

# *The Effect of Public Health Insurance on Mental Health of Middle-aged and Elderly people in China*

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**Abstract:** Using cross-sectional data in the 2018 wave of CHARLS, we use a simple OLS approach to explore the effect of public health insurance on the mental health of middle-aged and elderly people. After analysing the overall mental health condition among people over 45, We find that there is a positive and significant correlation between public health insurance coverage and improved mental health outcomes. Specifically, males benefit more from public health insurance than females; people with agricultural hukou have less desired effect than people with non-agricultural hukou; the impacts on the working group are more significant than the none-working group. According to our findings, we recommend Chinese government consolidate public health insurance schemes and expand the coverage of public health insurance. Additionally, efforts to reduce income inequality and put more attention on agricultural groups are recommended to improve overall mental health outcomes in China.

**Keywords:** Public health insurance, Mental health, Middle-aged and elderly people, OLS, Working group.

## 1. Introduction

China's overall health status has witnessed significant improvement in recent decades [1]. Currently, more than 90 percent of China's citizens benefit from the public health system, underscoring the broad reach and effectiveness of healthcare initiatives in the country [2]. However, despite the substantial advancements in the quality of the healthcare system, China continues to grapple with significant challenges related to its aging population and the management of chronic diseases. These issues present formidable hurdles for the nation's healthcare infrastructure. While substantial progress has been made, persisting concerns coupled with the emergence of new challenges underscore the ongoing complexity of the healthcare landscape. Marti has elaborated on these pressing health issues in China, emphasizing the need to address not only physical health but also the mental well-being of the population, influenced by the rapid demographic changes and socioeconomic transformations in the country [3]. This underscores the enduring importance of addressing health concerns as a critical issue demanding attention and action.

Middle-aged and elderly individuals are typically the most vulnerable to various health problems, including chronic and acute diseases, thus carrying a higher risk of illness [4]. Consequently, age is a crucial factor in the context of health insurance, given that the elderly population tends to face higher

medical expenditures and increased health risks. Research by Zheng suggests that a 1% increase in the elderly population and old-age dependency ratio would lead to a 4.8% and 5.2% increase in the demand for Private Health Insurance (PHI).[5]. Consequently, our study focuses on this demographic group, highlighting the potential of public health insurance to alleviate healthcare costs and improve access to healthcare services for elderly Chinese citizens.

Furthermore, mental health has emerged as a prominent public health and societal concern, significantly impacting economic and social development. The rapid pace of economic and social changes has introduced a multitude of psychological stressors, leading to a rising prevalence of common mental disorders [6, 7]. Mental illnesses affect individuals across all age groups and have become the leading contributors to the global burden of disease, affecting approximately 970.8 million people worldwide [8]. In the context of China, the economic burden of psychiatric disorders has been growing, accounting for 17% of the global disease burden attributable to mental, neurological, and substance use disorders [9]. A recent nationwide epidemiological study reported a lifetime prevalence of mental disorders in adulthood in China at 16.6% [10], highlighting the widespread nature of this issue.

Middle-aged individuals, in particular, face significant economic pressures, making them more susceptible to mental health problems. Typically, individuals in their 40s and 50s experience the highest levels of psychological distress [11]. Even the elderly population encounters unique challenges, including feelings of loneliness and detachment from society. Notably, individuals aged 85 and older have the highest suicide rates among all age groups, and it is anticipated that the number of mental disorders among the elderly will double by 2030, necessitating increased attention to their mental well-being.

Our study aims to explore the relationship between the current utilization of public health insurance and the mental health of middle-aged and elderly individuals in China. We seek to demonstrate the impact of public health insurance on the mental health of this demographic group. To achieve this, we will employ Simple Ordinary Least Squares (OLS) regression, incorporating relevant covariate variables to provide a fresh perspective on the effects of public health insurance (PUHI).

## 2. Background

China's current healthcare insurance system primarily comprises three key schemes: the Urban Employee Basic Medical Insurance (UEBMI), the New Cooperative Medical Scheme (NCMS), and the Urban Resident Basic Medical Insurance (URBMI) [2]. UEBMI, initiated in 1999, is a compulsory insurance program targeting urban employees in the formal sector. It is administered by cities and funded through premium contributions from employers via payroll taxes. URBMI, which commenced in 2007, is designed for urban residents without employment, the unemployed, children, students, and elderly individuals. This scheme is voluntary in nature. On the other hand, NRCMS, introduced as a pilot program in 2003, is a voluntary healthcare insurance scheme tailored to rural residents.

As of the end of 2022, the National Medical Security Development Statistical Bulletin reported that the number of individuals enrolled in the national basic medical insurance program reached 1,345.92 million, with an insurance participation rate consistently exceeding 95%.

Public health insurance has been a subject of substantial research interest, with a particular focus on its influence on health outcomes. Numerous studies have consistently indicated that expansions in insurance coverage often lead to improvements in individuals' health outcomes [8, 11-17]. Most of these studies have concentrated on the impact of public health insurance on physical health [18, 19]. For instance, Erlangga et al. conducted an extensive review of empirical studies published from July

2010 to September 2016, utilizing various assessment tools and databases. Their findings revealed a positive association between public health insurance and improved physical health outcomes [20].

Some studies have also delved into the relationship between public health insurance and mental health status. Lee and Kim observed a positive correlation between public health insurance coverage and mental health status[21]. Similarly, using data from the National Survey of America’s Families, Meng et al. discovered that expanded public health insurance coverage can potentially improve the efficiency of mental health care modalitie= among young children aged 6-17 in the United States. .[22]. However, their analysis did not encompass elderly individuals,

Despite these findings, only a limited number of studies have specifically focused on the influence of public health insurance on mental health, and most have overlooked the mental effects on middle-aged and elderly populations.

Hence, this study endeavors to examine the relationship between public health insurance and the mental health of individuals aged over 45 in China. We will utilize Simple Ordinary Least Squares (OLS) regression, while considering covariate variables, to present a fresh perspective on the impacts of public health insurance on this demographic group.

### 3. Descriptive Statistics

#### 3.1. Summary statistics

Table 1 presents the summary statistics of all variables utilized in our basic estimation for observations aged 45 and above. Notably, approximately 96.2% of middle-aged and elderly individuals possess public health insurance, highlighting the near-universal coverage of public health insurance in China.

In terms of mental health status, the average depression score stands at 8.429, surpassing the threshold of 8. This suggests that individuals aged 45 and older exhibit some degree of mental health issues. Turning to other covariates, approximately 73.9% of middle-aged and elderly individuals report fair or better self-rated health status, indicating generally favorable self-assessments of health. The average age of this demographic group is 61.436, signifying that the majority are indeed middle-aged and elderly individuals. Concerning employment status, a significant proportion, 34.5%, is comprised of retired individuals, underscoring the retirement status of a substantial portion of this population. In terms of marital status, 78.4% of middle-aged and elderly individuals are married, pointing to a high marriage rate within this demographic.

Table 1: Summary Statistics

Variable	Notes	Mean	N
CES	Continuous variable	8.429	18005
PUHI	Binary variable	0.962	19772
Age	Continuous variable	61.436	19751
<b>Self-rated Health Status</b>	Multi-categorical variable		
-Very good		0.122	18278
-Good		0.128	18278
-Fair		0.489	18278
-Poor		0.202	18278
-Very poor		0.059	18278
Individual income	Continuous variable	56.649	19634

Table 1: (continued).

<b>Employment status</b>	Multi-categorical variable		
-Agricultural employed		0.034	19718
-Agricultural self-employed		0.311	19718
-Non-Agricultural employed		0.212	19718
-Non-Agricultural self-employed		0.067	19718
-Non-Agricultural family business		0.013	19718
-Unemployed		0.004	19718
-Retired		0.345	19718
-Never work		0.013	19816
<b>Marital Status</b>	Multi-categorical variable		
-Married		0.784	
-Partnered		0.068	
-Separated		0.003	19816
-Divorced		0.012	19816
-Widowed		0.127	19816
-Never married		0.006	19816
Gender		1.529	19816
Male			
Female			

Notes: “CES” and “PUHI” represent The Center for Epidemiological Studies and public health insurance.  
 Sources: China Health and Retirement Longitudinal Study (CHARLS) in 2018 wave.

### 3.2. Mental Health by Employment Status

Figure A provides a visual representation of Center for Epidemiological Studies- Depression (CESD) scores among the middle-aged and elderly population, categorized by different employment statuses. Generally, it is evident that individuals employed in non-agricultural sectors exhibit relatively lower average CESD scores when compared to the overall population. In contrast, those engaged in agricultural employment tend to have higher average CESD scores. Moreover, the table illustrates that individuals who are not currently employed, particularly those who are unemployed, retirees, and those who have never worked, display the highest average CESD scores. In essence, this implies that individuals employed in non-agricultural sectors tend to enjoy better mental health compared to those engaged in agricultural employment or individuals who are currently out of work.

To delve further into the details, it is worth noting that individuals who are non-agricultural employees exhibit lower average CESD scores compared to those who are non-agricultural self-employed or involved in non-agricultural family businesses. This finding highlights that among individuals within non-agricultural employment statuses, those who are non-agricultural employees demonstrate the highest level of mental well-being. Additionally, individuals who are retired exhibit lower average CESD scores than those who have never worked or are currently unemployed. This suggests that among individuals who are not currently employed, retirees tend to have the best mental health.

### 3.3. Mental Health by Self-rated Health

Figure B visually demonstrates the variation in CESD scores based on self-rated health status. In general, there is a discernible trend wherein CESD scores tend to decrease as physical health status improves. More specifically, individuals who rate their self-rated health as “very poor” exhibit the highest average CESD score, reaching 14, while those who rate their self-rated health as “very good” display the lowest CESD score, which stands at 5. This observation underscores the direct relationship between physical and mental health, suggesting that individuals with better physical health are less likely to contend with mental health issues.

Furthermore, individuals reporting “very good”, “good”, and “fair” self-rated health tend to have average CESD scores below 8, whereas those indicating 'poor' and 'very poor' self-rated health show average CESD scores exceeding 8. This pattern aligns with the notion that individuals with better physical health tend to experience more favorable mental health outcomes.

### 3.4. Mental Health by Income

In Figure C, we observe the distribution of CESD scores among individuals with varying income levels. Notably, those with an income below 56.64906 exhibit a higher average CESD score compared to their counterparts with an income exceeding this threshold. This finding underscores the association between higher income and a reduced likelihood of experiencing mental health challenges. Moreover, individuals with an income below 56.64906 display an average CESD score exceeding 8, while individuals with an income higher than 56.64906 maintain an average CESD score below 8. This further supports the notion that individuals with higher income levels are less prone to depression and other mental health issues.

### 3.5. Mental Health by Marital Status

Figure D describes the CESD score of people with different marital status. Generally, people who live with their spouses have a lower average CESD score than those who do not live with their spouses. This means that people who have spouses and live with them have better mental health status than those who do not have spouses or live with them. Specifically, people who are married have a lower average CESD score than those others among people who have and live with their spouses, which supports that people who are married have the best mental health among people who have and live with their spouses. Additionally, people who never marry have the highest average CESD score among people who do not have and live with their spouses, which means that people who never marry have the worst mental health among people who do not have and live with their spouses.

## 4. Empirical Analysis

### 4.1. Public Health Insurance and Mental Health

This paper aims to examine the influence of public health insurance on middle-aged people and elderly people's mental health status. Exclusively, how the adoption of public health insurance affects personal depression rate will be indicated. Hence, before empirical work begins, it is necessary to demonstrate the mental health status through theory analysis of different variables. The simple ordinary least square model for estimation is as follows.

$$1. \quad MH_i = \alpha + \beta PUHI_i + \gamma X_i + \mu_i + \varepsilon_i$$

Where  $MH$  represents mental health status.  $PUHI$  represents whether an individual  $i$  participates in public health insurance, such as UEMI, URMI, and NRCMI.  $X_i$  represents some covariates that control personal characteristics.  $\mu_i$  is the individual fixed effect.  $\varepsilon_i$  is the error term.

## 4.2. Results and analysis

### 4.2.1. Basic estimate

Table 2 estimates the effect of public health insurance on the mental health status of people over 45 years of age in China. The second and third columns represent the estimates without controlling covariates and with controlling covariates respectively. If we do not control personal characteristics, the coefficient for public health insurance is much bigger and more significant. However, this estimate is biased because the R-squared is close to zero when we do not control other variables. Unobserved factors would produce bias.

Then we involve variables that are observable and affect mental health. We know that this effect is -0.403 and statistically significant at the significance level of 10%. This shows that public health insurance can decrease the CESD score or depression propensity of people aged 45 and older by 0.4. Therefore, public health insurance can improve the mental health of the Chinese population.

As for other controls, with the function of the body declining, elder people are more vulnerable to diseases, leading to a decline in life quality and life satisfaction. Along with loneliness and isolation from society, people's mental health status is likely to decline with time passing by.

When it comes to income, a negative impact on CESD score can be seen, denoting that people with higher incomes enjoy better mental health. People with higher income levels may receive better medical services and less financial pressure, thus they have better physical health than fewer mental health problems.

The different effect among gender is worth noting, The coefficient is 1.56, passing the significance of 1%. This indicates that men in general face more mental problems than women. Males on average are far more likely than females to get depression tendency.

Furthermore, the R-squared ratio is 0.197, which is quite large. This suggests that our model is reasonable and highly explained.

Table 2: The Effect of Public Health Insurance on Mental Health

	CESD score	
<b>PUHI</b>	<b>-0.808***</b>	<b>-0.403*</b>
	(0.256)	(0.233)
Age		0.103*
		(0.0529)
The squared age		-0.000995**
		(0.000416)
Individual income		-0.000129
		(0.000110)
gender		1.560***
		(0.0931)
Self-rated Health status		YES
Employment Status		YES
Marital Status		YES
Constant	9.217***	1.599
	(0.217)	(1.699)
Observations	17,741	17,583
R-squared	0.0006	0.197

Notes: "PUHI" and "CESD" represent public health insurance and Center for Epidemiological Studies Depression. \*\*\*means  $p < 0.01$ , \*\* means  $p < 0.05$ , \* ,means  $p < 0.1$ . They denote significance levels at 0.1, 0.5, and 0.01 level respectively. The standard errors

are clustered at the individual level. “YES” and “NO” represent the multicategorical covariate is controlled or not controlled respectively.

Sources: China Health and Retirement Longitudinal Study (CHARLS) in 2018 wave.

#### 4.2.2. Subgroup analysis

Although significant mental health effects of PUHI are verified from the basic estimation above, personal characteristics' discrepancies make the effects different. Hence, we will estimate the effect by classifying people into different groups according to gender (male and female), hukou (agricultural hukou and non-agricultural hukou), and working status (be working and be not working).

##### 4.2.2.1. Gender

Table 3 illustrates the impact of Public Health Insurance on the mental health of individuals aged 45 and above, stratified by gender. The second and third columns present the estimated effects for males and females, respectively. It is evident that the coefficient for males is substantially larger, with a notable effect of -0.918 observed at a significance level of 1%, compared to a marginal effect of -0.0151 for females. This discrepancy suggests that the utilization of public health insurance has a more pronounced positive influence on males. This finding aligns with expectations, as men, on average, experience a higher prevalence of mental health issues compared to women. Moreover, this gender disparity in mental health outcomes tends to exacerbate with increasing age.

Additionally, if we are to analyse the data from a different perspective, the different impact can be attributed to the significant difference of gender coverage of UEBMI in China. The UEBMI, which has the highest level of financing and benefits compared with other two, ties health insurance to work. Besides, UEBMI has a much higher reimbursement ratio than that of NRCMS (64.84% and 45.27% respectively in 2013)[2]. However, among the informal employed and unemployed, the percentage of women is much larger than men. What's more, elderly women are less likely to get a job, thus this gap is especially larger among people over 60 in China. These can partly explain why elderly men on average gain more for public insurance than women[23].

Besides, the increase in age and individual income can improve mental health as well. The difference between genders lies in the fact that income plays a bigger role for males while age has a greater impact on females.

Table 3: The Effect of Public Health Insurance on Mental Health stratified by gender

Variables	Male (n=8378) Coefficient (p value)	female (n=9205) Coefficient (p value)
<b>PUHI</b>	-0.918*** (0.335)	-0.0151 (0.325)
Age	-0.0135 (0.0734)	0.185** (0.076)
The squared age	-0.000108 (0.00057)	-0.00165*** (0.000602)
Individual income	-0.001095*** (0.000311)	-0.0000141 (0.000124)
Self-rated Health status	YES	YES
Employment Status	YES	YES
Marital Status	YES	YES
Constant	7.569***	1.554

Table 3: (continued).

	(2.356)	(2.408)
R-squared	0.1797	0.197

Notes: “PUHI” represent public health insurance.\*\*\*means  $p < 0.01$ , \*\* means  $p < 0.05$ , \* ,means  $p < 0.1$ .They denote significance levels at 0.1, 0.5, and 0.01 level respectively. The standard errors are clustered at the individual level. “YES” and “NO” represent the multicategorical covariate is controlled or not controlled respectively.

Sources: China Health and Retirement Longitudinal Study (CHARLS) in 2018 wave.

#### 4.2.2.2. Agricultural Hukou

Empirical estimates in Table 4 show that PUHI affects citizens with non-agricultural hukou more significantly, which passes a significance level of 10%. The coefficients are -0.994 for the non-agricultural hukou group and -0.00348 for the agricultural hukou group. People with agricultural work have a vividly higher CESD score compared with non-agricultural workers. That's somewhat resulted from the misallocation of medical resources in China, where urban areas are equipped with significantly more abundant medical services. [24]

Apart from the reason of misallocation, the scheme still has some shortages. Not like the urban scheme, the benefit package is still restricted to inpatient care and catastrophic treatment. The reimbursement rate decreases as the level of healthcare facilities goes up. Besides, some people tend to get more services than they need as the price drops, which will counteract some of the beneficial mechanism. According to the study by Qi et al, a “masking effect” might show up as the scheme progresses, which means the participation of farmers might increase the level of medical consumption, reducing their well-being[25]. As a result of the phenomenon, those who are poorer benefit less, as a push for inequality.

However, compared with its predecessor, RCMS (Rural Cooperative Medical Scheme), NRCMS has demonstrated improvements across several dimensions. Take risk pooling as an example, the new is set at county level, much higher than previous village level. And this scheme covers services in all public healthcare facilities at the country level instead of barefoot doctors only.

Now let’s return to other findings about table 2, taking other variables into consideration, the two groups get opposite consequences as a result of aging. The mental health status of people with agricultural hukou declined while improving for the other group. Age plays a noteworthy role for the two groups identically.

Furthermore, both groups witness a better mental health status with the increase in income as well as when being a man. The coefficients are similarly significant.

Table 4: The Effect of Public Health Insurance on Mental Health stratified by the ownership of agricultural “hukou”

Variables	Agricultural Hukou (n=12440)	Non-agricultural Hukou (n=4125)
	Coefficient (p value)	Coefficient (p value)
<b>PUHI</b>	-0.00348 (0.279)	-0.994* (0.548)
Age	0.249*** (0.068)	-0.264** (0.119)
The squared age	-0.00221*** (0.000534)	0.00198** (0.000906)
Individual income	-0.00232*** (0.000579)	-0.00119** (0.000571)



Table 4: (continued)

gender	1.549*** (0.114)	1.202*** (0.201)
Self-rated Health status	YES	YES
Employment Status	YES	YES
Marital Status	YES	YES
Constant	-3.074 (2.204)	13.814*** (4.125)
R-squared	0.1889	0.1968

Notes: “PUHI” represent public health insurance. \*\*\*means  $p < 0.01$ , \*\* means  $p < 0.05$ , \*, means  $p < 0.1$ . They denote significance levels at 0.1, 0.5, and 0.01 level respectively. The standard errors are clustered at the individual level. “YES” and “NO” represent the multicategorical covariate is controlled or not controlled respectively.

Sources: China Health and Retirement Longitudinal Study (CHARLS) in 2018 wave.

#### 4.2.2.3. Working Status

According to Table 5, the usage of public health insurance has a positive but not significant effect for both groups based on our empirical analysis. The effect is slightly greater among working people whose coefficient is -0.441 than non-working people whose coefficient is -0.299, partly as a result of a higher coverage of the type of insurance for working people.

The biggest reason might be that apparent inequalities remain in different insurance types. The biggest difference relates to people’s financing and benefits. The UEBMI enjoys the highest level of benefits and financing support.

For instance, taking reimbursement into consideration, the UEBMI reimbursements are for both outpatient and inpatient medical expenses, while only inpatient medical expenses and limited critical outpatient care expenses is included in URBMI. Besides, the UEBMI enjoys higher reimbursement rate compared with the other two.[2]

Table 5: The Effect of Public Health Insurance on Mental Health stratified by Working Status

Variables	Working (n=11509)	none-working (n=6074)
	Coefficient (p value)	Coefficient (p value)
<b>PUHI</b>	-0.441 (0.3)	-0.299 (0.372)
Age	0.237*** (0.077)	-0.0373 (0.0929)
The squared age	-0.00211*** (0.000631)	0.0000522 (0.000696)
Individual income	-0.000121 (0.000109)	-0.00203 (0.00152)
gender	1.722*** (0.113)	1.26*** (0.165)
Self-rated Health status	YES	YES
Employment Status	YES	YES
Marital Status	YES	YES
Constant	-2.517 (2.367)	6.637** (3.124)
R-squared	0.1804	0.2276

Notes: “PUHI” represent public health insurance.\*\*\*means  $p < 0.01$ , \*\* means  $p < 0.05$ , \* ,means  $p < 0.1$ .They denote significance levels at 0.1, 0.5, and 0.01 level respectively. The standard errors are clustered at the individual level. “YES” and “NO” represent the multicategorical covariate is controlled or not controlled respectively.

Sources: China Health and Retirement Longitudinal Study (CHARLS) in 2018 wave.

## 5. Conclusion

This study investigates the relationship between current public health insurance and the change in the mental health status of people aged 45 and above in China using data from 2018 CHARLS, filling some gaps in previous studies. Overall, taking variables like age, self-rated health status, employment status, marital status, gender, and so on into consideration, the results show that public health insurance has a positive impact on mental health. But age and gender at the same time play an important part in people's mental health. People's happiness generally decreases as they age. Besides, when it comes to gender, males on average have more mental problems than females.

Specifically, the mental health of groups with different gender, hukou, and working status, are separately affected by public health insurance. Among the sample group from middle-age and elderly people in China, our data suggests that compared to female people, males are significantly more positively influenced by PUHI. Besides, The mental health status is improved to a greater extent for people with non-agricultural hukou. As for working status, public insurance has a greater impact on those who work than on those who do not. From the separate group analysis we can briefly compare the different effects of different schemes and therefore come up with our suggestions.

Dependent on our empirical results, this study provides some policy suggestions. Firstly, although public insurance does have a positive impact to mental health, the degrees of impact varies person by person, additional measures are necessary to ensure that mental health services are equally accessible and effective for everyone. Secondly, increase the reimbursement rate and coverage area to better suit people's need, especially for NRCMS as rural residents benefit less from the medical scheme. Thirdly, education aimed at fostering a proper attitude towards mental health diagnosis and treatment is imperative. Such education can help correct misconceptions about mental health treatment and alleviate the stigma associated with seeking help, ultimately leading to improved overall mental health outcomes. Lastly, merge the insurance scheme. For enhanced consolidation, it is recommended that the funding pools, management offices, and information systems of the three basic health insurance schemes merge. This consolidation would result in reduced human resource costs and enhance the efficiency of insurance procedures, expand the area of risk pooling, and improve access to health service provision. Ultimately, this consolidation would promote the equality of benefit packages.

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