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Taking action to improve health for all

Can supplementary private health insurance reduce vulnerability to expected poverty and catastrophic health expenditure?

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Introduction

End poverty in all its forms everywhere

SUSTAINABLE DEVELOPMENT GOALS

Across **110 countries**, **1.1 billion** out of **6.1 billion** people are poor.

That is, just over **18%** are estimated to live in **acute multidimensional poverty.**

Challenges
- widespread inequality
- political instability and conflict
- a climate emergency
- COVID-19 pandemic recovery
- cost of living and other crises

The emergence of COVID-19 reversing these gains as the number of individuals living in extreme poverty increased for the first time in a generation by almost 90 million over previous predictions (UN , 2023)

Strong social protection systems are essential for mitigating the effects and preventing many people from falling into poverty.

Health Insurance System in China

Medical assistance

Safety net
For the poor

High-Cost Illness Insurance

Supplementary SHI
additional reimbursement for OOP cost in cases where OOP exceeds the deductibles after reimbursement from SHI

Social health insurance

Basic coverage 95%
Urban Employee Insurance: 371 million
Residents Medical Insurance: 963 billion

Challenges for SHI in China

Limited co-payment

The effectiveness of SHI has been hindered by limited co-payment , resulting in a portion of the population still facing high out-of-pocket (OOP) payments

Limited coverage

Rare disease, high-cost drugs

Supplementary private health insurance

PHI targets higher-income groups

- providing outpatient specialist care and diagnostic services
- requires enrollees to opt out of SHI coverage in order to expedite access to high-quality healthcare, private hospital et.al.
- Germany, Italy, the UK

PHI targets higher-OOP groups

- SHI's statutory cost-sharing and full payments for uncovered services
- Korea, Chile, China

Inclusive PHI in China

- Introduced in 2020

- To address high OOP costs for vulnerable groups

- Government-backed and operated by private insurance companies

- PHI complements SHI by covering co-pays and services not included in the SHI benefits package, addressing financial gaps left by SHI

- **Premium:** around 100 CNY

- As of 2023, China has implemented 193 inclusive PHI products across 30 provinces, covering 168 million participants

Research Questions

- **Current financial protection effect**

   Whether SPHI reduce the catastrophic health expenditure?

- **Future financial protection effect**

   Whether SPHI reduce the vulnerability to expected poverty?

Methods

Data source

- **The National Health Service Survey conducted in Shandong province in 2023**

  - carried out every five years

  - utilizes a multistage stratified cluster sampling methodology

  - covering all 16 cities within Shandong province

  - 30,551 samples were collected via face-to-face interviews

  - **The final sample**: 25,568 respondents for VEP; 23,574 respondents for CHE

Key measurements

- ## Vulnerability to Expected Poverty (VEP)

  - estimated the likelihood of future income or assets falling below a predefined poverty line by considering a range of assets including human capital (education attainment, employment status, EQ5D), health behaviours (smoking, alcohol consumption, physical activity, and dental hygiene), living standards (type of drinking water, sanitary latrines), household size, receipt or eligibility for old-age pension, poor households' registration status, and the household consumption expenditures.

  - three-stage feasible generalized least squares (FGLS)

$$V_{ht} = P_r\left(\ln Y_{h,t+j} < povertyline\right)$$

$$\ln Y_h = \beta X_h + \varepsilon_h$$

$$\hat{\sigma}^2_{ols,h} = X_h\hat{\theta} + \hat{\eta}_h$$

$$E\left(\ln \hat{Y}_h \mid X_h\right) = X_h\hat{\beta}_{FGLS}$$

$$V\left[\left(\ln \hat{Y}_h \mid X_h\right)\right] = \sigma^2_h = X_h\hat{\theta}_{FGLS}$$

$$\hat{V}_h = \hat{P}_r(\ln Y_h \leq \ln z) = \Phi\left(\frac{\ln z - X_h\hat{\beta}_{FGLS}}{\sqrt{X_h\hat{\theta}_{FGLS}}}\right)$$

Key measurements

- **Catastrophic health expenditure (CHE)**

OOP payments (both direct and indirect) for healthcare equalled or exceeded 40% of the capacity to pay (CTP)

$$\text{CHE}_i = \begin{cases} 1, if\ \dfrac{OOP_i}{CTP_i} \geq 40\% \\ 0, if\ \dfrac{OOP_i}{CTP_i} < 40\% \end{cases}$$

Key measurements

- **Supplementary private health insurance**

Do you have supplementary private health insurance? Yes=1 No=0

- **Covariates**

age , gender, marital status, residence, chronic disease status, health service accessibility.

Inference strategies

PHI is entirely voluntary, which may introduce the endogeneity problem caused by simultaneity and omitted variables.

- **Instrumental variable estimation**

$$\text{IV:} Depth\ of\ SPHI = \frac{Total\ Premiums}{GDP}$$

- **two-stage least squares (2SLS)**

$$V_i = \beta_0 Insur_i + + \beta_1 XX_i + \varepsilon_i$$
$$Insur_i = \alpha_0 Z_i + \alpha_1 T_i + \mu_i$$

Results

Results of OLS and IV-2SLS

Variable	OLS		2SLS (First stage)	2SLS (Second stage)	
	VEP	CHE		VEP	CHE
SPHI (ref: no)					
Yes	**-0.030***	**-0.036***	**-6.204***	**-0.745***	**-0.705***
Age	0.003***	0.004***	-0.004***	0.001	0.001*
Gender (ref: male)					
Female	0.006*	-0.002	0.005	0.009**	0.001
Marital status (ref: others)					
Married	-0.080***	-0.052***	0.068***	-0.031**	-0.006
Residence (ref: urban)					
Rural	0.042***	0.071***	-0.044***	0.015*	0.046***
Chronic disease (ref: no)					
Yes	-0.011***	0.073***	0.003	-0.009*	0.075***
15-minute medical circle (ref: no)					
Yes	-0.001***	-0.075***	0.061***	-0.012	0.044*

Note: ***$p<0.01$, **$p<0.05$, *$p<0.1$

Tests of instrumental variables

Test	Explanation	VEP	CHE	Comment
Endogeneity test: **Hausman test**	H_0: All explanatory variables are exogenous. Rejection of H_0 indicates that endogenous variables exist and IV estimate is appropriate.	χ^2=29.39, P-value=0.0000	χ^2=15.94, P-value=0.0001	SPHI is endogenous. IV estimate is appropriate.
Weak IV test	H_0: weakly identified. Rejection of H_0 & t > 11.59 indicates that the model is not weak.	F statistic=30.996, Minimum eigenvalue statistic=16.38	F statistic=31.871, Minimum eigenvalue statistic=16.38	IV is not weak.
Under-identification test	H_0: IV is under-identification	Statistic value=30.968 P=0.000	Statistic value = 31.839 P=0.000	IV is not under-identification.

Heterogeneous effects

Regression results of IV-2SLS(subgroups)

Variable	Subgroup	N	VEP	CHE
Age	Middle-aged (16-59)	16,178	-0.416***	-0.525***
	Older adults (≥60)	9,390	-2.235**	-1.648
Gender	Male	12,407	-0.774**	-1.068**
	Female	13,161	-0.723***	-0.493**
Marial status	Others	4,352	-0.357	-0.574*
	Married	21,216	-0.845***	-0.751***
Residence	Urban	12,375	-0.885***	-0.145
	Rural	13,193	13.235	75.469
Chronic disease	No	17,219	-0.833**	-0.837***
	Yes	8,349	-0.632**	-0.514

Note: *** p<0.01, ** p<0.05, * p<0.1, IV regressions include covariates.

Conclusion

- Among respondents covered by SHI, only 13.87% individuals purchased SPHI.

- SPHI in China has proven effective in reducing the likelihood of VEP (coff=-0.745) and CHE(coff=-0.705), demonstrating significant poverty reduction and prevention effects.

- SPHI provided greater welfare benefits, particularly for residents aged 60 and above, individuals without chronic diseases, and urban residents.

- We recommend that governments in LMICs consider implementing SPHI for vulnerable