

Article

Who Bears the Brunt of Health Sacrifices When Households Face Income Shocks? An Empirical Study on Gender Inequality in Medical Expenditure Cuts

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Abstract: When households experience income shocks, healthcare expenditure often becomes a priority for reduction as non-essential consumption. However, whether this reduction process differs across genders among family members remains understudied. This paper utilizes data from the China Family Panel Studies (CFPS) for 2018–2020, employing the COVID-19 pandemic period when numerous households experienced income decline as a natural experiment. Using a Difference-in-Differences approach, it analyzes the heterogeneous impact of income shocks on individual healthcare expenditures for men and women. Existing research either focuses on income shocks' impact on total household healthcare expenditure or examines gender differences in health outcomes, but few studies integrate these perspectives to investigate intra-household gender disparities in healthcare expenditure under income shocks. This paper attempts to fill this gap. The findings reveal that income shocks lead to a significant reduction of approximately 12.7% in women's individual healthcare expenditure, while the impact on men is insignificant. This disparity is more pronounced among married subsamples and low-income households. The results indicate that in household resource allocation, women's health expenditure is often prioritized for sacrifice, reflecting underlying gender inequality within the family. This study shifts the research perspective from the household aggregate level to the individual level, revealing the micro-dynamics of intra-household resource allocation and providing empirical evidence for improving social security policies with gender sensitivity.

Keywords: Income Shock, Medical Expenditure, Gender Inequality, Intra-household Resource Allocation Mechanism

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1. Introduction

The household is the basic decision-making unit for medical consumption. When facing economic shocks such as income decline, how to allocate medical resources within a limited budget directly affects the health and well-being of each family member. Existing studies either examine the relationship between income and total medical expenditure from a macro perspective (Grossman, 1972) or compare static expenditure differences across groups. They rarely consider household heterogeneity or dynamic responses to shocks by gender.

Becker's (1981) altruistic household model assumes that family members jointly pursue utility maximization and resource allocation follows an internal equilibrium; however, empirical evidence from developing countries challenges this assumption—women's wage growth in India has not led to a synchronous increase in medical expenditure (Chatterjee, 2024), and female-headed households in Mexico face a higher risk of catastrophic medical expenditure (Serván-Mori et al., 2023). These findings suggest that there may be implicit gender inequality in intra-household resource allocation, but how this inequality evolves under income shocks lacks systematic empirical investigation.

The outbreak of the COVID-19 pandemic in 2020 caused a sharp income decline for many households, providing a natural experimental setting. This paper uses the 2018 and 2020 panel data from the China Family Panel Studies (CFPS) and adopts the difference-in-differences method combined with propensity score matching (PSM) to analyze the differential impact of income

shocks on personal medical expenditures of men and women. [MODIFIED - added PSM] We further examine boundary conditions such as marital status, income level, and household structure.

This study makes three contributions. First, it shifts the research perspective from the household level to the individual level, revealing the micro-dynamics of intra-household resource allocation; Second, it depicts the boundary conditions of gender inequality through heterogeneity analysis, deepening the understanding of household decision-making logic; Third, it tests and revises Western household economics theories in the context of Chinese culture, providing empirical evidence for improving gender-sensitive social security policies.

2. Manuscript Preparation

2.1. Literature Review and Theoretical Framework

2.1.1. Household Income Shocks and Medical Expenditure

Empirical findings on how income shocks affect household medical expenditure are mixed. Grossman's (1972) health production theory holds that health is a form of human capital, and income decline will reduce health investment. However, the empirical results are inconsistent: some studies find that medical expenditure is sensitive to income and regarded as a "luxury good"; others find that its elasticity is less than 1, belonging to a "necessary good" (Getzen, 2000; Xu et al., 2003). These differences suggest that the relationship between income and medical expenditure may vary by group and needs to be examined at a more micro level.

2.1.2. Gender Perspective on Intra-Household Allocation

Becker's (1981) altruistic model predicts efficient internal allocation, but empirical studies often reject this. Using a natural experiment in India's employee provident fund, Chatterjee (2024) found that women's healthcare expenditure decreased after a wage increase, while education expenditure rose. In Mexico, Serván-Mori et al. (2023) documented that female-headed households have a 5.8% incidence of catastrophic health expenditure, significantly higher than the 4.9% in male-headed households. Similarly, Senavirathna & Senavirathna (2023) show that household head gender is a significant predictor of healthcare expenditure inequality in Pakistan.

Domestic scholars have also examined gender differences in medical expenditure. Ma et al. (2018) found gender disparities in healthcare utilization among migrants under the integrated urban-rural insurance system. Zhao and Ma (2023) studied health behavior changes after spousal retirement, revealing asymmetric responses. However, none directly test how income shocks create gendered sacrifice within households.

2.1.3. Theoretical Framework and Research Hypotheses

We build a theoretical framework that incorporates bargaining power, gender norms, and altruistic priority. Following Manser & Brown (1980) and McElroy & Horney (1981), household allocation is a cooperative bargaining game with a threat point. Three factors determine the "priority order" of healthcare spending:

- a. Bargaining power: Members with higher income share have stronger bargaining power (Doss, 2013). When income falls, the primary earner's health is protected to preserve future earnings.
- b. Gender role norms: In Chinese society, traditional "men outside, women inside" norms persist (Qing, 2019). Men are seen as the economic backbone, so their health is prioritized; women's health is considered "deferrable".
- c. Altruistic tendency: Parents prioritize children's health, and mothers often sacrifice themselves for children (Duflo, 2012).

When these three forces overlap, women's medical expenditure often becomes the first item to be cut.

Based on this, this paper puts forward the following hypotheses:

Hypothesis 1 (H1): The negative impact of income shocks on women's personal medical expenditure is greater than that on men's.

Hypothesis 2 (H2): This gender difference is more obvious in the married group, and marriage reinforces the traditional gender division of labor.

Hypothesis 3 (H3): This gender difference is more obvious in low-income households; the stronger the budget constraint, the more brutal the trade-offs.

2.2. Research Design

2.2.1. Data Source

This paper uses the 2018 and 2020 data from the China Family Panel Studies (CFPS) released by the Institute of Social Science Survey of Peking University. CFPS is a nationally representative tracking survey covering 25 provinces/municipalities/autonomous regions. We chose these two waves because the 2020 wave coincides with the COVID-19 pandemic, causing widespread income decline and providing a natural experiment.

Sample screening process: (a) Retain the working-age population aged 18–60; (b) Exclude samples with missing key variables; (c) Retain a balanced panel observed in both phases of the survey. A total of 8742 valid samples were obtained, including 4218 women and 4524 men.

2.2.2. Variable Definition

Dependent variable: Annual personal medical expenditure (log-transformed). CFPS asks: “Total personal healthcare expenditure (doctor, medicine, physical exam) in the past year?” Zero expenditures are recorded as 0 and controlled (robustness excludes zeros).

Core independent variables:

- a. Income shock: Indicator = 1 if household per capita income declined by >20% from 2018 to 2020.
- b. Female: indicator = 1 for women.
- c. Interaction: shock $\times$ female.

Control variables: Individual: age, age², education years, marital status, self-rated health (1–5), number of chronic diseases. Household: size, number of children under 16, number of elderly over 65, medical insurance enrollment. Regional: urban/rural, provincial fixed effects.

2.2.3. Model Specification

We estimate a standard DID model with individual and year fixed effects:

$$\ln(\text{medical_expenditure}_{it}) = \beta_0 + \beta_1 \times \text{shock}_{it} + \beta_2 \times \text{female} + \beta_3 \times (\text{shock}_{it} \times \text{female}) + \gamma X_{it} + \delta t + \epsilon_{it}$$

The coefficient β_3 captures the gender-differential effect. A negative β_3 means women’s medical expenditure falls more than men’s.

To address potential endogeneity (illness causing income decline), we control for baseline health and conduct robustness tests excluding the illness-induced poverty sample.

2.3. Empirical Results

2.3.1. Descriptive Statistics and Balance Test

Two tables provide baseline information and support for the parallel trends assumption. Table 1 summarizes gender differences in key variables at baseline. Table 2 tests the parallel trends assumption by comparing treatment and control groups before the income shock.

Women have higher average medical expenditure but lower education and poorer self-rated health at baseline. As shown in Table 1, women’s average annual personal medical expenditure is 1842 yuan, significantly higher than men’s 1536 yuan ($p < 0.01$). However, women have fewer years of education (8.9 vs. 9.5, $p < 0.01$) and lower self-rated health (3.17 vs. 3.31, $p < 0.01$). They also report slightly more chronic diseases (0.51 vs. 0.42, $p < 0.01$). The proportion of households experiencing an income shock is similar between genders (28.7% for women, 27.9% for men, $p = 0.42$).

Crucially, the treatment and control groups are well-balanced on pre-shock characteristics, supporting the parallel trends assumption. Table 2 shows that none of the key variables—including log medical expenditure, age, education, marital status, self-rated health, chronic diseases, household size, and urban residence—differ significantly between treated and control households in 2018. All standardized differences are below 0.1, and all p -values are ≥ 0.09 . This evidence satisfies the parallel trends condition for a two-period DID design (Angrist & Pischke, 2009), and the remaining concern of time-varying confounding is further addressed by including year fixed effects and robustness checks (e.g., PSM-DID).

Table 1. Descriptive Statistics by Gender (2018 Baseline).

Variable	Full Sample	Male	Female	Difference	<i>p</i> -Value
Personal Medical Expenditure (Yuan/Year)	1684	1536	1842	306	0.00
Income Shock (1 = Yes)	0.283	0.279	0.287	0.8 pp	0.42
Age (Years)	41.3	41.1	41.5	0.4	0.35
Years of Education (Years)	9.2	9.5	8.9	−0.6	0.00
Married (1 = Yes)	0.782	0.775	0.789	1.4 pp	0.11
Self-rated Health (1–5)	3.24	3.31	3.17	−0.14	0.00
Number of Chronic Diseases	0.46	0.42	0.51	0.09	0.00
Sample Size (Person)	8742	4524	4218	-	-

Note: Standard errors in parentheses. pp = percentage points. *p*-values are from two-sample *t*-tests (for continuous variables) or chi-square tests (for binary variables). Data from CFPS 2018 wave.

Table 2. Balance Test for Parallel Trends Assumption (2018 Baseline, by Income Shock Status).

Variable	Treated (Shock = 1, N = 2475)	Control (Shock = 0, N = 6267)	Standardized Difference	<i>p</i> -Value
Personal medical expenditure (log)	6.82(0.05)	6.85(0.04)	−0.03	0.62
Age (years)	41.6(0.4)	41.41(0.3)	0.05	0.18
Education (years)	9.0(0.1)	9.3(0.1)	−0.06	0.12
Married (1 = yes)	0.777(0.008)	0.785(0.005)	−0.02	0.48
Self-rated health (1–5)	3.21(0.03)	3.26(0.02)	−0.04	0.31
Number of chronic diseases	0.47(0.03)	0.45(0.02)	0.03	0.56
Household size	4.2(0.08)	4.0(0.05)	0.08	0.09
Urban (1 = yes)	0.514(0.010)	0.532(0.006)	−0.04	0.22

Note: Standard errors in parentheses. Treated group defined as households with >20% decline in per capita income from 2018 to 2020. Standardized difference = (mean_treated − mean_control)/pooled SD. No significant differences at conventional levels (all $p \geq 0.09$, all |std diff| < 0.1), supporting the parallel trends assumption in this two-period DID design (Angrist & Pischke, 2009).

2.3.2. Baseline Regression Results

Table 3 shows that income shocks reduce women's medical expenditure by about 12.7% more than men's.

Table 3. Impact of Income Shocks on Personal Medical Expenditure (ln).

Variable	(1) Basic	(2) +Health	(3) +Household	(4) +Year FE
Income Shock	−0.042 (0.028)	−0.038(0.027)	−0.035(0.027)	−0.031(0.026)
Female	0.153 *** (0.023)	0.126 *** (0.022)	0.118 *** (0.022)	0.115 *** (0.022)
Income Shock Female *	−0.142 ** (0.041)	−0.135 ** (0.040)	−0.129 ** (0.039)	−0.127 ** (0.039)
Control Variables	Basic	+Health	+Household	+Year FE
Sample Size	8742	8742	8742	8742
R ²	0.064	0.112	0.118	0.121

Note: Robust standard errors in parentheses, clustered at the community level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The interaction coefficient is stable around −0.127 to −0.142 ($p < 0.05$). This implies that women's medical expenditure drops by approximately 12.7% more than men's after an income shock. Based on average women's expenditure of 1842 yuan, this translates to a reduction of about 234 yuan. Hypothesis H1 is supported.

2.3.3. Heterogeneity Analysis

Table 4 confirms that the gender gap is larger among married, low-income, and households with children.

Table 4. Heterogeneity Analysis Results (Interaction coefficients Shock $\times$ Female).

SubGroup	Coefficient	Standard Error	Sample Size	Support for H2/H3
Married Sample	−0.156 ***	(0.045)	6836	Yes (H2)
Unmarried Sample	−0.058	(0.078)	1906	No
Low-income (bottom 20%)	−0.184 ***	(0.061)	3142	Yes (H3)
Middle/High income	−0.089 *	(0.048)	5600	Weak
Household with Children under 16	−0.148 **	(0.058)	4215	Yes
Household without Children	−0.107 *	(0.054)	4527	Marginal

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

The gender difference is nearly three times larger in married than unmarried households, supporting H2. In low-income households, the coefficient is −0.184, more than double that of higher-income households, supporting H3.

2.3.4. Robustness Tests

We conducted several robustness checks (results available upon request): (a) alternative shock definitions (10%, 30%, 50% decline); (b) excluding zero medical expenditure observations; (c) controlling for baseline health to address reverse causality; (d) propensity score matching (PSM) to alleviate selection bias; (e) adding individual fixed effects. The core interaction coefficient remained negative and significant (−0.112 to −0.139, $p < 0.05$) in all specifications.

2.3.5. Endogeneity Test: Instrumental Variable Evidence for the COVID-19 Income Shock

To test whether the observed income shock is indeed driven by the COVID-19 pandemic rather than unobserved household characteristics, we instrument the income shock with the provincial-level cumulative confirmed COVID-19 cases. Although the first-stage F-statistic is moderate, the Anderson–Rubin (AR) test, which is robust to weak instruments, strongly rejects the null that the instrument is irrelevant ($F(1,9133) = 27.56$, $p < 0.001$). This result confirms that provincial pandemic severity significantly predicts the income shock, supporting the causal interpretation that the income decline is attributable to the COVID-19 outbreak. Hence, the gender-differentiated effects reported in our main analysis are unlikely to be biased by endogeneity.

3. Conclusions

3.1. Mechanism Explanation

Why are women's health sacrifices more likely within households? Combined with existing studies, three mechanisms are plausible:

- Bargaining power difference:** In Chinese households, men's income is typically higher, giving them greater say. When income declines, resources are allocated to protect the main earner (Doss, 2013; Chatterjee, 2024).
- Gender role norms:** The traditional “men outside, women inside” norm persists. Men's health is prioritized because it directly affects income source; women's health is seen as “deferrable” (Qing, 2019).
- Altruism and intergenerational priority:** In households with children, parents prioritize children's health, and mothers often sacrifice themselves (Duflo, 2012). This matches our finding that the gender gap is larger in households with children.

3.2. Policy Implications

First, medical assistance policies should be more gender-sensitive. In the economic downturn, policymakers should pay attention to the medical accessibility of women, especially married women and women in low-income households.

Second, improve the risk-sharing mechanism at the household level. The current medical insurance is based on individuals and cannot solve the problem of intra-household resource allocation. Institutional arrangements such as household joint insurance and supplementary commercial insurance can be explored.

Third, promote in-depth changes towards gender equality. The fundamental solution lies in changing the traditional gender division of labor and enhancing women's status in economic activities and household decision-making.

3.3. Research Limitations

This study has three main limitations. First, medical expenditure is self-reported, potentially subject to recall bias. Second, we cannot distinguish necessary vs. unnecessary medical care; some reduction in women's expenditure might include overconsumption. Third, the two-wave panel does not allow a multi-period parallel trends graph, although we used PSM and balance tests to mitigate concerns. Future research with longer panel data could provide stronger causal evidence.

3.4. Research Findings

Using CFPS 2018–2020 data, this paper finds that income shocks significantly reduce women's personal medical expenditure but not men's. The gender gap is larger among married individuals, low-income households, and households with children. These findings reveal implicit gender inequality in intra-household resource allocation under economic pressure.

In the context of building a “Healthy China,” we call for: health security policies that penetrate the household level and protect individual health needs; a social security system with greater gender sensitivity that safeguards women's health during economic fluctuations. Only then can genuine health equity—“leaving no one behind”—be achieved.

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