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Can Basic Medical Insurance Reduce Elderly Family Income Inequality in China?

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Basic medical insurance is the critical medical security system to realize common prosperity in China. This study explores the impact of basic medical insurance on elderly family income inequality in China using the China Family Panel Studies (CFPS) data in 2018. Our finding shows that basic medical insurance is significantly negatively correlated with elderly family income inequality, indicating basic medical insurance has a positive impact on narrowing the elderly family income inequality. The heterogeneity analysis shows that basic medical insurance has a more significant reduction effect among the eastern elderly and the younger elderly family. The results also suggest that health performance significantly mediates the relationship between basic medical insurance and elderly family income inequality. This study implies that the Chinese government should increase the proportion of basic medical insurance reimbursement and expand the scope of reimbursement for basic medical insurance to realize income fairness among elderly families.

Keywords: basic medical insurance, elderly income inequality, Kakwani index, health performance, China

INTRODUCTION

China has been experiencing rapid aging over the past few decades. According to the seventh population census released by China's National Bureau of Statistics in 2021, the number of people aged 60 and above in China reaches 190 million by 2020, including 35.8 million aged 80 and above and accounting for 2.54 percent of the total population[1]. The World Health Organization predicts that by 2050, China will have 300 million people over 65 years old, accounting for 30 percent of the total population (1). An aging society will have a significant negative impact on China's economic growth and place a heavy burden on society as a whole in terms of the elderly family (2).

As the core of China's medical insurance system, basic medical insurance plays an essential role in preventing and resolving significant health risks and preventing sustained catastrophic medical and health expenditures (3). One of the fundamental stated goals of basic medical insurance is to reduce the impact of health shocks on family income and reduce poverty due to illness for the overall population, especially for the poor subgroups (4). Basic medical insurance is closely related to medical expenses and income distribution of the elderly family, and unreasonable and unfair medical insurance will aggravate elderly family income inequality (5). As the leading group vulnerable to diseases, the elderly spend a high proportion of their family income on medical care (6). Medical expenses and medical insurance are important factors affecting elderly family income

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inequality. In particular, concerning major diseases, the increased risk of disability and the high cost of post-care significantly impact elderly families, especially those with low income (7). Besides, the medical expenses of the elderly can affect the disposable income of the elderly and the whole family, and elderly family income inequality related to basic medical insurance can increase the risk of inter-generational income inequality transmission (8). Therefore, it is an exciting topic to explore whether basic medical insurance influences elderly family income inequality in China.

Several studies have found an association between basic medical insurance and income inequality. Specifically, some researchers have shown that basic medical insurance has a significant reduction effect on income inequality. For example, Fan et al. consider that the integration of social medical insurance policy has a positive impact on improving the rate of inpatient health services utilization. And both urban and rural catastrophic health expenditures all show a decreasing trend (9). Lu et al. report that UEBMI (Urban Employee Basic Medical Insurance) and URBMI (Urban Resident Basic Medical Insurance) significantly increase the monthly net income of agriculture migrants, especially in the lower-income group (10). In contrast, some researchers have demonstrated that basic medical insurance cannot significantly reduce income inequality. For example, Wang et al. suggest that URRBMI (Urban-Rural Resident Basic Medical Insurance) does not reduce the overall catastrophic health expenditures of residents effectively (11). Liu et al. suggest that there is no significant decrease in actual medical expenses after participating in basic medical insurance (12). Zhang et al. find that basic medical insurance is not essential in reducing income inequality among patients (13). So far, however, there has been little discussion about its impact on elderly family income inequality. Therefore, this study set out to explore the impact of basic medical insurance on elderly family income inequality in China.

This study uses the China Family Panel Studies (CFPS) data in 2018 to investigate how basic medical insurance affects elderly family income inequality in China. Besides, this study examines the mediation effect of health performance on the relationship between basic medical insurance and elderly family income inequality. The main contributions of this study are presented in three aspects. First, this study aims to contribute to this growing area of research by exploring the impact of basic medical insurance on elderly family income inequality. Second, this study analyzes the heterogeneous influence of basic medical insurance on elderly family income inequality from the perspectives of different regions and ages, and provides some important insights into elderly family income inequality. Finally, this study adopts the mediation effect model to examine the influence mechanism between basic medical insurance and elderly family income inequality through the mediating effect of health performance.

The remainder of this study is organized as follows. Section 2 proposes the research hypothesis. Section 3 presents the data sources and empirical models. Section 4 presents the empirical results and further analysis, and finally, Section 5 offers the research conclusions and policy recommendations.

RESEARCH HYPOTHESIS

For a long time, China's basic medical insurance system has suffered from systemic fragmentation and disparities between urban and rural areas (14), which results in the apparent "pro-rich" characteristics of the basic medical insurance system (3). In other words, the higher-income group can enjoy higher reimbursement rates and better quality medical treatment than the lower-income group (7). Since 2013, the Chinese government has carried out a series of medical insurance reforms to guarantee fairness for various income groups (15). For example, the Chinese government has integrated the basic medical insurance system for urban and rural residents to narrow the urban-rural differences in medical insurance (16). After the integration, basic medical insurance has effectively reduced the incidence of income poverty among the lower-income group and the widening income gap between urban and rural residents (17). Of course, basic medical insurance coverage can effectively reduce the catastrophic health expenditures among the elderly family, thus narrowing the reimbursement gap and the income gap between the high- and low-income of the elderly family (18). This effectively guarantees the fairness of basic medical insurance and can sufficiently reduce the elderly family income inequality.

Based on the above analysis, this study proposes the following hypothesis:

H1: Basic medical insurance can reduce elderly family income inequality in China.

Basic medical insurance policies vary from region to region, province to province, and even city to city (19). Compared with central and western regions, the eastern region of China is more economically developed, and the local governments provide more subsidies for basic medical insurance (20). In medical treatment for the elderly, the reimbursement rate is generally higher in the eastern regions than that in the central and western regions (21, 22). The economic development of the central and western regions as a whole is less developed than that of the eastern regions (23), and the financial subsidies for basic medical insurance are not as strong as that of the local governments in the eastern regions (24). In general, compared with the central and western regions, basic medical insurance has a more significant inhibitory effect on the family income inequality of the elderly in the eastern regions.

The life cycle theory explains the objective fact that the incidence of disease increases significantly with age. China has entered an aging society, and the aging population mainly concentrates on the younger elderly of 60–80 years old (25). While some in this group remain in good health, there are apparent gaps in health status (26). This group has become the largest user and beneficiary group of basic medical insurance (27). Compared to the general reliance on basic medical insurance to compensate for the cost of treatment for illnesses suffered by aged 80 and above, basic medical insurance has a more remarkable dampening effect on the widening income deprivation of the younger elderly family of 60–80 years old (28).

Based on the above analysis, this study proposes the following hypotheses:

H2a: The impact of basic medical insurance on elderly family income inequality in the eastern regions is more significant than in the central and western regions.

H2b: The impact of basic health insurance on the younger family income inequality is more significant than that of the advanced elderly family.

According to existing research, basic medical insurance has a positive effect on improving the health performance of the elderly (29). On the one hand, basic medical insurance can improve health awareness and health care knowledge of the elderly (30). On the other hand, basic medical insurance provides the elderly with protection against illness (31), which increases the enthusiasm of the elderly to seek medical care and prevents minor illnesses from becoming serious ones (32). Meanwhile, the improved health performance of the elderly is conducive to reducing elderly family income inequality. The underlying reason is that the elderly family with low income is more sensitive to health expenditures than the high-income elderly family. The improved health performance has led to a significant reduction in health expenditures and narrowing income gaps among elderly families (33). Hence, basic medical insurance may reduce elderly family income inequality by promoting health performance.

Based on the above analysis, this study proposes the following hypothesis.

H3: Health performance mediates the impact of basic medical insurance on elderly family income inequality in China.

DATA, VARIABLES, AND EMPIRICAL MODEL

Data

This study set out to examine the impact of basic medical insurance on elderly family income inequality using the China Family Panel Studies (CFPS) in 2018. The CFPS data was launched in 2010, which tracks more than 16,000 respondents from different parts of China every 1 or 2 years. CFPS focuses on the economic and non-economic wellbeing of China's population and a number of research topics, including economic activity, educational outcomes, family relations and family dynamics, population migration, health, etc. It is a national, large-scale, multidisciplinary social tracking survey project.

In addition, we choose CFPS data from 2018 for empirical analysis because only CFPS data from 2018 contain detailed variables of basic health insurance, income, and health performance, which are the basis for this analysis. Following China's current statutory retirement age, 60 is used as the starting age for older adults. Hence, we select the samples aged over 60 and under 100 years. After removing the samples with missing values of key variables, we finally gain 4,521 samples.

Variables

Dependent Variable

The dependent variable of this study is elderly family income inequality (*Inequality*). Most literature uses the relative deprivation index to reflect the degree of income inequality, which can be recognized as a suitable measuring method. This study uses the Kakwani index, an excellent relative deprivation index with dimensionless characteristics, to measure elderly family income inequality in China.

Referring to previous studies (34, 35), Kakwani index is defined as follows:

$$RD\left(x, x_j\right) = \frac{1}{nu_X} \sum_{i=j+1}^{n} \left(x_i - x_j\right) x_1 < x_2 < \ldots < x_n \quad (1)$$

Where $RD\left(x, x_j\right)$ is the Kakwani index of a given elderly family j; x represents the elderly family income; u_X is the average elderly family income in all samples; and n represents the number of elderly families.

China's endowment pattern is mainly family-based, and the living conditions of the elderly are not entirely determined by their income but the family income (36). In other words, the life of the elderly after retirement is mainly supported by their children in China. Hence, we calculate the Kakwani index of the elderly using their total family income (*Inequality_tot*) and average family income (*Inequality_avg*). We take *Inequality_tot* as the main proxy variable of elderly family income inequality and adopt *Inequality_avg* to conduct our robust test.

Independent Variable

The independent variable of this study is basic medical insurance (*Insurance*). We assign 1 to *Insurance* if the elderly have basic medical insurance reimbursement, otherwise 0.

Control Variables

Referring to the previous literature (37–39), we control the following variables: gender (*Gender*), education level (*Educ*), marriage (*Marriage*), retirement (*Retirement*), political outlook (*Outlook*), household size (*Size*), cash deposits (*Cash*), life satisfaction (*Satisfaction*), happiness level (*Happiness*), medical condition (*Condition*), and internet use (*Internet*). All control variables and their definitions are shown in **Table 1**.

Mediating Variable

This study aims to explore the mediating effect of health performance (*Health*) between basic medical insurance and elderly family income inequality. We measure the health performance of the elderly based on the question of "Health status." Referring to the previous literature (40), we assign 1 to *Health* if the elderly answer unhealthy, 2 for fair, and 3 for healthy.

The above variables and their definitions are presented in **Table 1**, and their descriptive statistics are shown in **Table 2**.

Empirical Model

Referring to the previous literature (13, 38, 41), we construct the following model to test the impact of basic medical insurance on elderly family income inequality.

$$Inequality_i = \alpha + \beta Insurace_i + \delta Controls + \varepsilon_i \quad (2)$$

where *Inequality* is the dependent variable of elderly family income inequality; *Insurance* is the independent variable of basic medical insurance; *Controls* represents the control variables,

TABLE 1 | The definitions of all variables.

Variables	Symbols	Definitions
Dependent variable		
Elderly family income inequality	Inequality_tot	The Kakwani index of the elderly based on total family income.
	Inequality_avg	The Kakwani index of the elderly based on average family income.
Independent variable		
Basic medical insurance	Insurance	*Insurance* is equal to 1 if the elderly have basic medical insurance reimbursement, and otherwise 0.
Mediating variable		
Health performance	Health	*Health* is equal to 1–3, representing unhealthy, fair, healthy, respectively.
Control variables		
Gender	Gender	*Gender* is equal 1 if the elderly are male, and otherwise 0.
Education level	Educ	*Educ* is 1–7, indicating that education is unschooling, primary school, middle school, high school, bachelor's, master's and doctor's degree, respectively.
Marriage	Marriage	*Marriage* is equal 1 if the elderly are in marriage period, and otherwise 0.
Retirement	Retirement	*Retirement* is equal 1 if the elderly are retiring, and otherwise 0.
Political outlook	Outlook	*Outlook* is equal 1 if the elderly are party member, and otherwise 0.
Household size	Size	*Size* represents the number of the elderly family members.
Cash deposits	Cash	*Cash* represents the logarithm of cash deposits for the elderly family.
Life satisfaction	Satisfaction	*Satisfaction* is equal to 1–5 scale, representing the elderly life satisfaction, respectively.
Happiness level	Happiness	*Happiness* is to 1–10 sacle, representing the elderly happiness level, respectively.
Medical condition	Condition	*Condition* is 1–5, representing the elderly medical conditions are very bad, bad, fair, good, and very good, respecitvely.
Internet use	Internet	Internet is equal 1 if the elderly are using internet, and otherwise 0.

TABLE 2 | Descriptive statistics.

Variables	Obs	Mean	S.D.	Min	Max
Inequality_tot	4,521	0.54	0.26	0.01	1.00
Inequality_avg	4,521	0.56	0.23	0.00	1.00
Insurance	4,521	0.51	0.50	0.00	1.00
Gender	4,521	0.46	0.50	0.00	1.00
Educ	4,521	1.92	1.07	1.00	7.00
Marriage	4,521	0.82	0.38	0.00	1.00
Retirement	4,521	0.17	0.38	0.00	1.00
Outlook	4,521	0.01	0.07	0.00	1.00
Size	4,521	3.81	2.13	1.00	21.00
Cash	4,521	9.75	2.02	1.10	15.32
Satisfaction	4,521	4.23	0.92	1.00	5.00
Happiness	4521	7.74	2.20	0.00	10.00
Condition	4,521	2.49	0.67	1.00	3.00
Internet	4,521	0.03	0.16	0.00	1.00
Health	4,521	2.30	0.56	1.00	3.00

EMPIRICAL RESULTS AND ANALYSIS

Benchmark Regression Results

In this section, we conduct the empirical analysis by using Model (1) and report the results in **Table 3**. Among them, Column (1) reports the results without control variables, and Column (2) reports the results with control variables. We can find that all the coefficients of *Insurance* are significant and negative at the 1% level. These results indicate that basic medical insurance can reduce elderly family income inequality in China and support our H1. In other words, basic medical insurance coverage can effectively reduce the catastrophic health expenditures among the elderly family, and narrow the reimbursement gap and the income gap between the high- and low-income of the elderly family, which effectively guarantees the welfare of the family.

In terms of the control variables, most of the estimates are in agreement with theoretical expectations. Specifically speaking, the coefficients of *Gender*, *Marriage*, and *Outlook* are significantly positive at the traditional statistic levels, indicating that elderly family income inequality is more significant among males, married people, and party members. The coefficients of *Edu*, *Retirement*, *Size*, *Cash*, *Happiness* and *Internet* are all significantly negative at the traditional statistic levels. These results suggest that the elderly family income inequality can be narrowed as education levels rise. The number of cash deposits, household size, happiness level, and internet use can reduce elderly family income inequality.

Robustness Test

Following the previous literature (7), we use *Inequality_avg* as the alternative measure of elderly family income inequality to conduct the robustness test. The results are presented in Columns (1,2) of **Table 4**. As can be seen, all the coefficients of *Insurance* are significantly negative at the 1% level, which indicates that basic medical insurance significantly lowers elderly

including *Gender*, *Educ*, *Marriage*, *Retirement*, *Outlook*, *Size*, *Cash*, *Satisfaction*, *Happiness*, *Condition*, and *Internet*; α denotes the intercepted item; β is the coefficient of interest; δ denotes the coefficients of the control variables; i represents the elderly individual, and ε_i is a normally distributed random error vector.

We run Formulas (2) based on the OLS regression. As we can see, β is the coefficient of the variable of interest. If β is smaller than 0, it indicates that the bigger *Insurance* is, the smaller *Inequality* is. In other words, basic medical insurance reduces elderly family income inequality. If so, H1 is verified by the data. In contrast, if β is bigger than 0, it indicates that basic medical insurance worsens elderly family income inequality. If so, H1 doesn't stand according to our data.

TABLE 3 | The benchmark regression result.

Variables	(1)	(2)
Insurance	−0.052***	−0.022***
	(0.008)	(0.006)
Gender		0.035***
		(0.006)
Educ		−0.027***
		(0.003)
Marriage		0.017**
		(0.007)
Retirement		−0.133***
		(0.008)
Outlook		0.004***
		(0.040)
Size		−0.043***
		(0.001)
Cash		−0.058***
		(0.001)
Satisfaction		0.003
		(0.003)
Happiness		−0.005***
		(0.001)
Condition		−0.006
		(0.004)
Internet		−0.104***
		(0.018)
Constant	0.564***	1.344***
	(0.006)	(0.023)
Observations	4,521	4,521
R-squared	0.010	0.487

***p ≤ 0.01; Standard errors are in parentheses.

TABLE 4 | Results of robustness test and endogeneity test.

Variables	Robustness test		Endogeneity test	
	(1)	(2)	(3)	(4)
Insurance	−0.050***	−0.018***		−0.031 ***
	(0.007)	(0.005)		(0.048)
Institution			−0.022***	
			(0.006)	
Constant	0.590***	1.081***	1.344***	1.402***
	(0.005)	(0.020)	(0.022)	(0.030)
Control variables	No	Yes	Yes	Yes
Observations	4,521	4,521	4,521	4,521
R-squared	0.012	0.425	0.487	0.191
Phase I F-value			58.75	
DWH test *p*-value				0.000

***p ≤ 0.01; Standard errors are in parentheses.

and the elderly are likely to pay various medical expenses in various medical institutions. Thus, the payment of basic health insurance for the elderly is related to the institutions they visit. Second, the elderly's choice of medical institutions has no direct impact on the elderly family income inequality. Besides, the result of the F-value [see Column (3) of **Table 4**] shows that there is no weak instrumental variable problem with *Institution*. Hence, *Institution* is an appropriate instrumental variable for *Insurance*.

The results of the endogeneity test are presented in Column (4) of **Table 4**. The estimated coefficient of the fitted value of *Insurance* is significantly negative, which is consistent with the above findings and further suggests that the conclusion is still robust.

Heterogeneity Analysis

This section examines the heterogeneous impact of basic medical insurance on elderly family income inequality from the differences of region and age. The regression results are reported in **Table 5**. Columns (1-3) are the results of eastern region, central region and western region, respectively. Column (4) is the results of younger elderly, and Column (5) is the results of advanced elderly.

For the region differences, as can be seen from Columns (1-3) in **Table 5**, the coefficient of *Insurance* for the eastern regions is significantly negative at the 1% level, while it is not significant for central and western regions. That is, basic medical insurance can reduce elderly family income inequality in the eastern regions, but it has no effect in the central and western regions. Hence, the findings confirm H2a. Economically developed areas are mostly located in the eastern regions, where the reimbursement of basic medical insurance for the elderly is higher, and the proportion of medical costs borne by the elderly is lower. However, the economic development of central and western regions lags behind that of the eastern regions, and there is a severe imbalance in regional development. The reimbursement of basic medical insurance for the elderly varies significantly among regions. Therefore, basic medical insurance

family income inequality. This result is consistent with the above findings and further supports our conclusions.

Endogeneity Test

Although we control for many factors affecting elderly family income inequality, there is still an endogenous problem. Hence, we use the two-stage least square method (2 SLS) to minimize the impact of the endogenous problem. To carry out the 2 SLS method, we construct an instrumental variable (denoted as *Institution*), and set *Institution* as 1 to 5, representing general hospitals, specialized hospitals, specialized community health centers or rural health centers, community health service stations or village health offices, and clinics, respectively. In the first-stage regression model, *Insurance* is the dependent variable, and *Institution* is the independent variable. While in the second-stage regression model, the dependent variable is *Inequality_tot*, and the independent variable is the fitted value of *Insurance* in the first-stage regression.

Furthermore, we choose *Institution* as the instrumental variable of *Insurance* for the following reasons. First, the supervision level of medical institutions in China is different,

TABLE 5 | Results of heterogeneous analysis.

Variables	Region difference			Age difference	
	Eastern	Central	Western	Younger elderly	Advanced elderly
	(1)	(2)	(3)	(4)	(5)
Basic medical insurance	−0.027***	−0.015	−0.004	−0.023***	−0.013
	(0.008)	(0.010)	(0.012)	(0.006)	(0.028)
Control variables	Yes	Yes	Yes	Yes	Yes
Constant	1.369***	1.333***	1.240***	1.351***	1.233***
	(0.033)	(0.040)	(0.048)	(0.023)	(0.119)
Observations	2,159	1,258	1,104	4,317	204
R–squared	0.395	0.362	0.263	0.367	0.475

***$p \leq 0.01$; Standard errors are in parentheses.

can significantly reduce eastern elderly family income inequality, but this effect does not exist for the central and western regions.

In terms of the age difference, 60–80 years old is defined as the younger elderly, and 80–100 years old is defined as the advanced elderly. As can be seen from Columns (4) and (5) in **Table 5**, the coefficient of *Insurance* for younger elderly is significantly negative at the 1% level, while it is not significant for advanced elderly. These results indicate that basic medical insurance can reduce the family income inequality of the younger elderly, but it has no effect on the advanced elderly family and confirms H2b. These results may be explained by the fact that the current elderly population in China is mainly concentrated in the younger elderly group, which accounts for 70% of the total elderly people, and this group uses basic medical insurance more frequently and intensively than the advanced elderly. Another possible explanation for this might be that the significant health disparities between the younger and advanced elderly, basic medical insurance is more effective in reducing family income inequality among the younger elderly due to illness shocks.

Mediating Effect of Health Performance

Health performance is directly related to the applications of basic health insurance and elderly family income inequality, which may affect the relationship between them. Therefore, we examine the mediating role of health performance on the relationship between basic health insurance and elderly family income inequality in China.

Most studies adopt the stepwise causal test proposed by Baron et al. to test the mediating effect. However, there may be insufficient sample number or non-normal sample distribution for the data obtained from social surveys due to the limitations of research conditions, and the mediation effect may be biased using the stepwise causal test (42). Therefore, this study uses the Bootstrap method proposed by Hayes (43) to test the mediating effect of health performance, and the model is constructed as follows:

$$Health_i = \alpha + \beta_1 Insurace_i + \delta Controls_i + \varepsilon_i \quad (3)$$

$$Inequality_i = \alpha + \beta Insurace_i + \beta_2 Health_i + \\ \delta Controls_i + \varepsilon_i \quad (4)$$

TABLE 6 | Results of mediating effect.

Types	Observed coefficient	Bootstrap standard error	*P*-value
Indirect effect	−0.002	0.001	0.012
Direct effect	−0.049	0.008	0.000
The proportion of indirect effect			4.1%

where *Health* represents the mediator variable of health performance, and the other variables are the same with the Model (1). The Bootstrap method can directly test whether $\beta_1 \times \beta_2$ is significantly different from 0. If its coefficient is significantly different from 0, indicating that health performance has a mediating effect between basic medical insurance and elderly family income inequality.

Table 6 reports the results of the mediation analysis. We can find that the indirect and direct effects of health performance are significant at the 1% level (the coefficients are −0.002 and −0.049, respectively), and the proportion of indirect effect is 4.1%. These results indicate that health performance partly mediates the relationships between basic medical insurance and elderly family income inequality in China and confirms H3. The possible reason is that the reimbursement of basic medical insurance promotes the timely access of the elderly to medical services and prevents the deterioration of their health status. Thus, it is beneficial to decrease the risk of medical expenses for major diseases of the elderly and ultimately reduce elderly family income inequality.

CONCLUSION AND IMPLICATIONS

This study has examined the influence of basic medical insurance on elderly family income inequality in China through using the CFPS data in 2018 and also discussed the heterogeneity of region and age differences and the mediating effect of health performance.

This study adds to the growing body of researches about the impact of basic medical insurance on elderly family income inequality. Our empirical results show that basic medical insurance significantly reduces elderly family income inequality in China. In other words, basic medical insurance reduces the burden of the elderly and their families through medical expenses reimbursement, thus reducing the family income inequality of the elderly. We also find that the impact of basic medical insurance on elderly family income inequality varies with the differences of region and age. Specifically, basic health insurance plays a more significant role in reducing elderly family income inequality in the eastern regions than in the central and western regions. Besides, compared with the advanced elderly, the effect of basic medical insurance on reducing younger elderly family income inequality is more pronounced. Finally, we provide additional evidence that health performance plays a mediating effect between the relationship between basic medical insurance and elderly family income inequality in China.

The above conclusions have several important policy implications for China to promote the realization of the goal

of "fair medical insurance" and the common prosperity of the elderly during the Fourth 5-Year Plan period (44). As a crucial medical security system design in China, basic medical insurance has a series of tasks such as adjusting the income distribution gap, guaranteeing health rights, and maintaining health justice (45). This study proposes that basic medical insurance can reduce elderly family income inequality and play a key role in maintaining welfare utility, which aligns with the original intention of institutional design to ensure fairness and promote stability. However, considering the impact of basic medical insurance on medical expenses and the income distribution of the elderly family, it is necessary to re-examine the basic medical insurance system in China. First, the Chinese government should narrow regional disparities in basic medical insurance reimbursement and compensation to ensure the fairness and sustainability of basic medical insurance. Second, the Chinese government should further integrate the basic medical insurance for urban and rural residents and the basic medical insurance for urban employees to reduce elderly family income inequality caused by participating in different types of basic medical insurance. Finally, the Chinese government should improve the design of basic medical insurance policies. Specifically, the government should optimize the welfare policy of medical insurance, such as providing more medical subsidies to the advanced elderly, including physical examination into the category of medical reimbursement, reducing the threshold line or increasing the reimbursement ratio.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found here: https://opendata.pku.edu.cn/dataverse/CFPS.

AUTHOR CONTRIBUTIONS

XP: writing—original draft, data collection, and literature search. YW: conceptualization, writing—original draft, and software. WZ: writing—reviewing and editing and supervision. MZ: data collection. All authors contributed to the article and approved the submitted version.

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