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et al. Health poverty reduction

# **BMJ Open** Health poverty reduction effect of medical insurance in China's middleaged and elderly populations: a crosssectional study

Yongqiang Lai,<sup>1</sup> Rui Chen,<sup>1</sup> Xinwei Liu,<sup>1</sup> Wanxin Tian,<sup>2</sup> Bing Wu,<sup>1</sup> Yiyun Zhang,<sup>3</sup> Xiyu Zhang,<sup>1,4</sup> Haijun Yang,<sup>5</sup> Fang Yin,<sup>6</sup> Yujuan Xu,<sup>7</sup> Wenqing Miao,<sup>8</sup> Linghan Shan,<sup>1</sup> Qunhong Wu,<sup>1</sup> Baoguo Shi,<sup>9</sup> Feifei Leng,<sup>10</sup> Ye Li <sup>10</sup>,<sup>11</sup>

#### ABSTRACT

**Objectives** In the context of demographic structure and disease spectrum changes: to study the role of the medical insurance system in providing protection and risk resilience for middle-aged and elderly vulnerable groups who are prone to impoverishment by medical expenses (IME), identify the vulnerable points and propose recommendations for improving the medical insurance system.

Setting The research used data from the 2018 China Health and Retirement Longitudinal Study. Participants 9184 households were included in the research ultimately.

Primary and secondary outcome measures We use the WHO's recommended composite measure of diseaserelated poverty and algorithm to determine the occurrence of IME in households. Instrumental variable probit regression model was used to target the characteristics of vulnerable groups and the influencing factors with strong correlation with IME.

Results The overall incidence of IME is 8.25% and the high incidence is concentrated in rural populations (9.79%). The risk of IME from stroke (13.17%) has been higher than cancer (7.38%). The incidence of IME is higher in families with five types of non-communicable diseases enrolled in Urban-Rural Integrated Medical Insurance (URRMI) (min 10.00%-max 14.29%) and New Rural Cooperative Medical Insurance Scheme (NRCMS) (min 8.97%-max 15.24%) health insurance than the overall IME incidence (8.25%).

Conclusions The medical insurance system has achieved the inclusive economic protection function for most people, but the risk resistance function for the middle-aged and older adults with multiple vulnerabilities still needs to be strengthened., the. Finally, to address the benefit gap of the NRCMS, the next stage of medical insurance development should focus on improving the top-level design of the reimbursement framework for urban and rural resident medical insurance.

# INTRODUCTION

According to a relevant report from the WHO, non-communicable diseases (NCDs) account for 71% of all deaths worldwide each

# STRENGTHS AND LIMITATIONS OF THIS STUDY

- $\Rightarrow$  The economic burden of disease uses the most extensive and authoritative big data on middle-aged and elderly people-the 2018 China Health and Retirement Longitudinal Study Database.
- $\Rightarrow$  Instrumental variable method introduces external variables to address endogeneity issues, thereby obtaining unbiased estimates of causal effects.
- $\Rightarrow$  Due to data limitations, this study may not have adequately accounted for some unmeasured confounders.

Protected by copyright, including for uses related to text and year, with more than one-third of these deaths occurring in the middle-aged and older adults.<sup>1</sup> As NCDs have a high incidence and require long-term intervention or care, they are costly in terms of medical expenditures. Given a rapidly ageing global population, it is almost inevitable that impoverishment by medical expenses (IME) will increase for the aforementioned populations. Because of their high morbidity rates, their utilisation of health services is also high.<sup>2–7</sup> Cardiovascular disease (CVD), cancer, diabetes, respiratory disease and mental health are the leading causes of death<sup>8</sup> for these population groups. According to the study by Slavin *et al*,<sup>9</sup> the average annual out-of-pocket (OOP) expenditure for people under 65 years of age with **ö** CVD in the USA is nearly \$5000. Furthermore, CVD healthcare costs rose by 17%from 2003 to 2018, and values continue to increase. According to the relevant research, the majority of people with CVD who cannot afford medical care are insured. Additionally, rural residents and individuals with the most limited functional status who have higher rates of CVD are most affected by inadequate medical coverage.<sup>9</sup>

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#### **Correspondence to**

Professor Ye Li; liye8459@163.com and Ms Feifei Leng; 13845046909@163.com

Previous studies have shown that up to 37% of patients who had a stroke in China are impoverished by the cost of medical care, and 70% of patients' families are affected by catastrophic health expenditures (CHE).<sup>10 11</sup> From 1980 to 2014, the global prevalence of diabetes nearly tripled with the population growth-particularly that of the ageing population, with the annual average global expenditure reported as US\$825 billion. China bears more than one-fifth of this total expenditure and has the heaviest economic burden.<sup>12</sup> Existing research has confirmed that health insurance is an important tool for preventing poverty in families and enhancing their economic protection.<sup>13'14</sup> Accordingly, China's medical insurance system is constantly being promoted and updated. At the Third Session of the 12th National People's Congress, Premier Li Kegiang's report revealed that China's universal health insurance coverage ensured benefits for more than 90% of the country's population in 2014. To address the urban-rural disparity and reduce the economic risk of disease for all residents, China established an Urban and Rural Resident Medical Insurance (URRMI) scheme in 2016, integrating a drug reimbursement catalogue and expanding the scope of medical insurance reimbursements. Therefore, the URRMI, as the basic medical insurance system with the highest population and benefit coverage at present, needs to address levels of protection for the vulnerable middle-aged and older adults who have a high need for health services.

Many scholars have calculated residents' medical expenses.<sup>15 16</sup> To our knowledge, few studies have considered the demands of the middle-aged and older adult groups and their overlapping social and physiological vulnerabilities. Their need for economic protection in terms of medical insurance, especially with the comprehensive measurement indicator of disease economic burden,<sup>17 18</sup> is real. We considered the copayment ability of households for medical expenses and ultimately adopted the most extensive, authoritative and updated big data on the aforementioned populations in China on a household basis, using the comprehensive measures and algorithms recommended by the WHO to achieve a more accurate measurement of the economic burden of disease. Consequently, we obtained a panorama measurement of the economic burden of disease from social, physical and medical insurance perspectives, providing deeper insights into how economic and disease burdens jointly influence health behaviours, especially in vulnerable populations. Further, we pinpointed the vulnerable groups needing priority protection in the current social environment in order to provide evidence for updating the design of the medical insurance system to the next stage of development. In addition, we used the instrumental variable probit (IV probit) to effectively address the question of possible bidirectional causality between the medical insurance system and the IME, as well as the path and direction of its causal mechanisms.

Therefore, at present, which groups of people still have health vulnerabilities? Can the URRMI, as an important

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welfare system reform initiative in China aimed at achieving universal coverage, health equity and healthcare well-being system innovation, improve the ability of vulnerable populations to withstand health economic risks? These two issues were prioritised in the analysis performed in this study.

#### MATERIALS AND METHODS Data source and sampling method

For this study, the China Health and Retirement Longitudinal Study Database (CHARLS), a multidisciplinary public database covering economic, social and health dimensions of the middle-aged and older adult groups, 8 was used. A stratified, multistage, probability proporopyrigh tional to scale random sample of over 17000 people was surveyed; more than 10000 households from 450 villages/ urban communities were covered.<sup>19 20</sup>

We integrated the household information of household heads through individual codes in the database, then merged and cleaned outliers for indicators such as household expenditures and OOP expenses involved in the IME measurement. In addition, we screened the data the IME measurement. In addition, we screened the data according to the range of inpatient and outpatient costs set by the CHARLS questionnaire, and we rechecked them with the health service utilisation indicators. After eliminating all samples with logical errors, we obtained a household database of 9184. to text

# **Key variable**

We chose the method recommended by WHO to calculate the CHE and IME (impoor,). CHE occurs when a household's total oop, equals or exceeds 40% of its capacity to pay (ctp<sub>b</sub>) or its non-subsistence spending. The threshold of 40% could be changed according to countries' specific situations. The CHE was represented with a binary vari- o able, indicating that it occurred when cata<sub>b</sub>=1 and that no CHE occurred when  $cata_{h}=0$ .

$$\begin{aligned} cata_h &= 1 \quad if \frac{oop_h}{ctp_h} \ge 0.4 \\ cata_h &= 0 \quad if \frac{oop_h}{ctp_h} < 0.4 \end{aligned}$$

Al training, and sim The IME for calculation included the total household consumption expenditure (exp<sub>b</sub>), household subsistence spending  $(se_h)$  and OOP health payments  $(oop_h)$ . Under the premise that exp<sub>h</sub> would be greater than se<sub>h</sub> when the difference between exp<sub>h</sub> and oop<sub>h</sub> of a household was less than  $se_{h}$ , impoor<sub>b</sub>=1 and the household was 2judged as having incurred IME. When the difference was greater than or equal to se,, impoor,=0 and IME was not incurred.<sup>21</sup>

$$\begin{aligned} &Impoor_h = 1 & \text{if } \exp h \ge se_h \text{ and } \exp_h oop_h < se_h \\ &Impoor_h = 0 & \text{if } \exp h \ge se_h \text{ and } \exp_h oop_h \ge se_h \end{aligned}$$

Based on an extensive literature review, the variables in this study were defined as follows: (1) household characteristics, including age of the household head and size of the household; (2) we use household expenditure quintiles to reflect household economic levels-quintile 1 is the poorest and quintile 5 is the wealthiest; (3) indicators reflecting the need for and utilisation of health services, such as whether there were disabled people or people over age 65 in the household and whether they had been outpatients in the past month or hospitalised in the past year; and (4) the household head's type of health insurance.

# **Probit and IV probit**

Given the characteristics of the binary dependent variable and large sample, the binary choices model was determined to be the most appropriate for this study. However, in cases with an endogenous explanatory variable, consistent estimates will not be obtained using the common binary choices model.<sup>22</sup> Combining previous research experience, we first assumed that the 'regional participation rate' was an endogenous variable.<sup>23 24</sup> Having medical insurance reduces hospitalisation costs and OOP expenditures, which in turn reduce the likelihood of IME. Therefore, poor households that are prone to IME may be more willing to participate in the medical insurance system, so there may be a two-way causal relationship between participating in the medical insurance system and IME. Additionally, the inclusion of the two-way causal relationship in the model may cause 'endogeneity bias'. By introducing the instrumental variables in the IV probit regression, an 'urban-rural' status and a 'self-assessed health status' affect the choice of health insurance participation, which satisfies the correlation of the instrumental variables (online supplemental table 3). The hypothesis that urban-rural status and self-assessed health status would not directly affect whether a household would have IME satisfied the exogeneity of the instrumental variables. The second stage results of IV probit showed that the model passed the endogeneity test (p=0.014<0.05), meaning that the district participation rate was an endogenous variable. Next, we conducted a weak instrumental variable test, and the results showed that the results of Conditional Likelihood Ratio test, Kleibergen-Jacobs statistic, Anderson-Rubin test and Wald were all less than 0.05 (online supplemental table 1), indicating that the instrumental variables we selected-urban-rural or selfrated health-were not weak. At the same time, since the number of instrumental variables was larger than the number of endogenous variables, we did not need to conduct overidentification tests.

#### Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

# RESULTS

# **Basic information**

The overall IME incidence rate for the sample was 8.25%. In particular, the older the household head, the higher BMJ Open: first published as 10.1136/bmjopen-2024-085226 on 27 April 2025. Downloaded from http://bmjopen.bmj.com/ on June 7, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES). 5

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the IME incidence. For example, the incidence of IME in people aged 75 and older reached 11.77%, which is about three times higher than the incidence for people above 45 years of age (3.88%). The rural IME incidence rate (9.79%) was more than twice as high as the urban incidence rate. Households with adults over 65 years of age (10.90%) and disabled members (10.97%) had a high risk of IME incidence. In addition, the uninsured were more likely to be at risk of IME than the insured (8.39%)(online supplemental table 2). Protected by

# Differences in the incidence of IME among people with different social characteristics

In table 1, the average outpatient and inpatient expendicopyrig tures gradually increase according to household economic level from low to high, with an overall decreasing trend in the household burden of health payments and IME incidence when the burden of health expenditures (22.94%), IME incidence (15.17%) and health payments that lead to IME (56.30%) for households at the subpoor economic level are the highest. The incidence of IME and burden of household health expenditures causing IME in rural households reached as much as twice those uses I of urban households. Among the types of coverage for household heads, the highest outpatient and inpatient expenditures with the lowest IME incidence (3.10%)were found among those who participated in the Urban Employee Basic Medical Insurance (UEBMI) plan. It was evident that IME incidence, including IME resulting from e the household burden of health payments, was particularly high among households of patients enrolled in the URRMI and New Rural Cooperative Medical Insurance Scheme (NRCMS). Data regarding health service utilisation show that the burden of household health expen- $\mathbf{Z}$ ditures associated with incurred IME reached almost twice the burden of household health expenditures for ≥ the overall sample. In addition, the values of each inditraining, and simi cator for the past year's hospitalisation occurrences were higher than the values of each indicator for the past month's outpatient occurrences.

# Differences in the incidence of IME among people with different disease characteristics

The categories for the division of the overall sample were diseased and non-diseased. As shown in figure 1A, the incidence of IME (10.39%), OOP expenses and household burden of health payments (27.51%) were approximately 1.5 times higher in the diseased population than in the **g**. non-diseased population. As seen in figure 1B, stroke was the disease with the highest OOP expenses and household burden of health payments (31.95%) after cancer. Additionally, the incidence of IME from stroke was the highest (13.17%). Further, the household burden from mental illness has surpassed that of diabetes and is almost equal to that of chronic respiratory diseases. Figure 1C shows that the average outpatient expenditures for families with stroke (¥2413.37) and mental illness (¥2201.04) are approaching the average hospitalisation expenditures

Outpatient and inpatient expenditures, household burden of health payments and incidence of IME for characteristic Table 1 populations

	Average outpatient expenditure (¥)	Average hospitalisation expenditure (¥)	Household burden of health payments (%)	Incidence of IME (%)	Household burden of health payments of IME households (%)
Household economic level					
Poorest	380.07	692.27	22.58	13.62	36.27
Subpoverty	440.25	1008.93	22.94	15.17	56.30
General	733.52	1404.39	19.68	5.49	54.07
Subrich	1387.42	1837.48	19.30	3.65	44.75
Richest	3337.90	4708.36	19.02	3.33	46.77
Urban or rural household					
Rural	1314.60	1978.50	22.50	9.79	56.71
Urban	2199.29	3267.60	15.24	4.56	23.00
Medical insurance for householder					
UEBMI	2813.36	4414.23	18.33	3.10	25.35
URRMI	1989.26	2656.37	19.56	8.01	49.71
URBMI	919.19	2399.46	14.84	5.10	15.61
NRCMS	1277.25	1842.06	20.77	9.75	56.32
Other insurance and no insurance	1633.95	1473.35	16.13	7.51	18.38
Health service utilisation					
Outpatient in the past month	1548.03	2041.93	28.27	10.80	58.66
Hospitalised in the past year	1972.77	2345.03	33.36	13.20	61.03

IME, impoverishment by medical expenses; NRCMS, New Rural Cooperative Medical Insurance Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Resident Basic Medical Insurance; URRMI, Urban and Rural Resident Medical Insurance.

(¥2934.33, ¥2740.84), and the average outpatient expenditure for families with diabetes (¥2459.29) is already about 1.3 times higher than the average hospitalisation expenditure (¥1957.61).

Overall, the incidence of IME in families of patients affected by one of the diseases mentioned and enrolled in the UEBMI plan (0.00-8.24%) did not exceed the overall IME incidence in the sample (8.25%). The IME incidence in families of patients affected by one of the diseases and enrolled in the URRMI (10.00-14.29%) and NRCMS (8.97-15.24%) plans was higher than the overall IME incidence. Regarding disease type, families with patients who had a stroke had relatively high IME incidence rates under all four enrolment types (11.11-15.245%), and families with patients enrolled in the NRCMS had the highest IME incidence rates (15.24%). Patients with chronic respiratory system disease, cancer and mental illness had higher IME incidence rates under all three medical insurance systems (ie, UEBMI, URRMI and NRCMS). Among them, families affected by mental illness (17.65%) had the highest incidence of IME under the Urban Resident Basic Medical Insurance (URBMI) scheme; this percentage was followed by the IME incidence for families affected by cancer (16.67%) (figure 2).

# **Regression results**

Protected by copyright, including for uses related to text and data mini First, a rise in the regional participation rate reduced the risk of IME occurrence; with each 1% increase in d the participation rate, the incidence of household IME  $\triangleright$ decreased by 1.95%. Among the types of participation, having other insurance and no insurance (5.3%) were protective factors for decreasing the risk of IME at significant levels (p<0.05). Further, health service utilisation ھ and potential demand indicators, such as outpatient services, hospitalisation and the number of people over 65 years of age in the home, were significantly associated with an increased incidence of IME. In addition, patients who had a stroke, as high health service users, increased the risk of IME occurrence (3.19%). It is clear that the higher the economic level of the household, the lower the risk of IME occurrence. For example, in this study, for each 1% increase in the richest and subrich households, the risk of IME decreased from 6.5% to 6.47% (table 2).

# DISCUSSION

From the results of the 2018 CHARLS data analysis, it is clear that as a key economic protection measure to prevent, reduce and alleviate poverty, medical insurance has achieved remarkable results in terms of the breadth







**Figure 1** Out-of-pocket (OOP), incidence of impoverishment by medical expenses (IME) and household burden of health payments. (A) Overall sample. (B) Diseased population. (C) Average outpatient expenditure versus average hospitalisation expenditure for the diseased population.



**Figure 2** Impoverishment by medical expenses (IME) occurrence of insured patients. NRCMS, New Rural Cooperative Medical Insurance Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Resident Basic Medical Insurance; URRMI, Urban and Rural Resident Medical Insurance.

of coverage, especially for major diseases such as cancer. However, given the continued changes in population structure and disease characteristics, the current medical insurance system does not accurately or dynamically target health risks in recently vulnerable groups. This study pinpointed the specific characteristics of the most economically vulnerable populations for health in the current environment by analysing the high prevalence of IME in China.

The analysis of the data revealed that vulnerable populations with a high incidence of IME were concentrated in rural areas (9.79%). Although China introduced a new rural medical insurance system in 2003 and miraculously reduced rural poverty to 1.6% in 2007,<sup>25</sup> the urban-rural economic development gap remains significantly different. Cui et al, refining the findings of Meng et al, suggest that the fragmentation of insurance plans in urban and rural areas is an important cause of this phenomenon.<sup>26</sup> Compared with URBMI, the rural middle-aged and older adults' poor economic conditions, as well as the low reimbursement ratio and service coverage for NRCMS, cause a greater financial burden in terms of access to limited resources. Although the inpatient reimbursement ratio and reimbursement ceiling of the NRCMS increased during healthcare reform, the problems of insufficient funds for NRCMS coordination

and intercounty regional differences in welfare still exist. В Using the NRCMS as the reference group, our regression results showed that, although the results for the three aforementioned types of insurance coverage were ≥ not statistically significant, they were all protective for IME in terms of trends. Moreover, the protective effects were stronger for URBMI and UEBMI than for URRMI. ß Other insurance and no insurance were the most significant protective factors for IME. Wang *et al*<sup>27</sup> reported in their study that people who were not covered by public S medical insurance and had a lower socioeconomic status were more likely to seek private health services at lower prices. This group is also limited by their own economic levels to reduce or abandon medical care, as mentioned in the study by Zhang *et al*,<sup>24</sup> who found that this group of insured people was significantly protected in terms of hospitalisation and OOP expenses, both of which **B** eventually lead to a low household financial burden, as evidenced by the health economic burden data for this group (online supplemental table 3). Therefore, NRCMS poses a stronger IME risk compared with other medical insurance types.<sup>28</sup><sup>29</sup>

These weaknesses in the NRCMS are linked to the social fragility of the rural population, which is likely to be a risk of poor health after the insured go to the doctor. To balance the level and strength of coverage of the medical

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insurance system between urban and rural areas, China integrated the NRCMS and URBMI and established an integrated medical insurance system for urban and rural residents in 2016. This integrated system has increased the reimbursement ratio for the overall insured population, expanded the scope of reimbursements and stimulated middle-aged and older rural groups to seek and use health services more actively. However, the 2018 data results indicated that integrated medical insurance for urban and rural residents was not satisfactory in terms of eliminating the risk of IME. Thus, the hard-to-eliminate rural-urban regional disparities mean that rural residents remain a vulnerable group that needs to be a priority

people, resulting in higher health expenditures. In addition, county and municipal medical insurance agencies have failed to unify the concept of urban and rural integration of medical insurance fund coordination, and the pressure on interlocal fund turnover has not been relieved. Therefore, in the long term, it is particularly important to strengthen the control of healthcare expenditures and guidance on the use of health services for vulnerable people in order to avoid a deficit in the medical insurance fund pool. On the other hand, passive protection from medical insurance benefits alone is not sufficient for eliminating the multiple vulnerabilities of rural people. It is also necessary to improve their subjective resilience through active empowerment in the form of increased employment and career opportunities so as to reduce the risk of IME among vulnerable people from a multidimensional perspective.

The regression results revealed that outpatient services and hospitalisation remained high-risk factors for IME. People using these two services incurred the highest burden of health payments for households experiencing IME (58.66% and 61.03%, respectively). Such a heavy burden might stem from copayments or unsubsidised treatments, as mentioned in the study by Jan *et al.*<sup>10</sup> Previous studies mention drug expenditures exceeding two-thirds of the OOP expenses of outpatients; also, patients with chronic diseases are highly susceptible to poverty because they incur the greatest burden from outpatient expenditures. In the context of increasing outpatient drug expenditures, some patients hope for increased drug reimbursements in the form of hospitalisation, but this may lead to a greater burden of inpatient expenditures. In fact, when faced with high outpatient and inpatient expenditures, current medical insurance coverage is still very limited for the vulnerable older adults.<sup>24 30</sup> This finding suggests that improvements in the medical insurance system should include increases in the overall reimbursement for outpatient and inpatient services, especially for outpatient prescription drugs. Additionally, there is a need to expand medical insurance coverage for services.

The current medical insurance system is focused on protection against various kinds of diseases, especially cancer. Figure 1B shows that, currently, the IME incidence from cancer is the lowest (7.38%), about half that of stroke, which has the highest IME incidence. This finding shows that in the early stages of reform, the Chinese medical insurance system prioritised coverage for diseases like cancer that are most likely to worsen and be fatal, as well as being the most financially burdensome. Clearly, the basic medical insurance system has worked in such cases. Moreover, as seen in figure 2, the incidence of IME among patients with cancer is the lowest (10%) among all patients enrolled in an integrated medical insurance scheme, implying that the priority given to cancer cases in the medical insurance system has continued since the start of healthcare reform. As the disease spectrum and sociodemographic conditions have changed and the incidence of IME for certain diseases, including strokes, has surpassed that of cancer, the medical insurance system's prioritisation of benefits in terms of disease should also change.

Stroke is the second most common cause of death worldwide, generating the second highest OOP expenditure and IME incidence, according to this study. While stroke treatments are evolving and mortality rates are decreasing, the number of complications and comorbidities, such as

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cognitive impairment and diabetes, is also increasing.<sup>31</sup> Thus, medical insurance coverage is not adequate in such cases. According to studies by scholars such as Pharm, about 60% of patients who had a stroke suffer from complications, and 87.96% of patients suffer from comorbidities. Furthermore, 30% of patients who had a stroke are cognitively impaired, and the incidence of cognitive impairment increases yearly.

It has also been shown that diabetes is the most common comorbidity besides CVD.<sup>32 33</sup> In the present study, nearly **ت** one-fifth of patients who had a stroke had cognitive impairment and diabetes, and the direct and indirect health economic burdens from stroke comorbidities and complications increased medication and care expenditures for utilisation of outpatient and inpatient services. Thus, the group of patients with comorbidities or compli-cations is more vulnerable to IME.<sup>34</sup> However, the current dynamic turnover of the medical insurance system lags behind the changing demographics and disease spectrum. Medical insurance benefits are focused more on a single disease, fragmenting the correlation between the primary disease and comorbidities and complications. There is an overall lack of a targeted benefit orientation and an extended reimbursement framework for patients with multiple chronic conditions.<sup>35</sup> Therefore, in future revisions to the medical insurance system, more attention needs to be paid to comorbidities or complications that may be involved in the complete treatment of a single **6** disease in order to include them in the reimbursement ŧ scheme. Moreover, it will be prudent to set priorities in terms of the severity of a condition to increase the reimbursement rate and benefit coverage.

ursement rate and benefit coverage. Patients' incidence of IME varies across medical insurance schemes, and URRMI is a key reform for future medical insurance systems in terms of its enhanced depth and benefit coverage. First, the URRMI, as a product of dual medical insurance integration, has expanded the pool of risk funds and increased reimbursement rates, making the insured population-especially in rural ğ areas-more active in seeking and using health services. The design remains inadequate in terms of providing benefits to the middle-aged and older adults who have social and physical vulnerabilities. As shown in Huang and Wu's study, urban-rural integrated medical insurance has no significant effect on the outpatient service utilisation and health outcomes of the rural middle-aged and older adults, which is related to the lack of welfare coverage and tendency of the current benefits allocated  $\overset{\circ}{\mathbf{a}}$ via the NRCMS.<sup>36 37</sup> Second, the URRMI system was established fairly recently, and the degree of implementation of the two medical insurance systems varies in different regions, which may cause such problems as lagging reimbursements during the integration process, thus raising the risk of IME.<sup>38</sup>

The IME outcomes arising from the medical insurance system are ultimately due to its current inability to provide better financial protection for people with vulnerable characteristics, so further deepening reforms to the system are needed now that China has reached its goal of full basic medical insurance coverage. The analysis and discussion in this study indicate that high demand and utilisation of health services, such as outpatient and

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and discussion in this study indicate that high demand and utilisation of health services, such as outpatient and inpatient care, are among the most important factors for the high prevalence of IME. Therefore, vulnerable characteristics to be included in updating the medical insurance system were identified as rural areas, patients with chronic NCDs and people suffering from stroke comorbidities or complications who need continuous attention. Providing a protective framework for the vulnerable in terms of health services and targeted assistance is a necessary component of the medical insurance system.

Unfortunately, the URRMI is still in its infancy, and the extent of protection against disease and impact on health outcomes of the insured population in the short term has not been fully revealed. Its development will need to be monitored continuously in the future.

#### CONCLUSION

The top-level design of the medical insurance system needs to be adjusted more comprehensively and dynamically based on changes in the social demographic structure and disease spectrum to ensure the vitality of progressive innovation in stages. In this study, the extent to which the existing medical insurance system protects the economically vulnerable was explored, and the negative impact of comorbidities and complications on patients' household finances was found. Moreover, the key groups that the medical insurance system will seek to address in its subsequent improvement were more precisely identified. These groups include those who suffer from IME and return to lives of poverty. The aim of this study was to provide evidence to facilitate the development of a more targeted reimbursement system framework for multiple vulnerable groups who have difficulty resisting the economic risks of illness through active empowerment. This will facilitate the construction of a more targeted reimbursement system framework for the multiple vulnerable groups who have difficulty in increasing their ability to withstand the financial risks of illness through active empowerment and ultimately reduce the risk of health poverty for these groups.

#### **Author affiliations**

<sup>1</sup>Research Center of Public Policy and Management, School of Health Management, Harbin Medical University, Harbin, Heilongjiang, China

<sup>2</sup>National Cancer Center/National Clinical Research Center for Cancer, Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

<sup>3</sup>School of Ethnology and Sociology, Yunnan University, Kunming, Yunnan, China
<sup>4</sup>Department of Laboratorial Science and Technology, School of Public Health, Peking University, Beijing, China

<sup>5</sup>Yan'an Hospital of Kunming City, Kunming, Yunnan, China

<sup>6</sup>The Second Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China

<sup>7</sup>The First Affiliated Hospital of Kunming Medical University, Kunming, Yunnan, China <sup>8</sup>Department of Science and Technology, The Affiliated Hospital of Xuzhou Medical University, Xuzhou, Jiangsu, China <sup>9</sup>Department of Economics, School of Economics, Minzu University of China, Beijing, China

<sup>10</sup>Nursing Department, Heilongjiang Provincial Hospital, Harbin, Heilongjiang, China
<sup>11</sup>School of Public Administration, Hangzhou Normal University, Hangzhou, Zhejiang, China

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#### ORCID iD

Ye Li http://orcid.org/0000-0001-8492-1808

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