



OPEN Factors associated with Traditional Chinese Medicine use among older adults with chronic diseases in China

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Chronic diseases impose a substantial health and economic burden in China, particularly among its rapidly aging population. Traditional Chinese Medicine (TCM) has been integrated into primary healthcare through national policies and is considered a promising approach for chronic disease management. However, utilization of community-based TCM services among older adults remains limited, and the determinants of service utilization have not been systematically examined within a theoretical framework. Guided by the Andersen Behavioral Model, this study examined factors associated with community-based TCM service utilization among older adults with chronic diseases and quantified their relative importance. A multi-stage stratified random sampling design was applied to survey 1,385 participants from community health service centers in Zhejiang Province and the Guangxi Zhuang Autonomous Region between July and September 2022. Data were collected via structured questionnaires covering TCM service utilization and predisposing, enabling, and need factors. Complex survey logistic regression models were applied to identify factors associated with the utilization of TCM treatment services and public health services, respectively. Overall, the utilization rates of TCM treatment and public health services were 14.2% and 15.7%, respectively. Predisposing factors (education, TCM health literacy, and familiarity with TCM services) and enabling factors (perceived competence of TCM physicians) were consistently positively associated with utilization of both service types (all $p < 0.05$). Accessibility to community health centers and need factors (particularly chronic disease severity and pain) were positively associated, whereas age (≥ 80 years) was negatively associated with utilization of TCM treatment services. In contrast, no significant associations were observed for public health service utilization. Utilization of TCM services in CHC among older adults with chronic diseases remains low. Predisposing and enabling factors are the main drivers. While need factors significantly predict treatment service use but not public health services. Enhancing health literacy, building provider trust, and adopting service-specific strategies are key.

Keywords Community, Traditional Chinese Medicine services, Older adults, Chronic diseases, Service utilization, Influencing factors

Abbreviations

TCM Traditional Chinese Medicine
CHC Community Health Center
ADL Activities of daily living

Population aging and the rising prevalence of chronic diseases have made the integration of traditional and complementary medicine a critical component of contemporary primary healthcare systems¹. Traditional Chinese Medicine (TCM), with its holistic and multi-modal therapeutic approaches—including herbal

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medicine, acupuncture, massage, cupping, scraping, moxibustion, and Tai Chi—has served as an essential part of healthcare in Asia for thousands of years and is increasingly recognized worldwide for its role in chronic disease management^{1–3}. Evidence suggests that TCM can improve symptoms and functional outcomes across a wide range of chronic conditions, including cancer, diabetes, cardiovascular diseases, and neurological disorders^{2,3}. The TCM philosophy of treating diseases before their onset aligns closely with preventive health services, making it particularly relevant for older adults who bear the highest chronic disease burdens^{4,5}.

While Western medicine is often viewed as rapid and potent but associated with side effects, TCM is perceived as slower acting but more comprehensive and restorative⁶. Many patients choose a combination of both approaches, believing that their complementary effects address different dimensions of chronic illness⁶. TCM interventions are also valued for their multi-target mechanisms, favorable safety profile, and relatively low cost, making them a potentially important tool for chronic disease prevention and long-term management^{2–7}.

China's rapid epidemiological transition has intensified the urgency of expanding effective chronic disease management strategies. Among the 180 million Chinese adults aged 60 years and above with chronic diseases, more than 75% live with multimorbidity⁸. In response, China has shifted from a hospital-centered healthcare model to a community-based primary care system, establishing community health centers (CHCs) as the frontline providers of chronic disease self-management support⁴. Since the implementation of the National Basic Public Health Service Program in 2009, CHCs have been mandated to provide free health education and chronic disease management services to all community residents⁹. National policies strongly promote the integration of TCM into primary care, with nearly 100 regulations emphasizing preventive care and chronic disease control using TCM principles⁵. TCM is now formally embedded within CHCs, as an essential service package, and is delivered alongside biomedical care^{10,11}. As a result, TCM service availability in primary care has achieved near-universal coverage, with almost all CHCs and township health facilities capable of providing TCM services¹².

Despite this well-established service infrastructure, utilization remains surprisingly low. Empirical studies show that only 8%¹³ to 40.73%¹⁴ of patients with chronic diseases use community-based TCM services, revealing a striking gap between high service availability and low actual uptake. Understanding the drivers of this discrepancy is therefore a critical public health and policy priority.

Existing research indicates that multiple barriers hinder TCM utilization, including limited insurance coverage¹⁵, inadequate infrastructure¹⁶, shortages of TCM-trained personnel⁴, and low health literacy among patients^{15,17}. Factors associated with TCM use include demographics (age, gender)^{7,18}, education level¹⁹, health status and chronic disease characteristics^{1,7,20,21}, health system factors^{13,16}, and perceived service quality¹⁸. However, current studies often examine these variables in isolation, lack an integrated theoretical framework, and rarely focus specifically on older adults with chronic diseases—one of the primary target populations for community-based TCM services. More importantly, existing literature has not quantitatively compared the relative importance of these factors, leaving policymakers without clear guidance on whether interventions should prioritize improving awareness, reducing financial barriers, or strengthening service accessibility.

The Andersen Behavioral Model—the most widely applied framework for analyzing healthcare utilization—offers a systematic approach to organizing these influences into predisposing, enabling, and need dimensions^{22–25}. The model has been extensively validated across countries and healthcare systems, including within China, and is particularly suited to contexts where access is shaped by complex social, economic, and cultural factors^{26,27}. However, few studies have applied the Andersen Model to TCM use in primary care settings, particularly in terms of quantifying the relative contributions of these factors to basic medical services and public health services, respectively.

To address these gaps, this study applied the Andersen model to examine the determinants of TCM service utilization in CHCs separately for basic treatment and public health services among older adults with chronic diseases in China. We identified the distinct contributions of predisposing, enabling, and need factors to each service type, aiming to inform targeted interventions, optimize resource allocation, and provide an empirical basis for improving TCM uptake in community settings.

Materials and methods

Data source and samples

A cross-sectional survey was conducted between July and September 2022 to investigate community-based TCM service utilization among older adults with chronic diseases. A multistage stratified cluster sampling method was employed to ensure representativeness across regions with different economic levels and TCM service development. In the first stage, two provinces in China were selected based on economic development and TCM service infrastructure: Zhejiang Province (relatively developed) and Guangxi Province (relatively underdeveloped). In the second stage, three cities were selected from each province according to their 2021 economic indicators: Hangzhou (high), Jinhua (medium), and Lishui (low) in Zhejiang; and Nanning (high), Liuzhou (medium), and Guilin (low) in Guangxi. In the third stage, one urban district and one suburban district were randomly selected in each city, and one CHC from each district was included, resulting in a total of 12 CHCs. Within each CHC, at least 90 older adults with chronic diseases were recruited using a stratified approach to reflect the local population structure. Trained investigators conducted one-on-one interviews with participants who provided informed consent. A total of 1,468 questionnaires were distributed, and 1,385 valid responses were obtained after excluding incomplete or invalid questionnaires, yielding a response rate of 94.3%. The present study was approved by the Ethics Committee of Hangzhou Normal University (No. 2019016). All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the principles of the Declaration of Helsinki, as well as relevant national guidelines and regulations. Informed consent was obtained from all participants prior to participation; all participants had intact cognitive function and provided consent themselves.

Eligible participants met the following criteria: (a) aged 60 years or above; (b) diagnosed with at least one chronic condition (e.g., hypertension, diabetes, heart disease, arthritis, stroke, respiratory disease, or cancer); (c) local residency for at least one year; (d) intact cognitive function and communication ability; and (e) willingness to participate and provide informed consent. Exclusion criteria included: (a) cognitive impairment or severe psychiatric disorders; (b) severe chronic conditions such as heart failure, respiratory failure, cirrhosis, or renal failure; (c) inability to perform basic self-care or severe mobility limitations; and (d) participation in another research study within the preceding 30 days.

Variable selection

Dependent variable

The dependent variable was the utilization of community-based TCM services. Participants were classified as service users if they had accessed any TCM-related services provided by community healthcare personnel within the past 12 months, including TCM preventive health services (e.g., TCM health lectures and TCM-related public health services) or TCM treatment services. The variable was coded as a binary outcome, with 0 indicating non-use and 1 indicating use of community-based TCM services.

Independent variable

Independent variables were categorized into predisposing, enabling, and need factors. Predisposing factors included gender (male, female), age group (60–69, 70–79, ≥ 80 years), marital status (married; single—including never married, divorced, or widowed), and educational attainment (elementary school or below, junior high school, high school or above)²⁸. TCM health literacy²⁹ was assessed using the item “You possess some knowledge of TCM healthcare³⁰,” rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Responses of 4–5 were classified as “adequate” literacy and 1–3 as “inadequate.” Familiarity with TCM services³¹ was measured with the item “You possess some knowledge of the TCM healthcare service programs offered by CHCs³⁰.” Responses were dichotomized in the same manner: 4–5 indicated familiarity, and 1–3 indicated unfamiliarity.

Enabling factors included monthly income (0–2,000; 2,001–4,000; 4,001–6,000; more than 6,000 RMB per month), length of local residence (< 5 years or ≥ 5 years), and health insurance (insured or uninsured). Accessibility of CHC was assessed using the statement: “Accessing a CHC is convenient for you³⁰,” rated from 1 (strongly disagree) to 5 (strongly agree). For analysis, responses of 4–5 were categorized as “good accessibility,” and 1–3 as “poor accessibility.” Perceived medical expertise of TCM doctors was measured using the item³⁰: “The medical skills of TCM doctors at CHCs are sufficient to meet your healthcare needs³⁰.” Responses were dichotomized into “good” (4–5) and “poor” (1–3).

Need factors included severity of chronic disease, physical pain, and limitations in activities of daily living (ADL). Perceived disease severity was assessed using a five-level scale (1 = none to 5 = poor control) and dichotomized into mild-to-moderate (1–3) and severe (4–5)³². Physical pain during the past four weeks was categorized as no pain, mild pain, or moderate-to-severe pain³³. Limitations in ADL were categorized as unrestricted, mildly restricted, or moderately to severely restricted³². Supplementary Table S1 presents the coding definitions for all covariates included in the multivariable analysis.

Statistical analysis

All analyses were conducted using R software (version 4.5.0). Descriptive statistics were summarized as frequencies and percentages, and bivariate associations were examined using chi-square (χ^2) tests. To account for the clustered sampling design, complex survey logistic regression models were fitted using the survey package, with clustering specified at the CHC level (12 clusters), and cluster-robust standard errors were estimated. Given the relatively small number of clusters, statistical inference (p-values and 95% confidence intervals [CIs]) was based on the t-distribution with 11 degrees of freedom^{34,35}, following recommended approaches for small-sample cluster-robust inference. Potential multicollinearity among independent variables was assessed using variance inflation factors (VIF). All VIFs were below 2, suggesting that multicollinearity was not a major concern. Model discrimination was evaluated using the area under the receiver operating characteristic curve (AUC), and model fit was assessed using McFadden's pseudo R^2 . All tests were two-sided, and a p-value < 0.05 was considered statistically significant.

Results

Descriptive statistics

Table 1 summarizes the demographic characteristics of the study sample ($n = 1,385$). Among the predisposing factors, 58.8% ($n = 814$) of participants were female, and the majority (84.0%, $n = 1,164$) were aged 60–79 years. Most were married (79.3%, $n = 1,098$), and nearly half had an education level of elementary school or below (45.6%, $n = 631$). Only 29.5% ($n = 409$) demonstrated adequate TCM health literacy, while a substantial proportion (82.7%, $n = 1,146$) reported limited familiarity with community-based TCM services.

Regarding enabling factors, the most common monthly income range was 2,001–4,000 RMB (52.1%, $n = 721$). Almost all participants (95.0%, $n = 1,316$) had lived locally for more than five years, and the majority (97.5%, $n = 1,350$) had health insurance coverage. Although 79.6% ($n = 1,102$) perceived local CHCs as accessible, over half (53.1%, $n = 736$) rated the medical skills of TCM practitioners as inadequate.

In terms of need factors, most participants reported a low disease burden (76.8%, $n = 1,064$). Additionally, 42.5% ($n = 589$) experienced no physical pain, and 82.9% ($n = 1,148$) reported no limitations in ADL.

Bivariate analysis

Table 2 presents the utilization of TCM public health and treatment services across participant characteristics. Overall, 15.7% of participants used public health services, and 14.2% used treatment services. Across multiple

Variable	<i>n</i> (%)
Predisposing factors	
Gender	
Male	571 (41.2)
Female	814 (58.8)
Age (years)	
60–69	571 (41.2)
70–79	593 (42.8)
≥ 80	221 (16.0)
Marital status	
Married	1098 (79.3)
Single	287 (20.7)
Education level	
Elementary school or below	631 (45.6)
Middle school	400 (28.9)
High school or above	354 (25.6)
TCM health literacy level	
Poor	976 (70.5)
Good	409 (29.5)
Familiarity with TCM health services	
Familiar	1146 (82.7)
Unfamiliar	239 (17.3)
Enabling factors	
Income (RMB per month)	
0–2000	400 (28.9)
2001–4000	721 (52.1)
4001–6000	199 (14.4)
More than 6000	65 (4.7)
Health insurance	
Uninsured	35 (2.5)
Insured	1350 (97.5)
Accessibility to CHCs	
Poor	283 (20.4)
Good	1102 (79.6)
Medical skill level of TCM doctors	
Poor	736 (53.1)
Good	649 (46.9)
Length of local residence (years)	
< 5	69 (5.0)
≥ 5	1316 (95.0)
Need factors	
Severity of chronic diseases	
Mild and moderate	1064 (76.8)
Severe	321 (23.2)
Physical pain	
No	589 (42.5)
Mild	512 (37.0)
Moderate to severe	284 (20.5)
ADL limitations	
No	1148 (82.9)
Mild	178 (12.9)
Moderate to severe	59 (4.3)

Table 1. Demographic characteristics of study participants (*n* = 1,385).

variables, significant differences were observed in the utilization of both types of TCM services. Female, higher education level, good TCM health literacy, and greater familiarity with TCM services were all significantly associated with higher service utilization (all $p < 0.001$). Similarly, higher income, better accessibility to CHCs, and greater medical skill of TCM doctors were also associated with increased service utilization. Conversely, age,

Variable	Use of public health services			Use of treatment services		
	No (%)	Yes (%)	χ^2 value	No (%)	Yes (%)	χ^2 value
Predisposing factors						
Gender			4.33*			6.42*
Male	495 (86.7)	76 (13.3)		506 (88.6)	65 (11.4)	
Female	672 (82.6)	142 (17.4)		682 (83.8)	132 (16.2)	
Age (years)			3.90			4.82
60–69	477 (83.5)	94 (16.5)		484 (84.8)	87 (15.2)	
70–79	494 (83.3)	99 (16.7)		504 (85.0)	89 (15.0)	
≥ 80	196 (88.7)	25 (11.3)		200 (90.5)	21 (9.5)	
Marital status			0.00			0.63
Married	925 (84.2)	173 (15.8)		946 (86.2)	152 (13.8)	
Single	242 (84.3)	45 (15.7)		242 (84.3)	45 (15.7)	
Education level			28.51***			25.73***
Elementary school or below	567 (89.9)	64 (10.1)		574 (91.0)	57 (9.0)	
Middle school	313 (78.3)	87 (21.8)		324 (81.0)	76 (19.0)	
High school or above	287 (81.1)	67 (18.9)		290 (81.9)	64 (18.1)	
TCM health literacy			145.68***			98.40***
Poor	897 (91.9)	79 (8.1)		896 (91.8)	80 (8.2)	
Good	270 (66.0)	139 (34.0)		292 (71.4)	117 (28.6)	
Familiarity with TCM health services			173.11***			134.68***
Unfamiliar	134 (56.1)	105 (43.9)		148 (61.9)	91 (38.1)	
Familiar	1033 (90.1)	113 (9.9)		1040 (90.8)	106 (9.2)	
Enabling factors						
Income (per month)			10.74***			6.94**
0–4000 RMB	962 (85.8)	159 (14.2)		975 (87.0)	146 (13.0)	
≥ 4001 RMB	205 (77.7)	59 (22.3)		213 (80.7)	51 (19.3)	
Health insurance			0.49			2.98
Uninsured	28 (80.0)	7 (20.0)		26 (74.3)	9 (25.7)	
Insured	1139 (84.4)	211 (15.6)		1162 (86.1)	188 (13.9)	
Accessibility to CHCs			10.31**			27.04***
Poor	256 (90.5)	27 (9.5)		270 (95.4)	13 (4.6)	
Good	911 (82.7)	191 (17.3)		918 (83.3)	184 (16.7)	
Medical skill of TCM doctors			97.69***			65.97***
Poor	687 (93.3)	49 (6.7)		684 (92.9)	52 (7.1)	
Good	480 (74.0)	169 (26.0)		504 (77.7)	145 (22.3)	
Length of local residence (years)			0.94			0.08
< 5 years	61 (88.4)	8 (11.6)		60 (87.0)	9 (13.0)	
≥ 5 years	1106 (84.0)	210 (16.0)		1128 (85.7)	188 (14.3)	
Need factors						
Severity of chronic diseases			0.20			12.43***
Mild and moderate	894 (84.0)	170 (16.0)		932 (87.6)	132 (12.4)	
Severe	273 (85.0)	48 (15.0)		256 (79.8)	65 (20.2)	
Physical pain			1.89			29.28***
No	505 (85.7)	84 (14.3)		534 (90.7)	55 (9.3)	
Mild	428 (83.6)	84 (16.4)		435 (85.0)	77 (15.0)	
Moderate to severe	234 (82.4)	50 (17.6)		219 (77.1)	65 (22.9)	
ADL limitations			0.07			0.45
No	966 (84.1)	182 (15.9)		988 (86.1)	160 (13.9)	
Yes	201 (84.8)	36 (15.2)		200 (84.4)	37 (15.6)	
Total	1167 (84.3)	218 (15.7)		1188 (85.8)	197 (14.2)	—

Table 2. Utilization of TCM services across demographic characteristics. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

marital status, health insurance, length of local residence, and ADL limitations were not significantly associated with the use of public health services or treatment services ($p > 0.05$).

Among need factors, the severity of chronic diseases and physical pain were only significantly associated with the use of treatment services ($p < 0.05$).

Multivariable analysis of utilization of TCM public health services

Table 3 presents the results of the multivariable analysis of factors associated with utilization of TCM public health services. The model achieved acceptable discrimination ($AUC = 0.810$) and a McFadden's pseudo R^2 of 0.210, indicating that approximately 21.0% of the variance was explained.

Among predisposing factors, education level showed a positive association. Compared with participants who had elementary school education or below, those with middle school education ($AOR = 2.39$, $p = 0.004$) and those with high school education or above ($AOR = 1.56$, $p = 0.018$) were more likely to use the services. Additionally, good health literacy ($AOR = 2.69$, $p < 0.001$) and familiarity with TCM services ($AOR = 2.88$, $p < 0.001$) emerged as strong predictors of utilization.

Among enabling factors, only perceived medical skill of TCM doctors was positively associated with utilization ($AOR = 3.27$, $p = 0.006$). Other enabling factors, including income, length of local residence, health insurance status, and accessibility to CHCs, showed no significant association.

In contrast, none of the need factors were significantly associated with the utilization of TCM public health services.

Multivariable analysis of utilization of TCM treatment services

Table 4 presents the results of the multivariable analysis of factors associated with utilization of TCM treatment services. The model showed good discrimination ($AUC = 0.811$) and a McFadden's pseudo R^2 of 0.217, explaining 21.7% of the variance in utilization of TCM treatment services.

Among predisposing factors, participants aged ≥ 80 years were less likely to use TCM medical services compared with those aged 60–69 years ($AOR = 0.48$, $p = 0.044$). Higher education levels were significantly associated with increased utilization (middle school vs. elementary or below: $AOR = 2.44$, $p < 0.001$; high school or above: $AOR = 2.07$, $p = 0.001$). In addition, participants with good TCM health literacy ($AOR = 2.25$, $p < 0.001$) and those familiar with TCM services ($AOR = 2.94$, $p < 0.001$) were more likely to utilize TCM treatment services.

Among enabling factors, good accessibility to CHCs ($AOR = 3.46$, $p < 0.001$) and higher perceived medical skill levels of TCM doctors ($AOR = 1.98$, $p = 0.008$) were significantly associated with increased utilization. Other enabling factors, including income, length of residence, and health insurance status, were not significantly associated with TCM medical service use.

Need factors showed that disease severity and pain were positively associated with service utilization. Severe disease was linked to higher utilization ($AOR = 1.60$, $p = 0.049$). Pain demonstrated a dose–response relationship, with both mild ($AOR = 1.98$, $p = 0.041$) and moderate/severe pain ($AOR = 3.53$, $p = 0.012$) increasing the

Variable	β	SE	AOR	95% CI	P-value
Constant	-3.99	0.65	0.02	(0.00, 0.08)	< 0.001
Predisposing factors					
Gender (Female vs. Male)	0.24	0.16	1.27	(0.90, 1.80)	0.157
Age (70–79 vs. 60–69)	0.18	0.22	1.20	(0.74, 1.93)	0.421
Age (≥ 80 vs. 60–69)	-0.35	0.31	0.71	(0.36, 1.41)	0.290
Marital status (Single vs. Married)	-0.14	0.17	0.87	(0.60, 1.27)	0.436
Education (Middle school vs. Elementary)	0.87	0.24	2.39	(1.41, 4.07)	0.004
Education (High school + vs. Elementary)	0.44	0.16	1.56	(1.10, 2.21)	0.018
TCM health literacy (Good vs. Poor)	0.99	0.16	2.69	(1.87, 3.85)	< 0.001
Familiarity with TCM health services (Familiar vs. Unfamiliar)	1.06	0.23	2.88	(1.74, 4.76)	< 0.001
Enabling factors					
Income (> 4000 vs. 0–4000 RMB)	0.23	0.40	1.26	(0.53, 3.02)	0.569
Health insurance (Insured vs. Uninsured)	-0.29	0.53	0.75	(0.23, 2.40)	0.593
Accessibility to CHCs (Good vs. Poor)	0.16	0.4	1.17	(0.49, 2.79)	0.701
Medical skill of TCM doctors (Good vs. Poor)	1.18	0.35	3.27	(1.50, 7.12)	0.006
Local residence (≥ 5 vs. < 5 years)	0.26	0.44	1.30	(0.49, 3.44)	0.562
Need factors					
Severity of chronic diseases (Severe vs. Mild/Moderate)	-0.27	0.23	0.76	(0.46, 1.27)	0.268
Pain (Mild vs. No)	0.28	0.23	1.33	(0.80, 2.20)	0.246
Pain (Moderate/Severe vs. No)	0.47	0.23	1.60	(0.97, 2.65)	0.063
ADL limitations (Yes vs. No)	0.19	0.36	1.21	(0.55, 2.66)	0.611

Table 3. Complex survey logistic regression of utilization of TCM public health services. SE = cluster-robust standard error; AOR = adjusted odds ratio; CI = confidence interval. Model performance: $AUC = 0.806$ (95% CI: 0.774–0.839); McFadden $R^2 = 0.210$.

Variable	β	SE	AOR	95% CI	P-value
Constant	-4.02	0.99	0.02	(0.00, 0.16)	0.002
Predisposing factors					
Gender (Female vs. Male)	0.33	0.24	1.39	(0.81, 2.39)	0.203
Age (70–79 vs. 60–69)	0.03	0.28	1.03	(0.56, 1.90)	0.913
Age (≥ 80 vs. 60–69)	-0.73	0.32	0.48	(0.24, 0.98)	0.044
Marital status (Single vs. Married)	-0.06	0.17	0.94	(0.65, 1.37)	0.731
Education (Middle school vs. Elementary)	0.89	0.18	2.44	(1.65, 3.61)	<0.001
Education (High school + vs. Elementary)	0.73	0.16	2.07	(1.44, 2.98)	0.001
TCM health literacy (Good vs. Poor)	0.81	0.18	2.25	(1.52, 3.34)	<0.001
Familiarity with TCM health services (Familiar vs. Unfamiliar)	1.08	0.21	2.94	(1.84, 4.69)	<0.001
Enabling factors					
Income (> 4000 vs. 0–4000 RMB)	0.24	0.28	1.27	(0.68, 2.36)	0.422
Health insurance (Insured vs. Uninsured)	-1.24	0.76	0.29	(0.05, 1.55)	0.132
Accessibility to CHCs (Good vs. Poor)	1.24	0.24	3.46	(2.06, 5.82)	<0.001
Medical skill of TCM doctors (Good vs. Poor)	0.68	0.21	1.98	(1.25, 3.16)	0.008
Local residence (≥ 5 vs. < 5 years)	-0.06	0.42	0.94	(0.37, 2.40)	0.893
Need factors					
Severity of chronic diseases (Severe vs. Mild/Moderate)	0.47	0.21	1.6	(1.00, 2.54)	0.049
Pain (Mild vs. No)	0.68	0.3	1.98	(1.03, 3.80)	0.041
Pain (Moderate/Severe vs. No)	1.26	0.42	3.53	(1.41, 8.86)	0.012
ADL limitations (Yes vs. No)	0.02	0.37	1.02	(0.46, 2.29)	0.951

Table 4. Complex survey logistic regression of utilization of TCM treatment services. SE = cluster-robust standard error; AOR = adjusted odds ratio; CI = confidence interval. Model performance: AUC = 0.811 (95% CI: 0.777–0.845); McFadden R^2 = 0.217.

likelihood of use. In contrast, ADL limitations were not significantly associated with utilization (AOR = 1.02, p = 0.951).

Discussion

In this study, we separately examined the utilization of TCM treatment and public health services in CHC among older adults with chronic diseases. The main results showed that both types of service utilization were low, with rates of 14.2% and 15.7%, respectively. Multivariable analysis based on the Anderson model revealed that predisposing factors (e.g., education, health literacy, familiarity with TCM) and enabling factors (particularly perceived medical skill of TCM practitioners) were significant drivers of utilization, whereas need factors showed no significant association. Notably, the influencing patterns differed between TCM primary care and public health services, suggesting that these two types of services may be driven by distinct mechanisms.

Predisposing factors

In our study, higher education level, better TCM health literacy, and greater familiarity with services were significantly associated with higher utilization of both types of TCM services, suggesting that cognitive ability and information access play key roles in healthcare decision-making. These findings align with Andersen's behavioral model, which posits that individuals' social structure and health cognition shape their service utilization^{36–39}.

Notably, although crude analysis showed a negative association between the familiarity with TCM health services and utilization, stratified and interaction analyses (Tables S2–S4) consistently demonstrated that familiarity was positively associated with utilization across all age and education subgroups, indicating that the crude finding was likely confounded. Service familiarity has been identified as an important determinant of healthcare service utilization, and its effect remains evident after controlling for educational level^{28,40}. In line with the above findings, further stratified correlation analysis (Table S5) revealed that, among non-users, education level, health literacy, and service familiarity were weakly to moderately correlated, whereas these associations were attenuated or absent among users. Nevertheless, the positive correlation between health literacy and service familiarity remained stable in both groups, suggesting that cognition-related factors may serve as important predictors of service utilization and represent potential pathways of influence. However, due to the cross-sectional design, causal relationships cannot be established.

Age was differentially associated with service type. For TCM medical services, participants aged ≥ 80 years had lower utilization than those aged 60–69 years, whereas no age difference was observed for TCM public health services. Functional decline in older adults increases their reliance on family care when seeking medical treatment^{41,42}, suggesting the need for targeted strategies for the very elderly. The lack of significant differences in public health service utilization may be attributed to the fact that active outreach service models effectively mitigate mobility barriers⁴³.

In our study, gender and marital status were not independently associated with either type of TCM service utilization, which partially contrasts with previous findings that females and married individuals are more likely to use TCM services^{44–46}. The univariate effect of gender (higher utilization among females) became non-significant after multivariable adjustment, and we found no significant interaction between gender and marital status (Table S6). These results suggest that the effects of gender and marital status are largely explained by factors such as education and health literacy, rather than serving as independent predictors.

Enabling factors

Among enabling factors, perceived competence of TCM physicians was positively associated with utilization of both service types, consistent with evidence that trust in provider competence reduces uncertainty and promotes healthcare use^{11,47}.

It was found that accessibility to CHCs was positively associated with basic medical service utilization, consistent with its role as an enabling factor in the Andersen model^{46,48}. Notably, accessibility was associated only with basic medical services, not with public health services, indicating that preventive service utilization may be more strongly influenced by institutional provision and health promotion than curative care, reflecting distinct underlying mechanisms^{49,50}.

Contrary to previous studies^{43,51–53}, we found no significant association between income, insurance status, or their interaction (Table S7) and service utilization. This discrepancy may reflect differences in sample characteristics and policy contexts^{49,50,54}. Given that insurance coverage in our study sample was as high as 97.5%, the statistical power to detect an insurance effect was limited. Furthermore, China's near-universal health insurance coverage in recent years, along with subsidies for TCM services at CHCs, may have substantially reduced financial barriers^{48,55}, thereby weakening the independent role of economic factors and highlighting the importance of non-economic determinants such as health literacy, familiarity with services, and perceptions of healthcare.

Need factors

Need factors were found to play different roles across different types of services. Disease severity and pain levels were positively associated with utilization of treatment services, confirming that subjective health impairment is a demand driver^{56–59}. However, the temporal mismatch between pain assessment (past four weeks) and service utilization (past year) in this study limits causal interpretation, and reverse causality or recall bias cannot be ruled out. For TCM public health services, no such associations were found, reflecting their preventive, supply-oriented nature^{49,50}.

In contrast to previous studies reporting a significant association between ADL independence and healthcare utilization^{60,61}, this study found no significant association between ADL limitations and the utilization of either service type. Several explanations may account for this finding. First, ADL limitations may give rise to a “need paradox,” whereby individuals with the greatest need are also those least able to access care due to mobility constraints⁶⁰. However, many TCM public health services in this study were delivered through proactive outreach, thereby reducing reliance on individual mobility and potentially attenuating access barriers associated with ADL limitations. Second, for TCM treatment services, older adults with ADL limitations may rely on family members for accompaniment or proxy healthcare-seeking. The relatively high levels of social and familial support in this sample may have compensated for functional impairment, thereby weakening the direct association between ADL and self-reported service utilization. Third, prior evidence suggests that economic resources, affordability, and geographic accessibility are key determinants of healthcare utilization among older adults with functional limitations⁶². Composite measures such as service accessibility may better capture these influences, which is consistent with the findings of this study. Finally, ADL in this study was measured based on basic self-care activities (e.g., bathing, dressing) and may not fully capture broader functional constraints relevant to healthcare access, such as instrumental activities of daily living (e.g., transportation use, financial management). Future studies should employ more comprehensive functional assessment tools to further elucidate this relationship.

Implications for practice and policy

Our findings indicate that TCM's role in primary chronic disease management remains underutilized, with several policy implications. First, because cognitive and informational barriers (e.g., low health literacy, unfamiliarity with TCM) appear more influential than financial factors, strengthening health education and communication is warranted. Second, given that CHC accessibility was associated with medical service use, optimizing primary-level TCM resources and referral pathways is recommended. Third, the need-driven nature of TCM medical services versus the supply-driven nature of public health services calls for differentiated strategies. Fourth, the lack of association between ADL and utilization suggests that functional assessment could be integrated into primary care to better target older and functionally impaired populations.

Limitations

Several limitations of this study should be acknowledged. First, healthcare utilization data were self-reported and may be subject to recall bias. Second, the cross-sectional study design precludes causal inference, necessitating longitudinal or experimental studies to validate underlying mechanisms. Third, TCM health literacy and familiarity with TCM services were measured using single-item indicators. Although this approach has been used in previous population-based surveys to reduce respondent burden, it may not fully capture the multidimensional nature of these cognitive constructs. In addition, these variables were dichotomized for analytical purposes. While this improves interpretability for clinical and policy applications, it may obscure within-group variability and potential dose-response relationships. Fourth, this study was conducted in regions where CHC infrastructure is relatively well-developed and TCM has been formally integrated into the basic

public health service system. This limits the external validity of our findings. Our results are most directly applicable to regions with similar characteristics. Generalization to areas with underdeveloped CHC networks, different TCM reimbursement policies, or lower cultural acceptance of TCM requires caution. Future multi-region studies are needed to validate our findings.

Conclusions

This study found that the utilization of both TCM treatment and public health services among older adults with chronic diseases remained low (14.2% and 15.7%, respectively). Based on the Andersen model, we identified that predisposing factors (education, health literacy, and service familiarity) and enabling factors (perceived competence of TCM doctors) were the primary drivers of service utilization, whereas need factors played a limited and service-dependent role. Notably, the influencing patterns differed between TCM treatment services and public health services, suggesting that these two service types are driven by distinct mechanisms. Our findings imply that strategies to improve TCM service utilization should focus on enhancing health literacy, building trust in providers, and adopting differentiated approaches for treatment versus public health services. Future research with longitudinal designs is needed to establish causal relationships and explore the mechanisms underlying the observed associations.

Data availability

All data generated or analysed during this study are included in this published article.

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Author contributions

Yan Chen and Dahui Wang contributed to conception and design of the study. Xuexia Gao, Dequan Shen, and Yan Chen performed the statistical analysis and drafted the original manuscript. Hui Huang, Dequan Shen,

Rouyi Xu, and Chenxuan Gong collected and processed data. Yan Chen and Dahui Wang reviewed and revised the manuscript. All authors read and approved the final manuscript.

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Declarations

Competing interests

The authors declare no competing interests.

Additional information

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