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The Impact of Informal Care on Healthcare Utilization of Older Adults with Functional Limitations in China

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ABSTRACT

Our study examines the impact of informal care on healthcare utilization, focusing on caregiver types, urban-rural, and gender differences. Analyzing data from the China Health and Retirement Longitudinal Study and using fixed effects models, we discovered complementary effects between informal care and healthcare. Specifically, spousal care increased inpatient care use, adult child care boosted both inpatient and outpatient use, and dual care from children and spouses showed the most significant impact on healthcare use. The association between informal care and healthcare use varied across gender or urban-rural residence. Our findings highlight the importance of caregivers in accessing healthcare services.

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Older adults; China; informal care; healthcare utilization

Introduction

With China's accelerated population aging, the number of older adults requiring care is expected to increase from 45.3 million in 2020 to 59.32 million in 2030 (Gong et al., 2022). Although the Chinese government has started investing in home- and community-based care, the availability of these services is sporadic or absent in most of China (Hu & Ma, 2018; Su et al., 2023). Moreover, the traditional culture of filial piety and the cost of employing professional caregivers make it challenging to shift the preference of Chinese older adults for informal care in the short term (Shi & Hu, 2020; Wang et al., 2023). On the other hand, frail older adults prefer to involve family members in health decisions because they lack executive autonomy or cannot carry out their decisions without assistance from caregivers (Gillick, 2013; Kelly et al., 2012; Wolff & Roter, 2011). If policymakers want to improve long-term care systems and healthcare systems, they need to understand the relationship between informal care and formal care.

Informal care refers to unpaid care provided by spouses, adult children, and other relatives to older adults in their daily activities (Bom et al., 2019).

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Previous studies primarily examined the impact of informal care on formal care provided by the social care system (e.g., nursing home care, community care, and adult day care) and have found that informal care may be an alternative to formal home care or nursing home care (Barczyk & Kredler, 2019; Choi et al., 2021; Hanaoka & Norton, 2008; Jimenez-Martin & Prieto, 2012; Kjaer & Siren, 2020; Litwin & Attias-Donfut, 2009; Zhang et al., 2021). However, healthcare service is an important factor in maintaining the quality of life of frail older adults in their later years (Gu et al., 2009). Therefore, it is crucial to investigate whether informal care affects healthcare utilization among older adults with functional limitations.

The evidence of informal care on healthcare utilization is mixed, and the existing evidence focuses on adult children care in developed countries. Some studies suggest that informal care may reduce the need for healthcare by preventing or slowing age-related health decline. Van Houtven and Norton (2004) found that informal care provided by adult children in the United States was a substitute for doctor visits and hospital nights but was complementary to outpatient surgery. They furthermore discovered that informal care could reduce inpatient care expenditure (Van Houtven & Norton, 2008). Another study from Swiss found that available informal care had no effect on the likelihood of hospitalization but reduced the length of hospitalization (Weaver & Weaver, 2014).

Other studies support that informal care is a difficult substitute for highly professional healthcare services. They believe that informal caregivers are primarily responsible for monitoring the health of older adults and assisting them in making and implementing decisions about healthcare visits. European research identified informal care as a complement to health visitor use, general practitioner visits, and hospital inpatient use (Bolin et al., 2008; Condelius et al., 2010; Urwin et al., 2019). In addition, two studies focused on older adults with particular illnesses. Torbica et al. (2015) found that informal caregivers significantly increased direct medical costs and the probability of accessing rehabilitation services for Italian stroke patients. Another study showed that informal care increased outpatient visits for the European dementia population (Bremer et al., 2017).

There is limited research on informal care and healthcare services in China. A study using two waves of data found that time of informal care was positively associated with the number of outpatient visits and hospitalizations among older adults (X. L. Chen et al., 2022). Another study using data from the China Longitudinal Healthy Longevity Survey found that time spent on informal care provided by adult children was positively associated with the utilization and expenditure on inpatient services, but negatively associated with the utilization of outpatient services (Wang et al., 2022).

Our study is expected to contribute in three ways. First, previous studies have focused either on general older adults or older adults with dementia

or stroke. Our study focuses on older adults with functional limitations. As China's population ages, the number of functionally limited older adults is increasing dramatically, and it is difficult for them to access healthcare services independently (X. Chen et al., 2022). Second, previous studies mainly explored the association between adult children care and healthcare utilization. However, spousal caregivers have worse health status and fewer social resources than adult child caregivers (Ai et al., 2022; Pinquart & Sorensen, 2011; van Groenou et al., 2013). In addition, adult children may need to balance their work and juvenile children while caring for disabled older adults (Pinquart & Sorensen, 2011). Thus, the impact of informal care on healthcare services may vary depending on caregiver type. Finally, the endogeneity of this study may exist for two reasons. One reason is that some important control variables may be omitted due to data limitations. Another reason is that healthcare expenditures may also affect the type of informal care. Our study is one of the very few empirical analyzes that use panel data to investigate the impact of informal care on healthcare use. Panel data with fixed effects can better control for endogeneity because it can control for unobserved heterogeneity by using the time dimension of respondents.

Based on four waves of panel data from the China Health and Retirement Longitudinal Study (CHARLS), we used the fixed effects model to examine the association between informal care and healthcare utilization among older adults with functional limitations. Given that adult children and spouses may interact with care recipients differently, we explored the impact of caregiver type on healthcare use. Finally, Urban-rural and gender heterogeneity were further examined.

This study investigates the impact of informal caregiving on healthcare utilization, drawing upon the Andersen and Newman Behavioural Model. According to the Andersen Model, healthcare utilization results from the interaction of three key factors: predisposing factors, enabling factors, and evaluated and perceived need factors (Andersen, 1995). Predisposing factors refer to demographic characteristics, social structures, and health beliefs that make individuals inclined to use healthcare services even before the onset of an illness. Enabling factors encompass healthcare service accessibility and an individual's capability to access healthcare services, often influenced by socioeconomic factors. Evaluated and perceived need factors that lead individuals to seek healthcare services, such as direct self-perceived illnesses and evaluated health indicators. The Andersen Model has found extensive application in research concerning healthcare use (J. R. Shi et al., 2018; Van Houtven & Norton, 2008; X. Chen et al., 2022). Our study places particular emphasis on various types of informal care, potentially expanding the scope of enabling factors that could advance the model's development. This expansion can provide a more comprehensive understanding of healthcare utilization among disabled older adults.

Method

Data

Our data from CHARLS 2011, 2013, 2015, and 2018, a longitudinal nationally representative survey among the community-dwelling middle-aged and elderly population in China (Zhao et al., 2014). A multi-stage stratified probability size scale technique was used by the survey to recruit community-dwelling residents. Waves 2011, 2013, 2015, and 2018 of CHARLS include 17,385, 18,610, 21,038, and 19,816 respondents, respectively. First, we retained those aged 60 years and older in the sample, leaving 36,445 observations. Second, the CHARLS questionnaire asked for informal care information only for older adults with basic activities of daily living (BADL) limitations or instrumental activities of daily living (IADL) limitations. Therefore, we excluded older adults without BADL or IADL limitations, leaving 14,564 observations. Specifically, BADL indicates difficulty doing five daily activities (bathing, dressing, eating, using the toilet, getting in or out of bed), and IADL refers to difficulties in doing six instrumental activities (doing household chores, cooking, shopping, making telephone calls, taking medications, and managing money). We then removed samples in which care was provided by other relatives or friends ($n = 756$) and by professional caregivers (including paid helpers, volunteers, employees of the facility and community, $n = 152$), as well as those in which informal care information was missing ($n = 307$) and all dependent variables were missing simultaneously ($n = 29$), leaving 13,349 observations. Finally, we retained respondents who had participated in at least two waves to form an unbalanced panel data. The final number of observations was 9538, and the number of individuals was 3789. 2185 of these individuals had participated in two waves, 1248 in three waves, and 356 in four waves. To maximize statistical power, the analysis sample size was allowed to vary according to the number of valid responses for each outcome variable. The sample size for the fixed effects model analysis ranged from 8860 to 9516, depending on the outcomes of concern.

Dependent variables

Dependent variables of interest for this study were utilization and expenditure of outpatient and inpatient care in the past year. Respondents were asked about utilization and expenditure for outpatient services in the past month and utilization and expenditure for inpatient services in the past year. We converted the past month's utilization and expenditure for outpatient services to the past year's utilization and expenditures for outpatient services. Specifically, healthcare utilization includes (1) the number of outpatient visits in the past year and (2) the number of hospitalizations in the past year. Healthcare expenditures were measured as (3) outpatient expenditure in the past year; (4) inpatient expenditure in

the past year; and (5) total outpatient and hospitalization expenditures in the past year.

Independent variables

Our key independent variable was informal care from spouses or adult children. First, we defined informal care as 1 if the respondent received help from a spouse or adult children in at least one BADL or IADL. Informal care was defined as 0 if the respondent was impaired in at least one BADL or IADL but received no help. Second, we further classified informal care type into four categories: not receiving any care (reference), receiving care from adult children only, receiving care from spouses only, and receiving care from both adult children and spouses.

Covariates

All covariates are time-varying because the fixed effects model eliminates time-invariant variables from the analysis. Based on existing studies (Bolin et al., 2008; Urwin et al., 2019; Van Houtven & Norton, 2004, 2008; Wang et al., 2022), we incorporated time-varying covariates including working status (categorical variable: unemployment, agricultural employment, nonagricultural employment), marital status (spouse alive, or spouse absent), log of per capita expenditure (continues variable), household size (the number of household members, continuous variable), public health insurance (include urban employees' basic medical insurance, urban residents' basic medical insurance and new rural cooperative medical insurance, dichotomous variable), private health insurance (dichotomous variable), other health insurance (dichotomous variable), smoking (dichotomous variable), alcohol consumption (dichotomous variable), social activity participation (dichotomous variable), and Chronic disease (continues variable; a total of fourteen chronic diseases, including hypertension, dyslipidemia, diabetes, cancer or malignant tumor, chronic lung diseases, liver disease, heart disease, stroke, kidney disease, stomach or other digestive diseases, psychiatric problem, memory-related disease, arthritis or rheumatism, and asthma).

Statistical analysis

Panel data models typically consist of fixed effects models and random effects models. We employed the Hausman test to determine which model best suits this study. The Hausman test was applied to all dependent variables, and the results indicated that the fixed effects model is more appropriate (all $p < .05$). Fixed-effects model provides more rigorous estimates of the association

between the dependent variable and the time-varying independent variables. The advantage of the fixed-effects model is that they allow us to control for all time-invariant and unobserved characteristics of individuals that may affect informal care and healthcare utilization. The modeling strategy captures the changes observed over time in individuals in both the outcome and explanatory variables. In the fixed effects model, each respondent serves as his or her own control group. Multiple observations of the same respondent and within-individual changes over time allow researchers to make robust conclusions regarding changes in healthcare utilization and informal care (Allison, 2009). The fixed effects model was specified as follows:

$$Y_{it} = \alpha + \beta InformalCare_{it} + \delta X_{it} + \omega_i + \mu_t + \varepsilon_{it}$$

Y_{it} is the outcome of the individual i at wave t. $InformalCare_{it}$ is a dummy variable indicating whether the individual i had informal care. The key coefficient of interest is β, which measures the effect of informal care on the healthcare utilization and expenditure. X_{it} denotes a set of time-varying covariates. $\omega_i$and μ_t represent individual and year fixed effects, respectively. The individual fixed effects control for differences in time-invariant individual characteristics such as gender, residence, education or long-term health, while the year fixed effects control for time-varying events common to all individuals such as age or economic downturns. ε_{it} is the random error term. We reported robust standard errors clustered at the community level to account for possible correlation in outcomes among older adults coming from the same residing community. All statistical analyzes were performed using Stata 17.

Finally, given that this study includes multiple dependent variables, we used Romano-Wolf corrections to address the problem of multiple hypothesis tests (Clarke et al., 2020). We reported the Romano-Wolf p-values associated with the critical coefficients for each outcome.

Result

Descriptive results

Table 1 shows the descriptive analysis results. Of the enrolled participants, 38.2% were male, and 69.5% lived in rural areas. The mean age of the sample was 71.439 years. Among those older adults in need of care, only 70.36% had informal care provided by adult children or spouses. Of these, 45.72% were cared for by a spouse only, 39.67% were cared for by adult children only, and 14.62% were cared for by a spouse and adult children together. In the past year, the average number of outpatient visits for the sample was 7.046, the average number of hospitalizations was 0.421, the average outpatient expenditure was

Table 1. Descriptive statistics of the sample.

	Overall ($N = 9538$)		Without care ($N = 2827$)		Informal care ($N = 6711$)	
	Mean/Prop.	SD	Mean/Prop.	SD	Mean/Prop.	SD
Total expenditure	7141.175	27722.578	4462.802	19711.556	8274.333	30415.051
Outpatient visits	7.046	19.919	6.778	18.765	7.159	20.389
Expenditure of outpatient visits	4059.875	22865.580	2560.953	16361.539	4692.136	25083.123
Hospitalizations	0.421	0.958	0.332	0.825	0.458	1.006
Expenditure of hospitalizations	3065.269	11831.687	1889.108	8525.845	3562.744	12947.456
Male	0.382		0.394		0.377	
Live in Rural	0.695		0.706		0.690	
Age	71.439	7.661	70.100	6.781	72.003	7.936
Working status						
Unemployment	0.637		0.507		0.692	
Agricultural employment	0.311		0.414		0.268	
Non-agricultural employment	0.052		0.080		0.040	
Married	0.696		0.642		0.718	
Household size	3.006	1.676	2.793	1.638	3.096	1.684
Log of per capita expenditure	8.853	0.953	8.851	0.903	8.854	0.973
Public health insurance	0.920		0.918		0.921	
Private health insurance	0.007		0.006		0.008	
Other health insurance	0.011		0.012		0.011	
Smoke	0.211		0.244		0.197	
Drink	0.216		0.268		0.194	
Social activity	0.362		0.428		0.334	
Chronic disease	2.807	1.991	2.700	1.909	2.852	2.022

4060.95 yuan, the average inpatient expenditure was 3061.52 yuan, and the average total expenditure was 7138.65 yuan.

Association between informal care provided by family caregivers and healthcare utilization outcomes

Table 2 shows the effects of informal care on healthcare utilization and expenditure. After controlling for time-varying covariates, the results indicated a positive and significant association between informal care and healthcare utilization and expenditure. Specifically, there was no significant difference in the number of outpatient visits between older adults who had family caregivers and older adults who did not have family caregivers. However, adult children or spouse care significantly increased the level of outpatient expenditure by 2050.935 yuan ($p < .01$). In the aspect of inpatient care, we found that informal care significantly increased the number of hospitalizations during last year by 0.105 times ($p < .01$), the level of inpatient expenditure by 1300.396 yuan ($p < .01$), and the total expenditure by 3348.688 yuan ($p < .01$).

Association between informal care types and healthcare utilization outcomes

Table 3 demonstrates the association between informal care type and healthcare utilization. The results showed that spousal care significantly increased the number of hospitalizations ($\beta = 0.089$, $p < .01$) and

Table 2. Fixed-effects regression models for healthcare utilization and informal care.

	Outpatient visits	Expenditure of outpatient visits	Hospitalizations	Expenditure of hospitalizations	Total Expenditure
Informal care (Ref: No care)					
Informal care	0.917^{+}	2050.935**	0.105**	1300.396**	3348.688**
	(0.690)	(722.954)	(0.025)	(377.256)	(870.510)
Romano-Wolf p-value	0.088	0.001	0.001	0.001	0.001
Constant	2.643	−7523.354*	−0.293^{+}	−15800.758***	−23005.222***
	(3.038)	(3499.690)	(0.150)	(2772.442)	(5124.835)
Observations	9335	9160	9516	9173	8860
R-squared	0.506	0.409	0.565	0.491	0.461

Standard errors in parentheses. Time-varying controls include working status, marital status, log of per capita expenditure, household size, public health insurance, private health insurance, other health insurance, smoking, alcohol consumption, social activity participation, and chronic disease. Significance levels (based on Romano-Wolf p-values): $^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

inpatient expenditure ($\beta = 958.811$, $p < .05$), but had no effects on other outcomes. Furthermore, adult child care significantly increased outpatient expenditure ($\beta = 2761.220$, $p < .01$), the number of hospitalizations ($\beta = 0.112$, $p < .01$), inpatient expenditure ($\beta = 1550.370$, $p < .01$) and the total expenditure ($\beta = 4254.194$, $p < .01$). Interestingly, we found that receiving care from both children and spouses significantly increased the number of outpatient visits ($\beta = 2.677$, $p < .01$), the number of hospitalizations ($\beta = 0.134$, $p < .01$). Similarly, this dual informal care also increased outpatient expenditure ($\beta = 4010.933$, $p < .01$), inpatient expenditure ($\beta = 1604.839$, $p < .01$), and the total expenditure ($\beta = 5833.686$, $p < .01$).

Table 3. Fixed-effects regression models for healthcare utilization and informal care type.

	Outpatient visits	Expenditure of outpatient visits	Hospitalizations	Expenditure of hospitalizations	Total Expenditure
Informal care type (Ref: No care)					
Spouse care	1.285	738.917	0.089**	958.811*	1694.691^{+}
	(0.792)	(743.678)	(0.031)	(426.519)	(903.660)
Romano-Wolf p-value	0.102	0.239	0.002	0.023	0.066
Child care	0.013	2761.220**	0.112**	1550.370**	4254.194**
	(0.913)	(1100.129)	(0.035)	(550.866)	(1315.220)
Romano-Wolf p-value	0.987	0.005	0.001	0.002	0.001
Dual care	2.677**	4010.933**	0.134**	1604.839**	5833.686**
	(1.117)	(1390.806)	(0.048)	(667.855)	(1744.724)
Romano-Wolf p-value	0.008	0.003	0.003	0.008	0.001
Constant	3.059	−7098.804*	−0.286^{+}	−15739.379***	−22460.215***
	(3.051)	(3512.774)	(0.149)	(2776.963)	(5123.811)
Observations	9335	9160	9516	9173	8860
R-squared	0.507	0.410	0.566	0.492	0.462

Standard errors in parentheses. Time-varying controls include working status, marital status, log of per capita expenditure, household size, public health insurance, private health insurance, other health insurance, smoking, alcohol consumption, social activity participation, and chronic disease. Significance levels (based on Romano-Wolf p-values): $^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Stratified analyses by residence and gender

We added an interaction term to further examine whether and how the association between caregiver type and healthcare utilization varies by urban-rural and gender groups. Supplementary Table S1 showed that informal care from children exerted weaker impacts on inpatient expenditures (β = –2962.629, *P* for interaction < 0.05) in rural participants than urban ones. Similarly, we found that the positive associations between spousal informal care and outpatient expenditures (β = –4865.406, *P* for interaction < 0.01) and total healthcare expenditures (β = –4483.506, $p < .05$) were lower in men than women (see Supplementary Table S2).

Sensitivity analysis

First, we replaced the measures used in the above analysis with the following measures of health care utilization and expenditures: (a) the probability of outpatient visits; (b) the probability of inpatient visits; (c) individual out-of-pocket (OOP) health expenditure on outpatient visits; (d) individual OOP health expenditure on inpatient visits; and (e) total OOP for outpatient and inpatient. Supplementary Table S3 shows similar results with Table 2: Informal care increased the probability of outpatient visits and hospitalizations, outpatient OOP, inpatient OOP and total OOP.

Second, since the number of outpatient visits and hospitalizations are essentially non-negative discrete integer and count variables, we use a negative binomial model with individual fixed effects and year-fixed effects, which assumes that variance is a quadratic function of the mean (Jones, 2007). Supplementary Table 4 shows that informal care tended to increase the number of hospitalizations during the last year. However, informal care had no impact on the utilization of outpatient services. These results are consistent with those in Table 2, indicating that our results are robust.

Third, we further considered the impact of the duration of care on health-care utilization and expenditures. Caregiving time is measured by the number of days of care participants received from all the family caregivers during the last month. Responses were categorized into four groups: none, less than 15 days, between 15 and 29 days, and 30 days or more (X. L. Chen et al., 2022). Results found that receiving care for more than 30 days significantly increased the number of outpatient visits, the number of hospitalizations, outpatient expenditure, and the total expenditure (see Supplementary Table 5), further demonstrating the robustness of our findings.

Discussion

This study presents a comprehensive picture of the impact of informal care on healthcare utilization among older adults with functional limitations. First, we found that family caregivers significantly increased outpatient expenditure, inpatient care utilization and expenditure, and total healthcare expenditure. Second, spouse caregiver promoted only inpatient care utilization and expenditures. However, adult child caregivers increased inpatient care utilization and expenditure, outpatient expenditure, and total healthcare expenditure. Dual care of children and spouses had the greatest impact on healthcare use. Finally, the positive effects of adult child caregivers on inpatient expenditure were much more prominent in urban than rural areas. Moreover, the positive impact of spousal care on outpatient expenditure and total expenditure was weaker for males than for female older adults.

Our results suggest that informal care significantly increased outpatient expenditure, inpatient care utilization and expenditure, and total healthcare expenditure among functionally limited older adults, echoing some previous studies (Bolin et al., 2008; Bremer et al., 2017; X. L. Chen et al., 2022; Condelius et al., 2010; Torbica et al., 2015; Urwin et al., 2019; Wang et al., 2022). Most scholars support that informal care is more similar to daily living care but hardly a substitute for highly specialized and skilled healthcare services (Bolin et al., 2008; Condelius et al., 2010; Jimenez-Martin & Prieto, 2012; Urwin et al., 2019; X. L.Chen et al., 2022). Family caregivers may not only provide daily care for older adults but also monitor the health status of their care recipients (Torbica et al., 2015; Williams et al., 2012). For example, Condelius et al. (2010) found that informal caregivers can take care of older adults' medications and usually notify pharmacies or medical staff quickly if a prescription problem occurs. Furthermore, family caregivers could facilitate access to healthcare facilities by providing advice and financial support and assisting in transportation (Torbica et al., 2015; Van Houtven & Norton, 2004). For those with severe functional or cognitive limitations, family members have an essential role in determining healthcare decisions, and they support access to specialized healthcare for disabled older adults over a longer period or until rehabilitation (Song, 2017; Van Houtven & Norton, 2004). However, a small number of studies found a negative association between informal care and outpatient (Van Houtven & Norton, 2008; Wang et al., 2022) or inpatient care (Van Houtven & Norton, 2004, 2008; Weaver & Weaver, 2014). One of the reasons for this disparity may be that China, as a developing country, has difficulty meeting the healthcare and daily care needs of frail older people. A recent national survey found that more than 17% of the older population in China was not hospitalized when they should be (Center for Health Statistics and Information, 2016). Another possible explanation is that some studies ignore the impact of spousal caregiving on healthcare utilization.

We found that spouse care promoted inpatient care use. However, adult children care increased not only inpatient care use but also outpatient expenditure. Dual care of children and spouses had the greatest impact on utilization and expenditures for healthcare. We proposed some possible reasons to explain this interesting result. First, society may have different expectations for spousal caregivers and adult child caregivers. Because of the prevalence of filial piety in China, adult children are responsible for taking positive initiatives for their parents' well-being, including helping older adults seek medical services when they are ill. In contrast, spouses may live more closely with disabled older adults and are more inclined to provide emotional support and daily care (Namkung et al., 2017). Second, adult children and spouses have different health capital. Adult children of older adults are in better physical health, have higher levels of education, and are at a higher economic level than spouses of older adults (Pinquart & Sorensen, 2011; van Groenou et al., 2013). These advantages make it easier for adult children to help older adults with functional limitations to access healthcare services. Third, adult child caregivers may be more health-conscious and more likely to identify the health needs of the care recipient than spousal caregivers. Spousal caregivers may have different perceptions of the needs and benefits of healthcare. It has been found that older adults tend to view illness as a result of natural aging and are reluctant to seek healthcare (Wu et al., 2022). In addition, many adult children have conflicting responsibilities, such as their careers, young children, or adolescents who need support and attention (Pinquart & Sorensen, 2011). As a result, adult children are often more likely to send their parents to the hospital. Finally, the presence of both adult children and spousal caregivers may increase the accessibility of informal care. When children and spouses are involved in caregiving at the same time, they can negotiate and adjust with each other to better attend to the health of older adults and accompany them to medical appointments.

Heterogeneity analysis showed that the positive effects of adult child caregivers on inpatient expenditure were more prominent in urban than rural areas. On the one hand, this may be due to the lower wage incomes of rural adult children compared to urban adult children, which limits rural older adults' healthcare expenditures. On the other hand, it may be that the scarcity of healthcare resources and transportation in rural areas limits access to healthcare services (Wang et al., 2019; Zhou et al., 2021). Moreover, the positive impact of spousal care on outpatient expenditure and total expenditure was weaker for males than for females. In traditional Chinese culture, women are usually responsible for the household chores, play the role of child-rearing, and act as guardians of their relatives, while men perform the role of breadwinner (Bordone & Arpino, 2016; Kaufman & Elder, 2003). Therefore, women have more experience caring for family members than men. It can be

hypothesized that when a male spouse cares for a disabled female, he is more likely to seek the help of an outpatient physician due to his inexperience.

Our research has several important policy implications. Policymakers face many challenging issues in the future provision of healthcare services and social care to older adults with functional limitations. Our results suggest that policymakers should consider the role of informal care when designing health policies for frail older adults. Firstly, it is essential to foster societal recognition of the value of informal care. Secondly, it is equally crucial to introduce incentives for willing family members to provide care. These incentives may encompass financial support such as social security subsidies, income tax reductions, and healthcare benefits like respite care services. Thirdly, the government should further develop a comprehensive care system and augment investments in community-based care services to mitigate the shortcomings of family caregiving. Moreover, the promotion of telemedicine services and electronic health record systems can enable real-time information sharing between healthcare professionals and informal caregivers, which can expedite the identification of the healthcare needs of care recipients. Furthermore, given the aging population and evolving disease patterns, policymakers should strategically allocate caregiving and healthcare resources, progressively implementing an integrated healthcare and caregiving model, for instance, expanding the system of family doctor contracts and establishing medical facilities within caregiving institutions. Lastly, policymakers should allocate additional healthcare resources to primary healthcare facilities, facilitating access to healthcare services for older adults in rural areas.

In light of our research findings, social workers should recognize the importance of family caregivers in enabling healthcare utilization for frail older adults and the distinctions between spousal and adult child caregivers. Given the positive impact of informal care on healthcare use, social workers can offer emotional support and professional training to family caregivers to assist them in fulfilling their caregiving roles more effectively. Furthermore, for those older adults solely cared for by their spouses, social workers should aid in coordinating medical services to ensure timely access to healthcare. Lastly, social workers should also consider the gender of care recipients, with particular attention to the healthcare needs of older male adults who are cared for by their spouses. These research findings will influence the practice strategies of social work.

This study has some limitations. First, all information on healthcare utilization and expenditure was obtained from the self-report of older adults, which may be subject to recall bias. Moreover, the measure of informal care was not asked within a time (within the past year); using the number of outpatient occurrences and cost from last month to estimate the 12-month total can be biased. In addition, our study defined informal care as receiving help in at least one BADL or IADL

without considering the intensity of care. Several essential control variables, such as filial piety, family relationships, relationships between care recipients and caregivers, or acute conditions, have been demonstrated to influence informal care provision (Meyer et al., 2022). However, due to data limitations, we could not control these variables. The influence of these factors on the relationship between informal care and healthcare utilization can be further explored in the future. Furthermore, we cannot distinguish specific outpatient or inpatient care services, such as screening tests, complex surgeries, and rehabilitation services, as this information was unavailable in our data. Finally, although this study relies on nationwide data, our sample does not include all provinces due to the CHARLS' complex sampling design.

Conclusion

Overall, our findings highlight the importance of family caregivers in accessing healthcare services for frail older adults. We found complementary effects between informal care and healthcare services using the fixed-effects model. Furthermore, family caregiver type has been demonstrated to impact healthcare utilization. Policymakers can effectively promote healthcare service utilization among older adults with functional limitations by encouraging family members to provide informal care.

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Ethics approval

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