral medicine for diabetes); none received disease management, which includes appropriate goal setting, dietary and exercise modifications, medications, appropriate self-monitoring of blood pressure and glucose, and regular monitoring for complications.

The goals in caring for patients with chronic conditions are to eliminate symptoms and to prevent, or at least slow, the development of medical complications. For rural elders with chronic conditions, the health outcome depends not only on medical

treatment but also on disease management.^{35,48} There is evidence that optimal management and monitoring of chronic conditions among elders is as important as treatment for improving quality of life and reducing risk of medical complications, including relapse,^{36,37} especially for those not receiving universally accepted therapy.³⁵ For some chronic conditions, such as hypertension, in addition to regular disease management and monitoring for side-effects and adherence to therapy, case-specific management is required until the target blood pressure goal is reached,⁴⁹ while for the disabling diseases, most of which are not curable, such as musculoskeletal pain, case-specific management is essential to maintain quality of life.⁴⁸ Therefore, accessible disease management, provided by rural primary healthcare facilities, needs urgently to be established for rural elders.

Primary healthcare facilities in rural areas of China have lagged behind those in urban areas, not only in medical technology, medical equipment and healthcare manpower but also in awareness of chronic disease prevention strategies and training in standard chronic disease management and prevention; this has led to poor awareness of chronic conditions and of the need for rural elders to access healthcare services for the management of such conditions. For example, although hypertension was highly prevalent among rural elders, it was found that rates of awareness, treatment and control among rural elders with hypertension were very low.^{20,50} Similar to the results of previous studies,^{20,50} this study has shown the proportions of those with hypertension who were treated and who received preventive healthcare interventions (e.g., blood pressure tests) were very low. As a basic preventive healthcare service, it is feasible for rural primary healthcare facilities to offer a simple blood pressure test using a medical sphygmomanometer. The present study has shown that only 2.0% of rural elders receive a blood pressure test. This low level of testing does not reflect any problem with medical technology, medical equipment or healthcare manpower for rural primary healthcare facilities, but rather a lack of awareness of chronic conditions and of rural elders' urgent need for accessible prevention and health promotion services and for disease management of chronic conditions.

NCMS cannot achieve success in promoting rural elders' access to chronic condition-related healthcare services without an efficient healthcare system. Many of the most effective and efficient health interventions are preventive and rely on early treatment offered by basic health services. Though annual free check-ups for elders have been instigated by NCMS in some rural areas, early diagnosis of chronic conditions through such check-ups is of no benefit without the subsequent identified cost-effective treatment and standard disease management that can be provided with reasonably good quality by health workers from the rural primary healthcare system. Similarly, check-ups are of no value for those at high risk of developing chronic conditions without the follow-up prevention and health promotion services that should be provided through the rural primary healthcare system by a multidisciplinary team of health professionals with expertise in chronic conditions.^{25,27} With the financial capacity of NCMS increasing year by year, it is possible for NCMS to cover prevention, health promotion services and disease management for chronic conditions. However, problems remain with healthcare manpower and with the service content of the rural primary healthcare system, especially in the case of public health services offered in township health centers and village clinics. Such

problems include inefficiencies resulting from overstaffing, unsafe medicines and un-regulated practices, weak supervision of services, incompetent practitioners and health workers, and so on. To reduce the burden of chronic conditions in the coming decades, early diagnosis, effective disease management and primary prevention are all needed and multidisciplinary approaches requiring input from various government departments (e.g., NCMS and the rural healthcare system) are required.²¹

Improvements are necessary in the prevention of chronic conditions, monitoring and reducing the incidence of complications, and systemic changes must be made to improve the coordination and delivery of the healthcare system's delivery of care for those with chronic conditions. It has been suggested that lifestyle modifications (e.g., diet, exercise) are essential for the prevention of hypertension and diabetes; adherence to diet and exercise should continue to be emphasized throughout the treatment, because these lifestyle measures can have a large effect on the degree of blood pressure and glucose level lowering that patients can achieve. Lifestyle modifications are generally the initial steps in managing a chronic condition, and those with a chronic condition should be educated about it and encouraged to follow an appropriate treatment plan. For example, disease management for hypertension and diabetes often begins with health education for lifestyle changes such as weight control, regular physical activity and encouragement of self-management strategies; advice, and efforts at education, have been shown to be more effective if given by healthcare professionals other than physicians, although successful management often begins with accurate diagnosis by the physician.^{17,49} However, in this study, only 14.0% of NCMS participants were treated simultaneously by special diet, weight control and oral medicine. Additionally, taking into account the progressive nature of chronic conditions, providing health education about them and encouragement to follow a lifestyle modification plan for those at high risk of developing chronic conditions may hold promise with regard to determining the cause of the syndrome and delaying the onset of chronic diseases. However, the present study found that more than one-half (58.0%) of elders were illiterate. The low education level among rural elders may limit their awareness of lifestyle modifications and of the need for prevention and health promotion services and limit compliance with an appropriate treatment plan. Health education provided by the rural primary healthcare system should be designed with the characteristics of rural elders in mind, and the service-content of health education should be easy for rural elders to understand and accept.

Limitations of the study

The way that CHNS investigated the prevalence rates of chronic conditions, by examining the history of chronic conditions among NCMS participants, may cause recall bias and the prevalence rates of chronic conditions may be underestimated in this study. Meanwhile, the use of preventive healthcare services was investigated by examining participant's response to these questions, 'Did you receive any kind of preventive healthcare services in the past 4 weeks?' 'What kind of preventive healthcare service did you receive in the past 4 weeks?' 'Where did you receive preventive healthcare service in the past 4 weeks?' Most participants, especially those who received preventive healthcare services in a township level and above health institution had sought attention

for various health problems and had been screened for chronic conditions. The preventive healthcare services provided by rural primary healthcare facilities need to be further studied.

Conclusions

Township health centers and village clinics are primary healthcare facilities serving rural areas. NCMS initiated a new reimbursement policy with the aim of promoting appropriate use of healthcare services among those otherwise least likely to attend, and it has changed the composition of healthcare use in rural China; rural residents increasingly seek outpatient care at village clinics and inpatient care at township health centers.⁵¹ Compared to township health centers, village clinics have advantages with regard to the distance and price of healthcare services, and hence they increase rural elders' access to basic healthcare service. As shown in this study, rural elders primarily receive preventive healthcare services (mainly blood pressure tests) in village clinics. Township health centers, which constitute a middle tier of care between village clinics and county hospitals, have responsibilities to train healthcare personal, supervise the medical practice of village clinics and help village clinics establish standard medical practice for chronic condition prevention, promotion services and disease management. Therefore, NCMS should strengthen the important role of township health centers, and the provider payment should encourage township health centers to make a greater contribution to the promotion of rural elders' access to chronic condition-related healthcare services (e.g. community outreach, education campaigns among rural residents and training village doctors in standard chronic condition management and prevention).

Until now, NCMS has not been structured to provide payment for prevention, promotion services and disease management for chronic conditions, and no health intervention (e.g. health education and promotion) was provided for groups at high risk of developing chronic conditions. Chronic disease management should cover the entire course of a chronic condition, from prevention to diagnosis, treatment and management, and the beneficiaries should include those diagnosed as having the conditions and those at high risk of developing it. However, NCMS partially reimburses just the medical expenses of chronic condition treatment; with regard to chronic disease management, NCMS pays only for outpatient expenses incurred by participants with one of the few designated chronic conditions. Therefore, to further improve NCMS, the provider payment should be designed to prioritize prevention and management of chronic conditions, and NCMS needs to strengthen preventive healthcare and disease management service provided by village clinics to increase rural elders' access to healthcare services.

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