RESEARCH

Outpatient pooling policy and healthcare satisfaction among middle-aged and older adults: evidence from China

Heling $\mathrm{Ai}^{1^*}\!,$ Ariel Shensa^2 and Faina Linkov^{2^*}

Abstract

Objective Previous studies have shown that health insurance and financial burden affect satisfaction with healthcare. This study aims to examine the relationship between China's outpatient pooling policies and healthcare satisfaction among middle-aged and older adults. Additionally, it investigates how demographic, socioeconomic, health status, healthcare utilization, and regional healthcare resource variables influence satisfaction levels.

Methods Using data from the 2015 and 2018 China Health and Retirement Longitudinal Study, a mixed-effects ordered logit model was employed to assess the relationship between outpatient pooling policies and healthcare satisfaction.

Results Outpatient pooling policies for Urban Employee Basic Medical Insurance were significantly associated with higher healthcare satisfaction (AOR = 1.29, 95% CI = [1.03, 1.62]), with particularly strong effects observed in the middle (AOR = 2.55, 95% CI = [1.05, 6.18]) and eastern regions of China (AOR = 3.05, 95% CI = [1.46, 6.39]). Higher financial levels of outpatient insurance protection were also associated with greater healthcare satisfaction (AOR = 1.44, 95% CI = [1.11, 1.86]). However, no significant association was observed regarding the outpatient pooling policies for Urban and Rural Residents Basic Medical Insurance. Additionally, demographic, socioeconomic, health, and healthcare utilization variables, along with regional healthcare resources, were significantly associated with healthcare satisfaction.

Conclusions This study highlights the role of implementing outpatient pooling policies, especially a higher level of protection under these policies, in improving healthcare satisfaction among middle-aged and elderly individuals in China.

Keywords Outpatient pooling policies, Healthcare satisfaction, Urban employee basic medical insurance, Urban and rural resident basic medical insurance, Mixed-effects ordered logit model

*Correspondence: Heling Ai 2023alily@gmail.com Faina Linkov linkovf@duq.edu ¹School of Public Health, Shanghai University of Traditional Chinese Medicine, Shanghai, China ²Department of Health, Exercise & Applied Science, John G. Rangos Sr. School of Health Sciences, Duquesne University, Pittsburgh, USA



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Background

Healthcare service satisfaction is an important indicator for measuring the quality of healthcare services and patients'experiences. In recent years, China has been actively promoting reforms in the outpatient pooling policies under its social health insurance system. These policies are particularly relevant to middle-aged adults (aged 45–59) [1] and older adults (aged 60 and above) [1, 2], who are the primary users of outpatient medical services. However, it remains unclear whether the implementation of outpatient pooling policies has effectively improved healthcare service satisfaction among these populations.

Institutional setting

Since 1998, China has gradually established a social medical insurance system that covers urban employees, as well as urban and rural residents, through schemes such as Urban Employee Basic Medical Insurance (UEBMI), New Rural Cooperative Medical Scheme(NRCMS), and Urban Resident Basic Medical Insurance (URBMI), with varying coverage scopes that primarily focus on inpatient services [3, 4]. Starting in 2009, a series of healthcare reforms had been implemented to increase healthcare accessibility, strengthen financial protection, and improve patient satisfaction [5]. These reforms became increasingly urgent as China faced a rapidly aging population, with the proportion of older people expected to rise from 11.4% in 2017 to 26.1% in 2050 [6]. Among these reforms, the outpatient pooling policy became a critical component of China's social health insurance system.

Various provinces and cities across China had already launched outpatient pooling pilot programs at different times [7, 8], which were conducted under the frameworks of the UEBMI,NRCMS or URBMI [7, 8]. Local governments were granted considerable autonomy in designing outpatient pooling policies, resulting in notable regional variations in the timing of policy implementation and specific policy features, such as deductible thresholds, reimbursement rates, and caps on reimbursement [7]. For example, under the UEBMI, cities like Beijing and Shanghai began implementing outpatient co-payment policies as early as 2001. However, by 2018, some cities had yet to initiate such policies [7]. These policy differences provide a unique quasi-natural experiment for studying the effects of outpatient pooling on satisfaction with local healthcare services, allowing for a comparison across different regions and policy settings.

With the issuance of the "Guiding Opinions of the General Office of the State Council on Establishing and Improving the Mutual Aid Guarantee Mechanism for Outpatient Services under the Basic Medical Insurance for Employees" in 2021 [9], China's outpatient pooling policy began its large-scale nationwide implementation. The core objective of this initiative is to establish

outpatient pooling funds that enhance financial support for outpatient services, thereby improving service accessibility and reducing individuals' financial burdens [9]. In the context of significant expansion of outpatient pooling policies and population aging, there is an urgent need for empirical research to explore the impact of outpatient pooling policy on local healthcare service satisfaction.

Theoretical framework

A number of studies have identified a range of factors that significantly influence healthcare service satisfaction. These include health insurance [10-12] and financial burden [13-16]. Other influential factors include demographic variables [17, 18], socioeconomic variables [15, 19, 20], individual health status [17, 21-23], and healthcare utilization [24]. Additionally, local economic development (such as per capita GDP), allocation of healthcare resources [17, 25, 26], and regional characteristics [19] are also considered important determinants of healthcare satisfaction. These findings suggest that healthcare satisfaction is a multifactorial construct shaped by individual level characteristics, institutional factors and contextual factors.

Among these factors, health insurance and financial burden are particularly important in determining satisfaction with healthcare services. Research has shown that having health insurance [11, 12], lower co-payments levels [14], adequate insurance coverage [12] are associated with higher levels of satisfaction. In contrast, higher financial burden [13–16] is associated with lower satisfaction. These findings underscore the theoretical role of financial protection as a mediating pathway through which healthcare policies may influence patient satisfaction.

Many studies have emphasized the broader benefits of outpatient pooling policies-particularly in promoting healthcare utilization, strengthening financial protection, and improving health outcomes. For example, studies have shown that the outpatient pooling policies for UEBMI significantly increased outpatient service utilization among insured individuals [27, 28]. Establishing an outpatient pooling system effectively reduces the financial burden associated with health expenditures in China [27, 29]. Furthermore, this policy has been found to improve the health of individuals enrolled in UEBMI [7], especially those with chronic diseases covered by the Urban and Rural Resident Basic Medical Insurance (URRBMI) [8]. Research based on other countries also shown that reduced reduced cost sharing is associated with lowerout-of-pocket expenditures [30], while higher cost-sharing models tend to reduce health service utilization [31].

Previous research provides a theoretical basis for the connection between outpatient pooling policies and healthcare service satisfaction, although this relationship has rarely been directly studied. Outpatient pooling policies have been shown to reduce financial burdens [27] and improve access to care [28]—two key pathways that are theoretically linked to higher satisfaction. Specifically, by enhancing financial protection and healthcare accessibility, such policies may alleviate patients' economic concerns and improve their healthcare experiences. Therefore, this study focuses on the effects of outpatient pooling policies on healthcare satisfaction among middle-aged and older adults.

These effects are likely influenced by both the level of outpatient pooling protection and regional variations in China. Research suggests that higher levels of outpatient pooling protection for employees lead to earlier and more noticeable health benefits [7]. Furthermore, the positive impact of outpatient pooling on service utilization is directly related to the financial coverage provided by the policy [32]. Additionally, regional differences significantly influence healthcare satisfaction in China. Disparities in satisfaction levels are linked to regional factors such as economic development, availability of healthcare resources, and local health policy implementation [19, 26].

Building upon the theoretical and empirical gaps identified in the existing literature, this study uses data from the 2015 and 2018 waves of the China Health and Retirement Longitudinal Study (CHARLS) to examine the relationship between outpatient pooling policies under UEBMI and URRBMI and healthcare service satisfaction among middle-aged and older adults. In addition, it investigates how regional heterogeneity and different levels of financial protection influence this relationship.

Methodology

Study design

This study employs a longitudinal observational design to assess the impact of China's outpatient pooling policies on healthcare satisfaction among middle-aged and older adults, using two waves (2015 and 2018) of the China Health and Retirement Longitudinal Study (CHARLS). The MEOLOGIT model was selected because healthcare satisfaction is an ordered categorical outcome, making it a suitable approach for modeling ordinal data [33, 34].

Fixed-effects models were deemed inappropriate due to the minimal within-individual variation in outpatient pooling policy variables between 2015 and 2018, which limits their effectiveness in estimating policy impact [35, 36].

Study population

The study focuses on two distinct subpopulations based on health insurance enrollment:

Sample one

Individuals aged 45 and above enrolled in the Urban Employee Basic Medical Insurance (UEBMI), to assess the impact of the UEBMI outpatient pooling policy (UEBMI-OP).

Sample two

Individuals aged 45 and above enrolled in the Urban-Rural Resident Basic Medical Insurance (URRBMI), Urban Resident Basic Medical Insurance (URBMI), or New Rural Cooperative Medical Insurance (NRCMI), to analyze the effects of the URRBMI outpatient pooling policy (URRBMI-OP). With the high similarity in system design between URBMI and NRCMI [37], and their merger beginning in 2016 [38], individuals enrolled in URRBMI, URBMI, or NRCMI were combined into a single sample. To ensure sample homogeneity, individuals without health insurance coverage were excluded from the study.

Data sources

The study integrates micro-level and macro-level data:

Micro-level data

This study utilizes micro-level data from the 2015 and 2018 waves of the China Health and Retirement Longitudinal Study (CHARLS), covering 28 provinces and 125 cities in China. The dataset includes information on healthcare satisfaction, demographic characteristics, socioeconomic factors, health status, and healthcare utilization [39].

Macro-level data

The macro-level data are derived from the 2016 and 2019 editions of the China City Statistical Yearbook, including per capita healthcare resources and per capita GDP at the city level. Missing data were supplemented using Provincial Statistical Yearbooks and Provincial Health Statistical Yearbooks. The detailed information on data sources for per capita GDP and healthcare resources across 125 cities of the CHARLS dataset can be found in Appendix Table 1.

Variables

Dependent variable

Satisfaction with local healthcare services was assessed using a single item from the CHARLS questionnaire, which asked participants: "Are you satisfied with the quality, cost, and convenience of local medical services?".

Explanatory variables

The primary explanatory variable in this study is the outpatient pooling policy, which includes UEBMI-OP, URRBMI-OP.

UEBMI-OP Among the 125 cities included in CHARLS, 30 had implemented the employee outpatient pooling policy before 2015. For individuals in sample one, if the city where they reside had implemented the employee outpatient pooling policy, UEBMI-OP is coded as 1; otherwise, it is coded as 0.

URRBMI-OP Among the 125 cities, 45 cities had implemented the policy before 2015, 47 cities had implemented the policy before 2018. For individuals in sample two, if the city where they reside had implemented the URRBMI outpatient pooling, URRBMI -OP is coded as 1; otherwise, it is coded as 0.

UEBMI-OP Protection Level (UEBMI-OP-PL) It measures the level of protection under UEBMI-OP in the heterogeneity analysis, high protection, low protection, and no protection. There is currently only one empirical study that categorizes outpatient pooling policy protection levels into three groups based on reimbursement standards [7]. However, in our dataset, the number of cities falling into each of the three categories would be insufficient for meaningful statistical comparison. Therefore, we simplified the classification into two groups—high and low protection—using a threshold of 1,000 RMB. This approach simplifies the variation in outpatient benefit levels, however, it may lead to a loss of some information. Among the 125 cities, 17 cities have UEBMI-OP-PL coded as 2 (high

Table 1 Variables' specifications

protection), 13 cities as 1 (low protection), and 95 cities as 0 (no protection).

Covariates

Following previous research, we also include additional control variables, such as demographic characteristics [17, 18], socioeconomic factors [15, 19, 20], health status [17, 21–23], healthcare utilization [24], as well as regional variables like region, per capita GDP and per capita healthcare resources [17, 18, 25]. Complete information about the specification of the variables is presented in Table 1.

Missing data were handled using different strategies depending on the nature and importance of the variable. For household consumption, missing values were imputed using the median consumption level using the average consumption level within the same community to retain a larger sample and reduce bias. For the dependent variable (healthcare satisfaction) and other core explanatory variables such as UEBMI-OP and URRBMI-OP, observations with missing values were excluded from the analysis through listwise deletion.

Statistical methods

To estimate the relationship between outpatient pooling policy implementation and healthcare satisfaction, we employed a Mixed-Effects Ordinal Logit (MEOLOGIT)

Category	Variable Name	Description	
Dependent variables	Satisfaction with local medical services	1 = Very dissatisfied, 2 = Somewhat dissatisfied, 3 = Neu- tral,4 = Somewhat satisfied, 5 = Very satisfied	
Explanatory Variables	Urban Employee Basic Medical Insurance—Outpatient Pool- ing policy (UEBMI-OP)	1 = Implemented, 0 = Not implemented	
	Urban and Rural Resident Basic Medical Insurance—Outpa- tient Pooling policy (URRBMI-OP)	1 = Implemented, 0 = Not implemented	
	Urban Employee Basic Medical Insurance—Outpatient Pool- ing policy protection level (UEBMI-OP-PL)	2 = high protection, 1 = low protection, 0 = no protection	
Demographic	Gender	1 = Male, 0 = Female	
Characteristics	Marital Status	1 = Married, 0 = Single	
	Age Group	0 = 45–59 years old, 1 = 60–69 years old, 2 = 70–79 years old, 3 = 80 + years old	
Socioeconomic characteristics	Education Level	0 = Illiterate/Semi-literate, 1 = Primary School, 2 = Middle School, 3 = High School and above	
	Per Capita Household Expenditure	Continuous variable	
Health Status Variables	Number of Chronic Diseases	0 = No chronic disease, 1 = One chronic disease, 2 = 2 to 3 chronic diseases, 3 = 4 or more chronic diseases	
	Self-reported Health Status	0 = Good, 1 = Fair, 2 = Poor	
	Activity of Daily Living (ADL)	Difficulty in Activities of Daily Living, Continuous variable	
Healthcare Utilization	Outpatient Visits in the Past Month	1 = Yes, 0 = No	
	Hospitalization in the Past Year	1 = Yes, 0 = No	
Regional Variables	Hospital Beds per 1,000 Population	Continuous variable	
	Doctors per 1,000 Population	Continuous variable	
	Log-transformed per capita GDP	Continuous variable	
	Region	2 = Eastern region, 1 = Central region, 0 = Western region	

model, which is well-suited for modeling ordinal outcome variables and allows for the inclusion of individuallevel random effects to capture unobserved heterogeneity [33, 34]. Moreover, as the key policy variables—UEBMI-OP and URRBMI-OP—remained largely stable over the study period, fixed-effects models that rely on withinindividual variation over time are not appropriate in this context [35, 36].

In this model, individual-level random effects were included to account for unobserved heterogeneity in personal characteristics that may influence healthcare satisfaction. Covariates and time were treated as fixed effects to control for their influence across different periods [40]. Province- and city-level random effects were excluded, as their Intraclass Correlation Coefficient (ICC) values were below 0.05, indicating negligible variance at these levels [41].

Unlike standard ordered logit models, which assume proportional odds, the MEOLOGIT model incorporates random effects, allowing for individual heterogeneity in threshold shifts across outcome categories. Consequently, strict testing of the proportional odds assumption is not required [42]. This approach provides a more flexible and robust estimation of healthcare satisfaction while appropriately modeling the hierarchical nature of the data.

Robustness checks

To verify the robustness of our findings, this study conducted robustness checks using alternative regression models:

Mixed-effects regression model

This model accounts for both individual-level random effects and fixed effects of covariates that may influence healthcare satisfaction. By incorporating hierarchical data structures, it provides a flexible alternative to assess the consistency of the results.

Generalized Ordered Logit Model (Gologit2)

Since tests for the parallel regression assumption including the Wolfe-Gould, Brant, Score, likelihood ratio, and Wald tests—all returned significant results (p < 0.001), indicating a violation of the assumption, we employed a Generalized Ordered Logit Model (Gologit2) as an alternative specification [43, 44]. This model relaxes the proportional odds constraint, allowing for varying effects across outcome categories.

Heterogeneity analysis

In the heterogeneity analysis section, we focused on two factors. First, we examined the heterogeneous effects of regional differences on the impact of the UEBMI-OP policy on healthcare service satisfaction, exploring differences between eastern, central, and western regions by using an interaction term to analyze the relationship between UEBMI-OP and region. Second, we investigated the heterogeneity of protection levels in the UEBMI-OP policy's impact on healthcare service satisfaction. This was achieved through a regression model that incorporates protection levels within the UEBMI-OP policy. All statistical analyses were conducted using Stata 18.0.

Results

Descriptive statistics

Table 2 presents the basic information for the two samples used in the regression analyses of UEBMI-OP and URRBMI-OP. The Sample One consists of individuals enrolled in UEBMI in either 2015 or 2018, with no missing values for dependent and explanatory variables. The Sample Two consists of individuals enrolled in the URRBMI (including URRBMI, URBMI and NRCMI) in either 2015 or 2018, also with no missing values. It also shows a significant difference in healthcare service satisfaction between middle-aged and older adults enrolled in UEBMI and NRCMI/($\chi^2 = 260.3462$, p < 0.001).

Table 3 presents the descriptive statistics of the main dependent and independent variables, as well as the unadjusted odds ratios for the key independent variables.

The impact of outpatient pooling policy on the satisfaction with medical services

We found that the impact of the UEBMI-OP and URRBMI-OP policies on healthcare satisfaction among middle-aged and elderly individuals differed significantly. Specifically, the UEBMI-OP policy was positively associated with higher satisfaction regarding healthcare services, while the URRBMI-OP policy showed no significant correlation with healthcare satisfaction. The detailed regression results can be found in Table 4 below.

Table 4 shows that the AOR for UEBMI-OP on satisfaction with medical services is great than 1(AOR = 1.29, 95%CI = (1.03, 1.62)). However, the AOR coefficient for URRBMI-OP for satisfaction with healthcare services is close to 1, indicating no significant impact (AOR = 0.99, 95%CI = (0.92, 1.06)).

To assess whether there is a difference between the regression coefficients of UEBMI-OP and URRBMI-OP on satisfaction with medical services, the Wald test was employed [36]. The results showed a significant difference between the regression coefficients of UEBMI-OP and URRBMI-OP on satisfaction with medical services (Z = 2.22, p = 0.027), indicating statistical significance at the 95% confidence level.

For middle-aged and older adults enrolled in either UEBMI or in URRBMI, URBMI, or NRCMI, factors such as higher age group, hospitalization in the past year,

Table 2 Descriptive statistics of the study samples

UEBMI (n=3619)

Variable

Difficulties in Activity of Daily Living

Log of per capita GDP

	Prop. (%) (n)	Prop. (%) (n)	, ,
Gender (Male)	57.70 (2088)	45.96 (11644)	
Marital status (Married)	87.95 (3182)	86.90 (22005)	
Age Group			
- 45-59 years old	38.13 (1380)	45.59 (11545)	
- 60-69 years old	35.70 (1292)	35.50 (8990)	
- 70-79 years old	20.72 (750)	15.38 (3895)	
- Above 80 years old	5.44 (197)	3.53 (893)	
Education Level			
- Illiterate/Semi-literate	10.64 (385)	46.18 (11694)	
- Primary School	26.42 (956)	28.07 (7107)	
- Middle School	28.05 (1015)	19.00 (4810)	
- High School and above	34.90 (1263)	6.75 (1709)	
Number of Chronic Disease Group			
- No chronic disease	19.67 (712)	25.80 (6532)	
- One chronic disease	24.21 (876)	29.09 (7366)	
- 2 to 3 chronic diseases	36.11 (1307)	31.47 (7968)	
- 4 or more chronic diseases	20.01 (724)	13.63 (3451)	
Self-related health			
- Good	28.76 (1041)	21.40 (5418)	
- Fair	55.40 (2005)	51.46 (13029)	
- Poor	15.83 (573)	27.13 (6868)	

Mean(SD)

Per Capita Household Expenditure		9.81±0.80		9.09±0.95
Hospital beds per 1,000 population		5.44±1.76		4.55±1.55
Doctors per 1,000 population		2.85±1.17		2.24±0.97
Outpatient visit in the past month	18.73 (678)		18.50 (4684)	
Hospitalization in the past year	19.73 (714)		15.51 (3927)	
Region				
-West	22.49(814)		31.29(7929)	
-Middle	33.13(1199)		33.28(8430)	
-East	44.38(1606)		35.43(8976)	
For categorical variables, percentages are	presented; for binary vari	iables, the percentages	of the "1" category are presented; for	continuous variables, means and

0.21±0.73

10.97±0.49

standard deviations are presented

Table 3 🛛	Descriptive	statistics a	ind unadj	usted c	odds ri	atios for l	key variables
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Variables	UEBMI	Unadjusted OR (95% CI)	URRBMI, URBMI & NRCMI	Unadjusted OR (95% CI)	
	(<i>n</i> = 3619)		(<i>n</i> = 25,333)		
	Prop. (%) (n)		Prop. (%) (n)		
Satisfaction with local medic	al services				
Very dissatisfied	9.04% (327)	-	8.12% (2056)	-	
Somewhat dissatisfied	11.19% (405)	-	9.46% (2396)	-	
Neutral	49.68% (1798)	-	42.17% (10,683)	-	
Somewhat satisfied	23.51% (851)	-	23.71% (6006)	-	
Very satisfied	6.58% (n = 238)	-	16.55% (4192)	-	
UEBMI-OP/URRBMI-OP	30.12% (1090)	1.36(1.19,1.55)	34.79% (8813)	0.98(0.94, 1.03)	
UEBMI-OP-PL					
High protection	19.59% (709)	1.45(1.24, 1.70)	-	-	
Low protection	10.53% (381)	1.21 (0.99,1.48)	-	-	
No protection	69.88% (2529)	1 (Reference)	-	-	

Mean(SD)

0.40±1.00

10.66±0.53

URRBMI, URBMI & NRCMI (n=25333)

Variables	UEBMI-OP	URRBMI-OP
UEBMI-OP/URRBMI-OP	1.29** [1.03,1.62]	0.99 [0.92,1.06]
Gender (0 = Female)	0.73*** [0.61,0.87]	0.77*** [0.72,0.82]
Marital status (0 = Single)	0.90 [0.67,1.21]	0.88** [0.80,0.98]
Age Group (0 = 45-59)		
60–69	1.14 [0.93,1.39]	1.24*** [1.16,1.33]
70–79	1.39*** [1.10,1.77]	1.72*** [1.55,1.90]
80 +	1.68** [1.11,2.54]	1.62*** [1.35,1.95]
Education level (0 = Illiterate/Ser	mi-literate)	
Primary School	0.69** [0.48,0.99]	0.63*** [0.58,0.68]
Middle School	0.65** [0.45,0.93]	0.57*** [0.52,0.63]
High School and above	0.71* [0.50,1.01]	0.53*** [0.47,0.61]
Per Capita Household	0.78*** [0.70,0.86]	0.91*** [0.88,0.94]
Expenditure		
Number of Chronic Disease Gro	up (0 = No chronic di	sease)
1 chronic disease	1.05 [0.82,1.33]	0.91** [0.84,0.99]
2 to 3 chronic diseases	1.00 [0.79,1.27]	0.86*** [0.79,0.93]
4 or more chronic diseases	0.94 [0.70,1.26]	0.81*** [0.72,0.90]
Self-related health ($0 = Good$)		
Fair	0.52***[0.43,0.64]	0.55*** [0.51,0.59]
Poor	0.32***[0.24,0.43]	0.42*** [0.38,0.46]
ADL	0.93 [0.82,1.06]	0.93*** [0.90,0.96]
Outpatient visit in the past month	0.95 [0.77,1.16]	0.95 [0.88,1.02]
Hospitalization in the past year	1.28** [1.03,1.60]	1.24*** [1.14,1.35]
Log of per capita GDP	1.04 [0.79,1.37]	0.92* [0.85,1.00]
Hospital beds per 1,000 population	0.90*** [0.83,0.97]	0.96** [0.93,1.00]
Doctors per 1,000 population	1.15** [1.01,1.30]	1.06* [1.00,1.13]
Year:2018	1.06 [0.90,1.25]	0.98 [0.93,1.04]
Random Intercept Variance	1.99*** [1.37,2.62]	1.69****[1.53,1.86]
Ν	3619	25,333
ICC	0.38	0.34

 Table 4
 MEOLOGIT regression results: the impact of UEBMI-OP and UBRBMI-OP on satisfaction with healthcare services

The Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) are reported in the respective columns

The Intraclass Correlation Coefficient (ICC) and the variance of the random intercepts for individual-level clustering in the MEOLOGIT models are reported *p < 0.1, *p < 0.05, ***p < 0.01 (based on z-tests)

and the number of doctors per 1,000 people in the city were positively associated with satisfaction toward local healthcare services. However, factors such as being male, having a higher level of education, higher household per capita expenditure, and the number of hospital beds per 1,000 people in the city were negatively associated with satisfaction among middle-aged and elderly urban and rural residents (Table 4).

While, marital status, number of chronic diseases, ADL were significantly and negatively associated with the satisfaction for individuals enrolled in URRBMI, URBMI, or NRCMI, but showed no significant association for those enrolled in UEBMI (Table 2). For middle-aged and older adults enrolled in URRBMI, URBMI, or NRCMI, compared to single individuals, married individuals report lower satisfaction with local healthcare services. Similarly, individuals with chronic diseases show lower satisfaction than those without, with the lowest satisfaction observed among those suffering from four or more chronic diseases. As the number of ADL increases, middle-aged and elderly urban and rural residents' satisfaction with local healthcare services decreases (Table 4).

With substantial random intercept variance (1.99, 95%CI = [1.37, 2.62] and 1.69, 95%CI = [1.53, 1.86]) and ICC of 0.38 and 0.34, these results indicate that using a mixed-effects model is appropriate, as it effectively accounts for individual-level variability.

Heterogeneity analysis

Heterogeneity analysis reveals that, within the UEBMI system, increased outpatient pooling coverage significantly enhances satisfaction with healthcare services, as shown in Fig. 1.

The regression results indicate differences in satisfaction with medical services across different levels of healthcare protection. At the low protection level (UEBMI-OP-PL low), there was no significant association with satisfaction (AOR = 1.09, 95%CI = [0.81, 1.46]), whereas at the high protection level (UEBMI-OP-PL high), there was a significant positive association with satisfaction (AOR = 1.44, 95%CI = [1.11, 1.86]), suggesting that higher protection was significantly positively associated with patient satisfaction with medical services.

Figure 2 further demonstrates that individuals residing in the Eastern and Central regions report higher satisfaction levels when covered by outpatient pooling policies. Full model outputs are provided in Appendix Table 2.

Figure 2 shows that, in the western region (region = 0), there was a significant negative association between UEBMI-OP and employee satisfaction with healthcare services (AOR = 0.41,95%CI = [0.2,0.84]). In contrast, compared to the western region, there was a significant positive association between UEBMI-OP and healthcare service satisfaction in the central (AOR = 2.55, 95%CI = [1.05,6.18]) and eastern regions (AOR = 3.05, 95%CI = [1.46,6.39]).

Robustness check

The result of robustness check confirmed the positive effect of employee outpatient pooling policy on employee satisfaction with healthcare services is relatively robust. The results of the generalized ordered logit model indicated a significant positive effect of employee outpatient pooling on healthcare satisfaction (AOR = 1.21, 95%CI = [1.02, 1.41]). Similarly, the mixed-effects regression model results also showed a significant positive impact of employee outpatient pooling on healthcare satisfaction (regression coefficient β = 0.10, 95%CI = [0.01, 0.19]). Full regression results were provided in Appendix Table 3.



Fig. 1 Effects of outpatient protection levels under UEBMI on satisfaction with medical service



Fig. 2 Region × outpatient pooling policies: interaction effects on healthcare satisfaction

Discussion

This comprehensive analysis of the relationship between outpatient pooling policies and healthcare service satisfaction among middle-aged and older adults found that the UEBMI-OP policy was positively associated with higher satisfaction with healthcare services, while the URRBMI-OP policy showed no significant correlation with healthcare satisfaction. Furthermore, a higher level of outpatient pooling coverage under UEBMI was found to have a stronger positive effect on healthcare service satisfaction. These findings align with prior research indicating that outpatient pooling policies contribute to improved healthcare utilization [32] and health outcomes [7, 8, 45], and add to the literature suggesting that outpatient pooling policies may also enhance satisfaction with healthcare services.

This study expanded empirical research on social health insurance outpatient pooling, providing important

findings on the relationship between outpatient pooling policy and healthcare service satisfaction among middleaged and older adults in China. This study also highlighted the significant positive influence of UEBMI-OP on healthcare satisfaction among urban middle-aged and older employees, with robustness checks supporting this conclusion.

In contrast, the URRBMI-OP scheme did not have a significant positive effect on healthcare service satisfaction, which may be due to its relatively low level of protection. While previous studies have suggested that only higher outpatient coverage tends to improve residents'perception of health [45]. Prior research has also highlighted that outpatient service utilization increases significantly only when the outpatient coverage level of URRBMI is adequately high in China [32]. Furthermore, even with coinsurance reductions, the impact on healthcare utilization and satisfaction remains limited when the overall cost-sharing burden on patients remains high [46]. This suggests that the relatively low reimbursement rates, limited coverage scope in policy design may collectively contribute to the lack of a significant association between URRBMI-OP and healthcare service satisfaction.

The heterogeneity analysis highlighted that higher level of outpatient pooling protection under UEBMI had a stronger positive effect on healthcare service satisfaction, while lower levels of protection offer limited, statistically insignificant benefits. This underscores the essential role of sufficient protection levels in enhancing satisfaction with healthcare services among elderly urban employees. These results aligned with prior studies. It was found that only adequate outpatient protection levels can significantly improve outpatient service utilization [32]. Likewise, it was noted that the impact of outpatient pooling on reducing household economic burdens depends on lowering outpatient cost-sharing and increasing service utilization [29].

This study also revealed significant regional disparities in the impact of UEBMI-OP on healthcare service satisfaction, with a stronger positive effect observed in the eastern and central regions compared to the western region. While previous studies have shown that individuals in the western region are generally less satisfied with the urban health system [11], and that affordability—as reflected in the out-of-pocket percentage after insurance reimbursement-is a primary concern in western China [26]. In addition, there are additional challenges that may contribute to this regional disparity. Specifically, the western region faces lower levels of healthcare workforce distribution [47], more dispersed healthcare resources [48], and less efficient policy implementation [49], which may collectively lower residents' satisfaction with healthcare services.

In addition to the primary findings on outpatient pooling policy, this study identifies significant effects of demographic factors, socioeconomic status, and local healthcare resources on healthcare service satisfaction among middle-aged and older adults in urban and rural areas.

Contrary to the conclusions that the demographic dimension had a weaker impact on the satisfaction of both urban and rural residents [50], this study showed that several individual factors have a significant impact on healthcare service satisfaction. Notably, older individuals tended to report higher satisfaction with local healthcare services compared to the middle-aged group, aligning with findings [21], but contrasting with the study [23]. This may be due to reduced expectations with age, along with increased flexibility in accessing care through primary health services in China. Consistent with the findings [11, 19, 21], healthier individuals generally reported higher satisfaction, although Peng and Zhang observed the opposite trend in China [22].

Interestingly, contrary to previous findings [23], consistent with other research [19], this study found that higher education levels were associated with lower satisfaction with healthcare services. Contrary to other studies [11, 21], this study revealed that higher per capita household expenditure was associated with lower satisfaction with healthcare services. These trends were consistent for individuals enrolled in both UEBMI and in URRBMI, URBMI, and NCMS, suggesting that those with higher socioeconomic status tend to have higher expectations for healthcare services.

Additionally, consistent with previous findings [24], this study reported that inpatient service utilization in the past year significantly increased satisfaction, possibly due to positive care experiences during hospitalization. Similar to previous findings [17, 25], this study confirmed that per capita bed availability is negatively associated with satisfaction, whereas per capita physician availability is positively associated.

Finally, this study identified that the impact of some covariates on healthcare service satisfaction varies between middle-aged and older adults enrolled in UEBMI and those in the URRBMI group (URRBMI, URBMI, and NCMS). For example, chronic diseases and ADL limitations were significantly associated with lower satisfaction among individuals in the URRBMI group, consistent with the findings [24]. However, these effects were not significant for UEBMI enrollees. This discrepancy may be due to greater economic constraints, limited insurance coverage, and restricted healthcare resources in rural areas [51], which can limit access to healthcare for individuals with chronic conditions and ADL limitations in the URRBMI group.

This study offers several key contributions to the literature, including: (1) expanding research on outpatient pooling policies by innovatively examining the relationship between outpatient pooling and healthcare service satisfaction; (2) effectively integrating city-level policy data (UEBMI-OP and URRBMI-OP), per capita GDP, healthcare resources, and individual-level data to combine macro- and micro-level perspectives; and (3) utilizing mixed-effects ordered logit regressions that account for individual-level random effects and fixed time effects, providing a robust statistical framework and yielding reliable insights into the association between outpatient pooling policies and healthcare satisfaction.

This study has several limitations: (1) Possible limitations in sample representation. The CHARLS dataset may not fully represent certain populations or regions. For example, cities implementing UEBMI outpatient pooling are primarily located in the eastern region, with limited data from the central and western regions. The limited representation of certain regions may affect the generalizability of the findings across the entire country. (2) Limited time coverage. CHARLS provides healthcare service satisfaction data only for the 2015 and 2018 waves, during which variation in UEBMI and URRBMI outpatient pooling policies across regions was minimal. This limits the ability to examine policy dynamics over time. (3) Lack of data on policy implementation differences. Variations in policy enforcement, administrative capacity may influence how the policies affect healthcare satisfaction, but these factors were not captured in the dataset.

Conclusion

The observed relationship between outpatient pooling and healthcare service satisfaction suggests that future reforms in China should prioritize higher levels of financial protection to maximize the policy's potential in improving healthcare satisfaction. Chronic diseases and ADL limitations significantly affected satisfaction among URRBMI enrollees, underscoring the need for healthcare coverage, especially within the URRBMI system. Based on the findings of this study, we recommend further increasing the actual reimbursement rates under the outpatient pooling policy, particularly by raising the outpatient reimbursement rates for the UEBMI in the western regions, as well as for the entire URRBMI. Special attention should be given to the chronic disease population, whose healthcare needs are often more complex and costly, to improve their healthcare service satisfaction and ensure that the policy meets their specific needs.

With the nationwide implementation of the UEBMI outpatient pooling policy in China, future research could build on this study in several ways. First, longitudinal studies comparing healthcare satisfaction levels before and after the policy reform would help identify causal

effects. Second, future research could incorporate more detailed regional implementation data to better understand the regional heterogeneity and the mechanisms in the impact of outpatient pooling policies on healthcare service satisfaction.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

Heling Ai: Conceptualization, Methodology-Statistical analysis, Writing original draft, review & editing, project administration, visualization, data curation, Software. Ariel Shensa: Methodology—Statistical analysis, methodology, visualization, Writing—review & editing. Faina Linkov: Conceptualization, Supervision, methodology, visualization, Writing- original draft, review & editing. Both authors have read and agreed to the published version of the manuscript.

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Data availability

Data used in this study are available in publicly accessible repositories as follows: (1) The CHARLS datasets are publicly available from the National School of Development at Peking University (http://charls.pku.edu.cn/en) and can be accessed after submitting a data use agreement to the CHARLS team. (2) City-level healthcare resource data were primarily sourced from the 2016 China City Statistical Yearbook and 2019 China City Statistical Yearbook (Supplementary Table 1).

Declarations

Ethics approval and consent to participate

The CHARLS data collection process received approval from the Ethics Committee of Peking University, and all participants provided informed consent at the time of data collection.

Consent for publication

Not applicable. No experiments were conducted, nor were patients involved in this study.

Competing interests

The authors declare no competing interests.

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