Journal of Racial and Ethnic Health Disparities
https://doi.org/10.1007/s40615-026-02876-5

Patient-Physician Ethnic Concordance and its Impact on Care Continuity: First Evidence from Tibet

Weizhuo Chen[1,2] · Changli Jia[1,2] · Yuting Zhang[3] · Qiao Yang[1,4] · Sisi Zhong[1,2] · Junyi Chen[1,2] · Boyang Li[5] · Ting Ye[1,2]

Received: 1 May 2025 / Revised: 25 December 2025 / Accepted: 26 January 2026

Abstract

Background Continuity of care is crucial for improving health outcomes, yet its relationship with patient-physician ethnic concordance remains understudied, particularly in ethnic minority populations. This study provides the first evidence of this relationship in Tibet, a region with unique ethnic dynamics.

Methods We conducted a retrospective cohort study analyzing 3,883,031 patient visits from 2021 to 2023 across three major Tibetan cities. Using de-identified reimbursement claims data, we categorized patient-physician interactions into four groups based on patient-physican ethnic concordance. The Bice-Boxerman Continuity of Care (COC) index was used to quantify care continuity.

Results Ethnic concordance between patients and physicians positively influenced care continuity (coefficient = 0.0114; 95% CI 0.0100 to 0.0128). Han patient-physician pairs demonstrated the highest continuity (COC = 0.7765). Tibetan patients experienced lower continuity overall, particularly when treated by Han physicians (COC = 0.7192). However, Tibetan patient-physician pairs showed improved continuity compared to Tibetan-Han pairs, highlighting the positive effect of ethnic concordance.

Conclusions This first study in Tibet reveals that while patient-physician ethnic concordance is associated with improved care continuity, significant disparities persist for Tibetan patients. These findings emphasize the need for culturally competent healthcare policies, support for traditional medicine, improved healthcare access, and targeted interventions for minority groups. The results have potential implications for healthcare delivery in ethnically diverse regions worldwide, as they may help bridge gaps in care continuity, enhance health equity for ethnic minorities in demographically diverse nation.

Keywords Continuity of care · Ethnic concordance · Patient-physician relationship · Minority health

Weizhuo Chen and Changli Jia contributed equally to this paper.

✉ Ting Ye
yeting@hust.edu.cn

Weizhuo Chen
mushroom31@163.com

Changli Jia
jiachangli1014@gmail.com

Yuting Zhang
yuting.zhang@unimelb.edu.au

Qiao Yang
276858689@qq.com

Sisi Zhong
zhongsisi@hust.edu.cn

Junyi Chen
1045907692@qq.com

Boyang Li
Liboyang@whu.edu.cn

[1] School of Medicine and Health Management, Tongji Medical College, Huazhong University of Science and Technology, Hangkong Road 13, Qiaokou District, Wuhan 430030, China

[2] Research Center for Rural Health Service, Key Research Institute of Humanities & Social Sciences of Hubei Provincial Department of Education, Wuhan, China

[3] Applied Economic & Social Research, Faculty of Business and Economic, The University of Melbourne, Melbourne, Victoria, Australia

[4] Department of Medical Record Management, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China

[5] School of Political Science and Public Administration, Wuhan University, Wuhan, China

Published online: 13 March 2026

Introduction

Continuity of care, defined as a sustained relationship between a patient and a specific healthcare provider or institution over time [1–3], is consistently associated with a range of favorable outcomes, including reductions in mortality rates, hospital admissions, condition-specific complications [4–6]. Consequently, the World Health Organization has highlighted the strengthening of care continuity as a crucial element in achieving patient-centered universal health coverage [7].

While previous research has consistently emphasized the beneficial impact of continuity of care on healthcare outcomes, the evidence regarding the determinants facilitating its establishment remains fragmented [8–10]. Existing studies have primarily focused on structural and organizational factors, including healthcare system policies, service delivery models, and accessibility [11–13], along with patient-related characteristics such as demographics and disease profiles [14, 15]. Increasingly, interpersonal dynamics between patients and physicians have also been identified as crucial to maintaining continuity of care [16]. High-quality interpersonal interactions directly influence patient loyalty and sustained engagement with healthcare providers [17]. Physicians who continuously accumulate comprehensive knowledge about their patients' backgrounds, medical histories, and personal values can deliver more personalized and effective care, forming the cornerstone of continuity of care [18].Beyond acquired communication skills [19], inherent sociocultural similarities or differences between patients and providers may also substantially influence the quality of their interactions. A few studies have examined patient ethnicity in relation to continuity of care, reporting that racial and ethnic minority patients tend to experience lower continuity and more fragmented care than majority groups in both US survey data and English general practice records [20, 21]. This consideration is especially relevant for examining continuity of care within ethnically diverse or minority populations, as structural barriers to healthcare utilization frequently intersect with sociocultural disparities.

In addition to a regular source of care, reports suggest that interpersonal aspects of the patient–physician relationship lead to additional variation in the quality of medical care [22, 23]. One such interpersonal factor ethnic concordance between patients and physician has increasingly attracted scholarly attention, particularly for ethnically and culturally diverse patient populations [22, 24, 25]. Existing studies suggest that patient-physician ethnic concordance, defined as the tendency for individuals sharing similar social and cultural backgrounds [26]. This concordance may promote continuity of care primarily through relational mechanisms, including more effective communication, greater trust, and improved alignment in understanding of health needs, behaviors, and expectations compared to interactions lacking such sociocultural alignment [22, 27]. Moreover, additional evidence indicates that improved continuity of care among patients facing language barriers may help address healthcare disparities and reduce hospital readmission rates [28]. Other studies on language concordance and social background alignment indicate that continuity of care could function as a moderating or buffering factor in managing chronic conditions, such as asthma and cardiovascular risk factors [29, 30].

In conclusion, although some studies suggest that ethnic concordance may enhance continuity of care and health outcomes [24, 25], the magnitude and relative contribution of concordance to continuity remain unclear, particularly among minority populations [29]. Additionally, limitations in research design, such as an over-reliance on cross-sectional studies and limited sample sizes involving minority patients and healthcare providers [24, 25, 29], further constrain the clarity and generalizability of findings regarding the actual impact of ethnic concordance on continuity of care.

We examine the impact of patient-physician ethnic concordance on continuity of care, with a particular focus on the Tibetan population in China. In China, ethnicity is an administratively defined category within the state's official ethnic classification system, which recognizes 56 ethnic groups (the Han majority and 55 minority groups), including Tibetan. The Tibetan population is primarily concentrated in Tibet, where it comprises approximately 90% of residents; the remaining population is roughly 8% Han and 2% other ethnic minority groups. As Tibetans constitute the local majority and represent an integral component of China's cultural and demographic diversity, ethnic minority status does not mechanically imply lower social power within the local context. Nevertheless, ethnic differences may still shape healthcare experiences through structural and interpersonal pathways, including linguistic and cultural distance in clinical encounters and disparities in health literacy [31, 32]. Recent significant investments by the Chinese government in Tibetan regions have led to increased interactions between Han and Tibetan populations, highlighting the structural inequalities faced by ethnic minority groups [33, 34]. In this context, the relationship between ethnic concordance and continuity of care provides an opportunity to analyze and address underlying inequities [35, 36]. This study aims to address this gap by analyzing large-scale reimbursement claims data, providing empirical evidence on the impact of ethnic concordance on continuity of care, and to explore how this relationship varies across different patient and provider factors. The findings offer critical insights for enhancing healthcare services for minority populations in nations or regions characterized by demographic diversity, and contribute to the development of policies that promote healthcare equity, improve care continuity in multicultural settings globally, and ultimately achieve universal health coverage.

Methods

Data Sources and Study Population

This study utilized de-identified reimbursement claims data from the Urban Employee Basic Medical Insurance (UEBMI) and Urban and Rural Residents Basic Medical Insurance (URRBMI) programs, encompassing all beneficiaries across three major cities in the Tibet Autonomous Region, China. The dataset includes anonymized patient demographic details, all outpatient and inpatient reimbursement claims (not including data related to pharmaceutical purchases at pharmacies), institutional identifiers, and the names and unique identifiers of attending physicians, spanning the period from January 2021 to December 2023. UEBMI and URRBMI are the predominant national health insurance schemes in China, collectively covering over 95% of the population [37], thereby effectively encompassing nearly the entire population of the three cities under study.

Initially, a total of 6,673,256 reimbursement claims were identified, with each claim representing a single visit. We use three exclusion criteria to construct our study sample (Fig. 1). First, we excluded those who had fewer than 3 visits per year because otherwise we cannot construct continuity of care measures 1,338,346 claims were exclude (Tibetan 89.80%, Han 8.33%, other 1.87%) [38, 39]. Second, we excluded claims with missing physician information and missing patient demographic information, to ensure we can measure patient-physician ethnic concordance among the Han and Tibetan ethnic groups. After applying these exclusion criteria, the final analytic cohort consisted of 3,883,031 claims.

Study Variables

Outcome Measures

We used the Bice-Boxerman Continuity of Care (COC) index to quantify continuity of care within our study population (Supplement Table S1 for formula) [40, 41]. The index ranges from 0 (indicating complete discontinuity) to 1 (representing optimal continuity). The COC index is a measure of care dispersion and density and reflects the extent to which a patient's medical visits during the year relate to a distinct physician, therefore, we calculated the annual COC index for each patient for the years 2021 to 2023 [39]. While it is common practice to categorize measures of COC before the analysis, we decided to keep them continuous to avoid problems associated with the choice of arbitrary cut-points or the categorization of variability within each group [42]. In addition, we conducted sensitivity analyses using the K Index that measures the degree of dispersion, the Sequential Continuity (SECON) index that measures the sequence of care, the Usual Provider of Care (UPC) index and the Herfindahl Index (HH) that measure visit density [6, 41, 43].

In this study, we adapted the COC index to focus on the continuity of care at the institutional level rather than the physician level, a decision driven by the unique characteristics of healthcare delivery in China. China's family physician system and tiered medical treatment structure remain underdeveloped [44, 45]. As a result, Chinese patients have significant flexibility in selecting healthcare providers, often prioritizing the reputation and service quality of

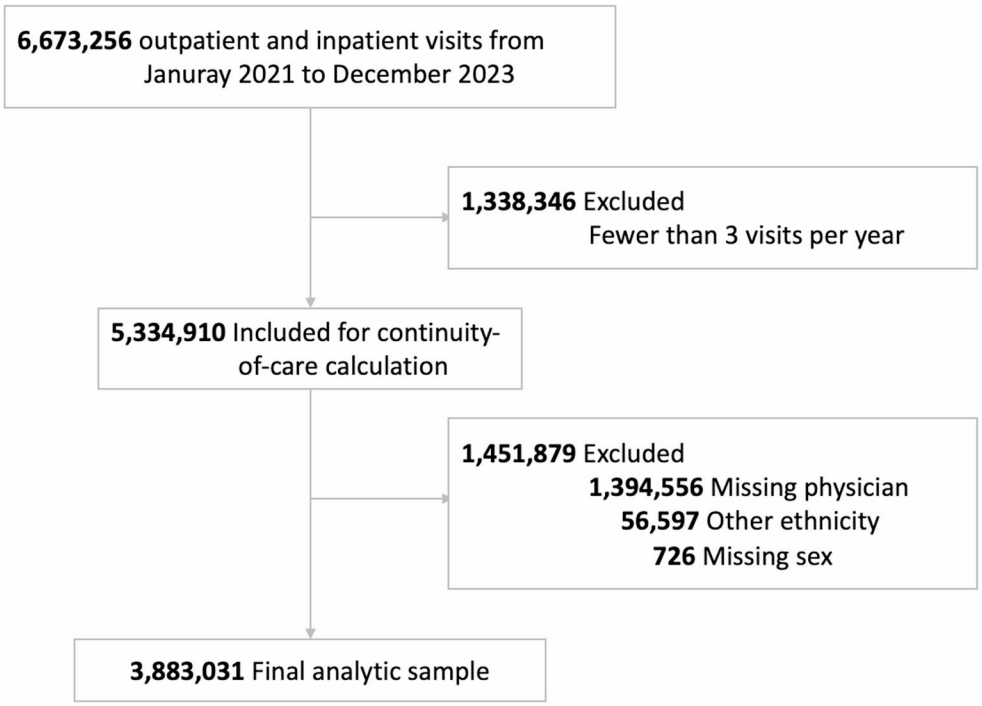

Fig. 1 Study population

institutions over individual physicians [46]. Unlike in some western countries where the General Practitioner serve as the first contact system, Chinese patients typically do not establish long-term, fixed relationships with individual physicians [47–49]. Furthermore, China's current healthcare model emphasizes multidisciplinary collaboration, enabling institutions to offer a broader spectrum of medical services that individual physicians may not be able to provide comprehensively [50, 51]. In this context, continuity of care extends beyond the responsibility of a single physician to encompass a team of healthcare professionals [52]. Consequently, measuring continuity at the institutional level can reflects the patient's healthcare experience more accurately within this system.

Independent Variable

The primary independent variables in this study were patient ethnicity, physician ethnicity, and their interaction. Patient ethnicity was directly identified from personal information contained within the reimbursement claims data. Physician ethnicity was determined based on physician names, utilizing the methodology referenced by Sun et al. [53]. Names classified as Tibetan were coded as Tibetan, whereas all remaining names were coded as Han. Based on these classifications, the independent variables were categorized into four groups: Han physicians-patients pairs, Tibetan physicians-Han patients pairs, Han physicians-Tibetan patients pairs, and Tibetan physicians-patients pairs. Because the Han population constitutes the nationally majority (non-minority) ethnic group in China, Han physician–patient pairs were selected as the reference category.

Covariates

The covariates included patient age, sex, type of visit type (outpatient/inpatient), civil servant status, insurance type (UEBMI/URRBMI), total medical fees, number of visits, hospital level, household registration type, number of diseases, location of care, and hospital location. All this information is at patient or patient-visit level, not at the physician level. Civil servants may be eligible for additional medical subsidies and other supplementary benefits beyond basic insurance in China's multi-tier medical security system [54], which can reduce financial barriers and shape healthcare utilization patterns and provider choice. Hospital level in China follows a tiered system, consisting of primary, secondary, and tertiary hospitals, each serving distinct roles. Primary hospitals are community-based healthcare centers or township hospitals. Secondary hospitals are district or county-level facilities, while tertiary hospitals, located in larger cities, provide specialized care for complex conditions. The number of diseases diagnosed can partially reflect health status [55, 56]. Location of care refers to whether a patient seeks cross-regional care, classified into three categories: Local Care, Intra-Province Care, and Cross-Province Care. These categories indicate whether the hospital a patient was admitted to is within the same region where the patient enrolled in health insurance (normally at the city level), within the same province but outside the local area, or outside the insured province.

Statistical Analyses

All statistical analyses were performed using R, version 4.4.2 (R Foundation for Statistical Computing). We estimated an ordinary least squares (OLS) with fixed-effects model to examine the relationship between the continuity of care outcome and both patient ethnicity and physician ethnicity as well as their interaction. The models included patient covariates as mentioned above, and patient, year, and hospital fixed effects. The model specification is:

$$\begin{aligned}\mathrm{COC}_{i,t} &= \beta_0 + \beta_1 \mathrm{EthP}_i + \beta_2 \mathrm{EthD}_{i,j,t} + \beta_3 (\mathrm{EthP}_i \times \mathrm{EthD}_{i,j,t}) \\ &+ \mathbf{X}'_{i,j,t}\boldsymbol{\theta} + \alpha_i + \gamma_t + \delta_k + \epsilon_{i,j,t}\end{aligned} \quad (1)$$

Where $\boldsymbol{X}'_{i,j,t}$ is a vector of covariates. The terms α_i, γ_t and δ_k denote patient, year, and hospital fixed effects, respectively, and $\epsilon_{i,j,t}$ is the error term. We calculated 95% CIs for all estimated coefficients and considered 2-sided $P<0.05$ as statistically significant.

In addition, we conducted subgroup analyses, stratifying by the demographic and institutional factors (patient age, age, sex, visit type, civil servant status, insurance type, total medical fees, number of visits, household registration, number of diseases, hospital location, location of care and hospital level) to investigate heterogeneous effects.

Sensitivity Analyses

We conducted sensitivity analyses from five perspectives: alternative outcome measures, alternative independent variables, alternative sample specifications, alternative model specifications, and a lagged model.

First, to assess the robustness of our findings, we conducted supplementary analyses using physician-level continuity measures. To address potential measurement bias, we also replaced our primary COC indicator with other commonly used indices (e.g., HH, UPC, SECON, and K index) and tested binary and categorical logistic models with varying COC cutoffs [57, 58]. Next, we modified independent variables by applying methods such as LASSO-based variable selection, excluding fixed effects, and log-transforming skewed variables (e.g.,

medical fees). For sample specifications, we additionally adopted an unconditional estimation strategy by retaining patients with fewer than three annual visits and assigning their continuity-of-care index (COC) a value of 0 before re-estimating the regression models. We also considered alternative categorizations of ethnic groups, performed PSM, and restricted analyses to data from 2022 to 2023 to minimize possible inaccuracies in the initial year. We also examined different model structures by using Tobit regression, quantile regression, and models with clustered standard errors to account for potential censoring, distributional heterogeneity, and within-group correlation. Lastly, to explore possible temporal relationships, we estimated a lagged model linking predictors at time t − 1 to outcomes at time t. Unless indicated otherwise, all sensitivity models included the same covariates and maintained fixed effects for year, patient, and institution. Statistical significance was determined with 2-sided tests at a threshold of $P < 0.05$. All analyses were performed using R (version 4.4.2).

Results

Cohort Characteristics

Descriptive data on the study cohort are presented in Table 1 and Supplement Table S2. Among 3,883,031 visits, 42.3% (n=642,925) were with Han physicians and 57.7% (n=2,240,106) with Tibetan physicians. In terms of patient ethnicity, 14.6% (n=567,216) of the visits involved Han patients, while 85.4% (n=3,315,815) involved Tibetan patients. When examining the four patient-physician ethnicity groups, Tibetan patient-physician pairs constituted the largest subgroup with 2,139,436 (55.10%) visits. In terms of continuity, the mean COC index across all visits was 0.60 (SD=0.30). The Tibetan patient-physician pairs exhibited the highest continuity, with a mean COC index of 0.64 (SD=0.30).

Main Results from Fixed-Effects Model Analysis and Disparities in Different Patient-Physician Ethnicity Groups

Table 2 and Supplement Table S3 in the present estimates derived from the fixed-effects model. The regression analysis reveals that the coefficient for Tibetan physician is -0.0090 (95% CI, -0.0104 to -0.0077; P<0.001), suggesting that, for Han patients, continuity of care provided by Tibetan physicians is slightly lower than that provided by Han physicians. The coefficient for Tibetan patient is -0.0573 (95% CI, -0.0600 to -0.0545; P<0.001), indicating that continuity of care for Tibetan patients is significantly lower compared to Han patients. A particularly noteworthy finding is the coefficient for the interaction term between physician and patient ethnicity, which is 0.0114 (95% CI, 0.0100 to 0.0128; P<0.001). This suggests that when both the physician and the patient are Tibetan, continuity of care improves slightly, highlighting a positive effect of ethnic concordance on continuity of care.

To further examine the effect of different patient-physician ethnicity groups on the continuity of care, we conducted a comparative analysis and ranking of the effect sizes for the four groups. Accordingly, for the reference group (Han physician-patient pairs, EthP=0, EthD=0) ,the COC is 0.7765 (the intercept reported in Supplement Table S3). For Tibetan-Han pairs (EthP=1, EthD=0), the predicted COC decreases to 0.7675 ($0.7765-0.0090\times1-0.0573\times0+0.0114\times0$). In contrast, for Han-Tibetan pairs (EthP=0, EthD=1), the COC further drops to 0.7192 ($0.7765-0.0090\times0-0.0573\times1+0.0114\times0$). Finally, for a Tibetan physician–patient pairs, the COC is 0.7216 ($0.7765-0.0090\times1-0.0573\times1+0.0114\times1$).

Heterogeneity in in Different Patient-Physician Ethnicity Groups

Our subgroup analyses revealed that patient-physician ethnic concordance significantly enhanced continuity of care across most subgroups, although the strength and significance of this relationship varied depending on specific demographic and institutional factors (online Supplement Table S4-12). Specifically, ethnic concordance significantly improved continuity of care for both pediatric patients (0.0090; P<0.001) and adults (coefficient: 0.0101; P<0.001). However, this effect was not statistically significant among elderly patients (coefficient: −0.0074; P>0.05), and for both pediatric (coefficient: −0.0058; P<0.1)and elderly Han patients (coefficient: 0.0077; P<0.1), continuity was similar between Tibetan and Han physicians. In terms of hospital location, the beneficial effect of concordance was pronounced in urban hospitals (coefficient: 0.0111; P<0.001) but was not significant in rural hospitals (coefficient: 0.0126; P<0.1). Furthermore, the location of care influenced outcomes, with ethnic concordance improving continuity of care for patients receiving treatment locally (coefficient: 0.0068; P<0.001) and those seeking care within the same province (coefficient: 0.0072; P<0.001). Conversely, no significant effect was observed for patients traveling across provinces (coefficient: 0.0136; P>0.05).

Results from Sensitivity Analyses

The sensitivity analysis confirmed the robustness of our main findings, with consistent results across different

Table 1 Demographic characteristics and continuity of care

Characteristic	No. (%) of visits				
	Overall (n = 3,883,031)	Han physician-Han patient (n = 466,546)	Tibetan physician-Han patient (n = 100,670)	Han physician-Tibetan Patient (n = 1,176,379)	Tibetan physician- Tibetan patient (n = 2,139,436)
COC					
Mean (SD)	0.60 (0.30)	0.55 (0.29)	0.58 (0.30)	0.54 (0.30)	0.64 (0.30)
Median (IQR)	0.52 (0.33-1.00)	0.49 (0.33-1.00)	0.50 (0.33-1.00)	0.47 (0.31-1.00)	0.60 (0.37-1.00)
Gender (ref: Female)					
Male	1,706,955 (44.0)	255,504 (54.8)	54,388 (54.0)	494,384 (42.0)	902,679 (42.2)
Age					
Mean (SD)	44.6 (17.8)	41.6 (12.6)	35.6 (12.5)	44.5 (17.7)	45.7 (18.8)
Median (IQR)	44 (32–58)	41 (32–51)	33 (28–42)	43 (32–58)	46 (32–60)
Visit type(ref: Inpatient)					
Outpatient	3,679,636 (94.8)	453,771 (97.3)	99,210 (98.5)	1,079,343 (91.8)	2,047,312 (95.7)
Civil servant status					
Civil servant	815,141 (21.0)	233,956 (50.1)	38,701 (38.4)	288,854 (24.6)	253,630 (11.9)
Insurance type(ref: UEBMI)					
URRBMI	1,909,577 (49.2)	15,552 (3.3)	5,310 (5.3)	471,847 (40.1)	1,416,868 (66.2)
Total medical fees, ¥					
Mean (SD)	812.7 (9201.9)	602.4 (3326.3)	405.3 (2225.9)	1,401.7 (10,641.1)	554.0 (9,407.5)
Median (IQR)	126 (43.0-362.0)	158.6 (54.5–390.0)	127.9 (45.0-353.3	216.4 (81.9-601.6)	88.00 (31.2-256.8)
Number of visits					
Mean (SD)	11.84 (12.5)	17.5 (17.4)	11.2 (11.6)	11.9 (12.5)	10.6 (10.8)
Median (IQR)	8 (5–14)	12 (6–22)	8 (5–13)	8 (5–14)	8 (5–13)
Hospital level(ref: Tertiary)					
Secondary	863,900 (22.2)	49,025 (10.5)	22,340 (22.2)	143,340 (12.2)	649,195 (30.3)
Primary or below	1,293,526 (33.3)	137,410 (29.5)	19,978 (19.8)	447,911 (38.1)	688,227 (32.2)
Household registration type(ref: Rural)					
Urban	1,886,424 (48.6)	441,884 (94.7)	84,927 (84.4)	660,854 (56.2)	698,759 (32.7)
Number of diseases					
Mean (SD)	3.6 (2.9)	5.5 (4.2)	3.5 (2.7)	3.7 (2.8)	3.1 (2.5)
Median (IQR)	3 (2–5)	4 (3–7)	3 (2–4)	3 (2–5)	2 (1–4)
Location of care (ref: Local care)					
Cross-province care	331,722 (8.5)	258,780 (55.5)	838 (0.8)	71,806 (6.1)	298 (<0.1)
Intra-province care	1,782,791 (45.9)	111,173 (23.8)	51,762 (51.4)	754,708 (64.2)	865,148 (40.4)
Hospital location(ref: Rural)					
Urban	3,331,639 (85.8)	462,044 (99.0)	95,946 (95.3)	1,123,398 (95.5)	1,650,251 (77.1)

SD, Standard Deviation; *IQR*, Interquartile Range. Notes: except for physician ethnicity, all other information is at patient or patient-visit level, not at the physician level

outcome measures, variables, and model specifications (Table 3, Supplement Table S14 and Fig. S3). In particular, when we re-estimated the models using a dichotomized continuity outcome (COC > 0.5), Tibetan physician–patient pairs showed higher continuity, with the odds of achieving a COC greater than 0.5 increasing by a factor of 1.15 (OR = 1.15). Across specifications, the negative association between Tibetan ethnicity and continuity of care, and the positive interaction effect of patient-physician ethnic concordance, remained stable across various adjustments.

Discussion

Main Findings

Using large-scale reimbursement claims data from ethnic minority regions, we provide novel empirical evidence on the impact of patient-physician ethnic concordance on continuity of care. Given that we observed substantial variability in COC across patients, patient–physician ethnic concordance may have a greater influence on continuity of

Table 2 Coefficients from adjusted fixed-effects models : overall and subgroup analyses

Model	Coefficient (95% CI)		
	Physician ethnicity (Tibetan vs. Han)	Patient ethnicity (Tibetan vs. Han)	Interaction
Overall	–0.0090 (–0.0104 to −0.0077)***	–0.0573 (–0.0600 to −0.0545)***	0.0114 (0.0100 to 0.0128)***
Sex			
Male	–0.0091 (–0.0110 to −0.0071)***	–0.0621 (–0.0660 to −0.0581)***	0.0116 (0.0097 to 0.0136)***
Female	–0.0086 (–0.0106 to −0.0067)***	–0.0524 (–0.0564 to −0.0485)***	0.0108 (0.0088 to 0.0128)***
Age			
≤18	–0.0058 (–0.0118 to 0.0002)	–0.0218 (–0.0359 to −0.0077)**	0.0090 (0.0029 to 0.0152)**
18≤Age<65	–0.0074 (–0.0089 to −0.0060)***	–0.0634 (–0.0663 to −0.0605)***	0.0101 (0.0086 to 0.0115)***
≥65	0.0077 (–0.0011 to 0.0166)	–0.0920 (–0.1078 to −0.0761)***	–0.0074 (–0.0163 to 0.0015)
Visit type			
Outpatient	–0.0093 (–0.0107 to −0.0079)***	–0.0579 (–0.0607 to −0.0551)***	0.0114 (0.0099 to 0.0128)***
Inpatient	–0.0300 (–0.0431 to −0.0169)***	–0.0888 (–0.0964 to −0.0812)***	0.0387 (0.0255 to 0.0519)***
Civil servant status			
Non–civil servant	–0.0088 (–0.0105 to −0.0070)***	–0.0512 (–0.0547 to −0.0477)***	0.0106 (0.0088 to 0.0124)***
Civil servant	–0.0034 (–0.0057 to −0.0011)**	–0.0780 (–0.0822 to −0.0738)***	0.0068 (0.0044 to 0.0091)***
Insurance type			
UEBMI	–0.0062 (–0.0077 to −0.0047)***	–0.0753 (–0.0781 to −0.0724)***	0.0088 (0.0072 to 0.0103)***
URRBMI	–0.0100 (–0.0165 to −0.0035)**	–0.0474 (–0.0579 to −0.0370)***	0.0111 (0.0046 to 0.0177)***
Hospital level			
Tertiary	–0.0054 (–0.0072 to −0.0036)***	–0.0740 (–0.0772 to −0.0709)***	0.0102 (0.0083 to 0.0120)***
Secondary	–0.0077 (–0.0117 to −0.0037)***	–0.0256 (–0.0316 to −0.0196)***	0.0086 (0.0045 to 0.0127)***
Primary or below	–0.0148 (–0.0180 to −0.0117)***	–0.0523 (–0.0561 to −0.0484)***	0.0083 (0.0051 to 0.0115)***
Household registration			
Urban	–0.0080 (–0.0119 to −0.0045)***	–0.0708 (–0.0737 to −0.0678)***	0.0112 (0.0096 to 0.0128)***
Rural	–0.0082 (–0.0097 to −0.0069)***	–0.0237 (–0.0324 to −0.0149)***	0.0095 (0.0057 to 0.0132)***
Hospital location			
Urban	–0.0083 (–0.0097 to −0.0069)***	–0.0644 (–0.0672 to −0.0616)***	0.0111 (0.0097 to 0.0126)***
Rural	–0.0187 (–0.0355 to −0.0019)*	–0.0118 (–0.0314 to 0.0078)	0.0126 (–0.0042 to 0.0295)
Location of care			
Local care	–0.0069 (–0.0091 to −0.0047)***	–0.0398 (–0.0440 to −0.0356)***	0.0068 (0.0045 to 0.0091)***
Intra-province care	–0.0038 (–0.0059 to −0.0018)***	–0.0468 (–0.0503 to −0.0432)***	0.0072 (0.0051 to 0.0093)***
Cross-province care	0.0035 (–0.0043 to 0.0112)	–0.1340 (–0.1395 to −0.1285)***	0.0136 (–0.0048 to 0.0320)

CI, Confidence interval. *means p values <0.05. **means p values <0.005. ***means p values <0.001. Notes: This table presents the overall regression results and subgroup analyses. All coefficients were derived from fixed-effects models with patient, year, and institution as fixed effects, controlling for sex, age, visit type, civil servant status, insurance type, total medical fees, number of visits, hospital level, household registration type, number of diseases, location of care, and hospital location

care in regions where multiple ethnic groups live in close proximity.

Comparison with Previous Findings

Compared to prior research, our findings support studies conducted in multicultural countries such as the United States, where ethnic concordance has been shown to improve patient satisfaction and health outcomes [23, 59, 60]. Our study goes a step further by exploring the impact of ethnic concordance on care continuity, which may serve as an intermediary pathway between ethnic concordance and health outcomes. This association is consistent with evidence that improved communication, reduced misunderstandings, and increased trust between patients and physicians, all of which contribute to greater patient compliance and, ultimately, enhanced continuity of care [61–63]. This positive effect remains consistent even when different methods of measuring continuity are used in sensitivity analyses.

We found that among the four patient-physician ethnicity groups, the highest continuity is Han physician-patient pairs. Although Tibetan physician–patient pairs showed the highest unadjusted continuity, this advantage attenuated after adjustment for utilization intensity, disease burden, and access-related factors, with Tibetan concordant pairs exhibiting lower continuity than Han–Han pairs. This pattern is consistent with the possibility that structural constraints in service organization and access, beyond interpersonal concordance, contribute to lower continuity among

Table 3 Results from sensitivity analyses

Model	Coefficient (95% CI)		
	Physician ethnicity (Tibetan vs. Han)	Patient ethnicity (Tibetan vs. Han)	Interaction
Alternative outcome measures			
COC (Doctor-level)	-0.0042 (-0.0058 to -0.0026)***	-0.0204 (-0.0212 to -0.0196)***	0.0020 (0.0016 to 0.0024)***
Logistic COC (Cutoff = 0.5)[a]	0.6658 (0.6524 to 0.6795)***	0.8188 (0.8164 to 0.8213)***	1.1503 (1.1442 to 1.1564) ***
Logistic COC (Median = 0.52)[a]	0.6599 (0.6466 to 0.6735)***	0.8201 (0.8177 to 0.8226)***	1.1545 (1.1484 to 1.1607)***
Logistic COC (Mean = 0.60)[a]	0.6630 (0.6495 to 0.6768)***	0.8152 (0.8127 to 0.8177)***	1.1495 (1.1433 to 1.1557)***
HH	-0.0082 (-0.0093 to -0.0070)***	-0.0520 (-0.0542 to -0.0498)***	0.0097 (0.0085 to 0.0109)***
UPC	-0.0070 (-0.0080 to -0.0060)***	-0.0441 (-0.0461 to -0.0421)***	0.0083 (0.0073 to 0.0093)***
SECON	-0.0056 (-0.0067 to -0.0044)***	-0.0455 (-0.0479 to -0.0431)***	0.0087 (0.0075 to 0.0099)***
K index	-0.0038 (-0.0048 to -0.0028)***	-0.0315 (-0.0335 to -0.0295)***	0.0063 (0.0053 to 0.0073)***
Alternative independent variables			
Lasso variable selection[b]	-0.0103 (-0.0118 to -0.0089)***	-0.0612 (-0.0639 to -0.0585)***	0.0128 (1.0114 to 0.0142)***
No fixed effects[c]	-0.0455 (-0.0475 to -0.0435)***	-0.0975 (-0.0987 to -0.0964)***	0.0688 (0.0667 to 0.0709)***
Log transformation[d]	-0.0056 (-0.0067 to -0.0044)***	-0.0455 (-0.0478 to -0.0431)***	0.0087 (0.0075 to 0.0099)***
Alternative samples			
Unconditional estimation	-0.0070 (-0.0088 to -0.0052)[d]	-0.0231(-0.0260 to -0.0202)[d]	0.0114 (0.0096 to 0.0132)[d]
Expanded ethnic groups[e]	-0.0038 (-0.0048 to -0.0028)***	-0.0315 (-0.0335 to -0.0295)***	0.0063 (0.0053 to 0.0073)***
PSM sample[f]	-0.0081 (-0.0092 to -0.0069)***	-0.0519 (-0.0541 to -0.0497)***	0.0097 (0.0085 to 0.0109)***
2022–2023 only	-0.0070 (-0.0080 to -0.0060)***	-0.0441 (-0.0461 to -0.0421)***	0.0083 (0.0073 to 0.0093)***
Alternative model specifications			
Tobit regression[g]	-0.0589 (-0.0614 to -0.0561)***	-0.1240 (-0.1256 to -0.1224)***	0.0887 (0.0858 to 0.0916)***
Quantile regression	-0.0552 (-0.0593 to -0.0511)***	-0.1054 (-0.1066 to -0.1042)***	0.0903 (0.0876 to 0.0930)***
Clustered standard errors[h]	-0.0454 (-0.0503 to -0.0405)***	-0.0975 (-0.1012 to -0.0938)***	0.0688 (0.0637 to 0.0739)***
Causal inference specification			
Lagged model	-0.0564(-0.0613 to -0.0515)***	-0.0271 (-0.0279 to -0.0263)***	0.0071 (0.0057 to 0.0085)***

CI, Confidence interval.*means p values <0.05. **means p values <0.005. ***means p values <0.001. Notes: This table presents the overall regression results and subgroup analyses. All coefficients were derived from fixed-effects models with patient,year, and institution as fixed effects, controlling for sex, age, visit type, civil servant status, insurance type, total medical fees, number of visits, hospital level, household registration type, number of diseases, location of care, and hospital location

[a]OR (95%CI)

[b]Using LASSO regression via the glmnet package (with the 'lambda.min' parameter), the "Location of care" variable was excluded and the model was re-estimated

[c]Using ordinary least squares analysis

[d]Total medical fees were log-transformed for analysis

[e]Other ethnic groups were treated as Han culture for analysis

[f]PSM was conducted using the MatchIt package with nearest neighbor matching (caliper = 0.2)

[g]Tobit regression with censoring from 0 to 1

[h]Clustered standard errors by patient ID

Tibetan patients. Interestingly, continuity declines slightly when Tibetan physicians treat Han patients, and the lowest continuity is observed in Han physician–Tibetan patient pairs. This pattern may partly reflect Tibetan patients' preference for traditional medicine, while also underscoring the challenges that substantial cultural and linguistic differences can pose for sustaining continuity of care. One plausible explanation is that Tibetan physicians may, on average, have higher educational attainment and greater proficiency in Mandarin, which can reduce communication barriers and mitigate the potential adverse effects of ethnic discordance. By contrast, Han physicians often do not speak Tibetan, and the cultural distance and language barriers between Han physicians and Tibetan patients may therefore be more pronounced [64]. However, with the growing prevalence of Mandarin, Tibetan physicians may find it easier to acquire Mandarin proficiency, whereas Han physicians may face greater difficulty in learning Tibetan. This asymmetry underscores the importance of strengthening physicians' cultural competence, not only to enhance basic communication ability, but also to attend to cultural nuances that can help mitigate communication barriers associated with ethnic discordance and improve physicians' capacity to engage effectively with patients from diverse ethnic backgrounds [65–67]. Additionally, socio-economic differences, geographic distances, and the medical system's inadequate

attention to the special needs of minority populations (such as the demand for traditional medicine) might also exacerbate this decline in continuity [68, 69]. These findings echo similar challenges faced by many nations characterized by rich cultural diversity. According to surveys, 80% of the population in many Asian and African countries use traditional medicine for primary healthcare [70]. The continuity of care under systems where traditional medicine coexists with modern healthcare warrants further investigation.

The positive effect of patient-physician ethnic concordance on continuity of care was consistently observed across various subgroups, suggesting that cultural understanding and shared language can transcend demographic and institutional factors such as sex, age, insurance type, and hospital level, highlighting the generalizability of these findings. However, in certain subgroups, the positive effect of ethnic concordance on continuity was not significant, a pattern also seen in previous studies [25, 71], where the influence of ethnic concordance varies depending on context. In this study, ethnic concordance did not significantly impact continuity in subgroups such as pediatric and elderly Han patients, patients in urban hospitals, and those seeking care across provinces. This may be due to the unique healthcare needs of children and elderly patients. For children, acute care visits often prevent the development of long-term patient-physician relationships, particularly given the underdeveloped family physician system in China [72]. For elderly patients, continuity is more likely to be based on long-standing familiarity and trust, rather than ethnic concordance, as they typically require extensive chronic disease management [73]. Additionally, rural hospitals often face challenges such as limited medical resources and access to specialized care [74], which can diminish the influence of ethnic concordance on continuity. For patients traveling across provinces, seeking care outside their local area is often associated with the pursuit of higher-level medical services, and due to the high costs and infrequency of such visits, ethnic concordance does not significantly impact continuity in these cases [75, 76].

Despite the benefits of ethnic concordance, Tibetan patients experience consistently lower continuity of care compared to Han patients, highlighting ongoing healthcare inequities in ethnic minority regions [77]. Additionally, the insufficient integration of traditional Tibetan medicine into the healthcare system leads to fragmented care [78]. Over the past 30 years of the Chinese healthcare system's paired assistance program [79], the increased presence of Han physicians in Tibet has strengthened the physician workforce and improved service quality. However, it has also created challenges in understanding Tibetan cultural practices and language [80], resulting in suboptimal patient interactions, lower treatment adherence and care continuity. Addressing these disparities requires an integrated approach. Specifically, traditional Tibetan medicine should be incorporated into national health systems. In addition, Han physicians need to receive enhanced cultural competence training that emphasizes cultural awareness, an in-depth understanding of cultural differences, effective communication, and genuine engagement with Tibetan practices [68, 81]. Finally, improving access to and the quality of care in ethnic minority regions is essential to ensure equitable care coverage for all populations.

Strengths and Limitations

In summary, this study has several key strengths. First, by using large-scale, longitudinal reimbursement claims data, it overcomes the biases associated with cross-sectional survey data, such as recall bias, and better establishes causality [82]. Second, it fills a significant gap in the literature by providing first evidence on patient-physician ethnic concordance in the context of China's multicultural environment [83, 84]. Third, the comprehensive use of reimbursement claims data allows for a more accurate reflection of every patient visit across the entire population, enhancing the reliability of the findings compared to studies based solely on institutional data [25].

Despite offering valuable insights, this study has several limitations. First, the determination of physician ethnicity was based on their names, which may lead to misclassification, particularly with common names shared across ethnic groups. For example, ethnic diversity within physicians identified as Han may have been overlooked, as some may belong to other ethnicities but do not have names that reflect their ethnic background. However, this issue is unlikely to impact the overall findings, as it would only result in higher predicted values for the Han physician-patient pairs, and the proportion of other ethnic minorities in Tibet is minimal, constituting only 2% of the population. Second, our data is limited to three major cities and does not encompass all Tibetan-concentrated areas. Nevertheless, the three cities included in the study hold significant positions in terms of population distribution, economic development, cultural heritage, and religious influence within Tibet, and thus provide a reasonable level of representativeness. Finally, since claims data primarily provides patient-level demographic characteristics, there is a lack of detailed physician-level information in this study, and data from patients not using insurance was not included.

Conclusions

This study highlights the important role of ethnic concordance between patients and physicians in improving continuity of care, particularly for ethnic minority populations in multicultural contexts. While ethnic concordance

significantly enhances continuity, the benefits are not evenly distributed across all subgroups, with Tibetan patients experiencing systemic healthcare challenges that result in lower continuity compared to Han patients. Despite improvements in care quality through ethnic concordance, broader structural factors such as insufficient integration of traditional medicine, geographic isolation, and cultural barriers persist and contribute to ongoing disparities. This research underscores the need for targeted interventions, including better cultural competence training for healthcare providers and more inclusive healthcare policies for traditional medicine, to bridge the gaps in care continuity and enhance health equity for ethnic minorities in demographically diverse nations.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40615-026-02876-5.

Author Contributions Conceptualization: Weizhuo Chen, Changli Jia, Yuting Zhang; Methodology: Changli Jia, Weizhuo Chen; Formal analysis and investigation: Changli Jia, Weizhuo Chen, Qiao Yang, Sisi Zhong, Junyi Chen; Writing - original draft preparation: Weizhuo Chen, Changli Jia; Writing - review and editing: Weizhuo Chen, Changli Jia, Yuting Zhang, Boyang Li, Ting Ye; Funding acquisition: Ting Ye; Resources: Ting Ye; Supervision: Yuting Zhang, Boyang Li, Ting Ye.

Funding This study was supported by the National Natural Science Foundation of China (No. 72074087), and the MOE (Ministry of Education in China) The Humanities and Social Sciences Fund (No.20YJC630193). The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Data Availability The study data and related documents are available upon reasonable request from the corresponding author, Professor Ting Ye, via email at yeting@hust.edu.cn.

Declarations

Ethics Approval The study was performed in accordance with the Declaration of Helsinki. Ethics approval for this study was granted by the Medical Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology (protocol numbers: [2022](S092)). All participants' information have been de-identified.

Competing Interests The authors have no relevant financial or non-financial interests to disclose.

References

1. Haggerty JL, Reid RJ, Freeman GK, et al. Continuity of care: a multidisciplinary review. Br Med J. 2003;327:1219–21. https://doi.org/10.1136/bmj.327.7425.1219.
2. Gulliford M, Naithani S, Morgan M. What is continuity of care? J Health Serv Res Policy. 2006;11:248–50. https://doi.org/10.1258/135581906778476490.
3. Sonmez D, Weyer G, Adelman D. Primary care Continuity, Frequency, and regularity associated with medicare savings. JAMA Netw Open. 2023;6:e2329991. https://doi.org/10.1001/jamanetworkopen.2023.29991.
4. Schwarz D, Hirschhorn LR, Kim J-H, et al. Continuity in primary care: a critical but neglected component for achieving high-quality universal health coverage. BMJ Glob Health. 2019;4:e001435. https://doi.org/10.1136/bmjgh-2019-001435.
5. Barker I, Steventon A, Deeny SR. Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data. BMJ-British Med J. 2017;356:j84. https://doi.org/10.1136/bmj.j84.
6. Romano MJ, Segal JB, Pollack CE. The association between continuity of care and the overuse of medical procedures. JAMA Intern Med. 2015;175:1148. https://doi.org/10.1001/jamainternmed.2015.1340.
7. World Health Organization. Continuity and coordination of care: a practice brief to support implementation of the WHO framework on integrated people-centred health services. Geneva: World Health Organization; 2018.
8. van Walraven C, Oake N, Jennings A, et al. The association between continuity of care and outcomes: a systematic and critical review. J Eval Clin Pract. 2010;16:947–56. https://doi.org/10.1111/j.1365-2753.2009.01235.x.
9. Baker R, Freeman GK, Haggerty JL, et al. Primary medical care continuity and patient mortality: a systematic review. Br J Gen Pract. 2020;70:E600–11. https://doi.org/10.3399/bjgp20X712289.
10. Sandvik H, Hetlevik Ø, Blinkenberg J, et al. Continuity in general practice as predictor of mortality, acute hospitalisation, and use of out-of-hours care: a registry-based observational study in Norway. Br J Gen Pract. 2022;72:e84–90. https://doi.org/10.3399/BJGP.2021.0340.
11. Haggerty JL, Pineault R, Beaulieu M-D, et al. Practice features associated with patient-reported accessibility, continuity, and coordination of primary health care. Ann Fam Med. 2008;6:116–23. https://doi.org/10.1370/afm.802.
12. Goodwin JS. Continuity of care matters in all health care settings. JAMA Netw Open. 2021;4:e213842. https://doi.org/10.1001/jamanetworkopen.2021.3842.
13. Ljungholm L, Edin-Liljegren A, Ekstedt M, et al. What is needed for continuity of care and how can we achieve it? - Perceptions among multiprofessionals on the chronic care trajectory. BMC Health Serv Res. 2022;22:686. https://doi.org/10.1186/s12913-022-08023-0.
14. Kristjansson E, Hogg W, Dahrouge S, et al. Predictors of relational continuity in primary care: patient, provider and practice factors. BMC Fam Pract. 2013;14:72. https://doi.org/10.1186/1471-2296-14-72.
15. Vargas I, Garcia-Subirats I, Susana Mogollon-Perez A, et al. Patient perceptions of continuity of health care and associated factors. Cross-sectional study in municipalities of central Colombia and north-eastern Brazil. Health Policy Plan. 2017;32:549–62. https://doi.org/10.1093/heapol/czw168.
16. Waibel S, Vargas I, Coderch J, et al. Relational continuity with primary and secondary care doctors: a qualitative study of perceptions of users of the Catalan National health system. BMC Health Serv Res. 2018;18:257. https://doi.org/10.1186/s12913-018-3042-9.
17. Park S, Kim H-K, Choi M, et al. Factors affecting revisit intention for medical services at dental clinics. PLoS ONE. 2021;16:e0250546. https://doi.org/10.1371/journal.pone.0250546.
18. Gray DP, Evans P, Sweeney K, et al. Towards a theory of continuity of care. J R Soc Med. 2003;96:160–6. https://doi.org/10.1177/014107680309600402.
19. Saha S, Beach MC. Impact of physician race on patient Decision-Making and ratings of physicians: a randomized experiment using video vignettes. J GEN INTERN MED. 2020;35:1084–91. https://doi.org/10.1007/s11606-020-05646-z.
20. Doescher MP, Saver BG, Fiscella K, et al. Racial/ethnic inequities in continuity and site of care: location, location, location. Health Serv Res. 2001;36:78–89.
21. Stafford M, Becares L, Hayanga B, et al. Continuity of care in diverse ethnic groups: a general practice record study in England.

Br J Gen Pract. 2023;73:E257–66. https://doi.org/10.3399/BJGP.2022.0271.
22. Stevens GD, Mistry R, Zuckerman B, et al. The parent-provider relationship: does race/ethnicity concordance or discordance influence parent reports of the receipt of high quality basic pediatric preventive services? J Urban Health. 2005;82:560–74. https://doi.org/10.1093/jurban/jti125.
23. Kelley JM, Kraft-Todd G, Schapira L, et al. The influence of the Patient-Clinician relationship on healthcare outcomes: A systematic review and metaanalysis of randomized controlled trials. PLoS ONE. 2014;9:e94207. https://doi.org/10.1371/journal.pone.0094207.
24. Jerant A, Bertakis KD, Fenton JJ, et al. Patient-provider sex and Race/Ethnicity concordance: A National study of healthcare and outcomes. Med Care. 2011;49:1012. https://doi.org/10.1097/MLR.0b013e31823688ee.
25. Ye H, Yi J. Patient-Physician race Concordance, physician Decisions, and patient outcomes. Rev Econ Stat. 2023;105:766–79. https://doi.org/10.1162/rest_a_01236.
26. Thornton RLJ, Powe NR, Roter D, et al. Patient–physician social concordance, medical visit communication and patients' perceptions of health care quality. Patient Educ Couns. 2011;85:e201–8. https://doi.org/10.1016/j.pec.2011.07.015.
27. Bajaj SS, Stanford FC. Beyond Tuskegee — Vaccine distrust and everyday racism. N Engl J Med. 2021;384:e12. https://doi.org/10.1056/NEJMpv2035827.
28. Squires A, Engel P, Ma C, et al. Continuity of care versus Language concordance as an intervention to reduce hospital readmissions from home health care. Med Care. 2023;61:605–10. https://doi.org/10.1097/MLR.0000000000001884.
29. Hodes T, Marino M, Lucas JA, et al. Quality of care for Latinx children with asthma: associations with Language concordance and continuity of care. J Am Board Fam Med. 2023;36:616–25. https://doi.org/10.3122/jabfm.2022.220379R1.
30. Kurek K, Teevan BE, Zlateva I, et al. Patient-Provider social concordance and health outcomes in patients with type 2 diabetes: a retrospective study from a large federally qualified health center in Connecticut. J Racial Ethn Health Disparities. 2016;3:217–24. https://doi.org/10.1007/s40615-015-0130-y.
31. Bai M, Sui X, Zhou C, et al. The challenge of cross-cultural care encounters: perspective of imported nurses in Lhasa, Tibet. Biomed Res Int 2020;2020:3159178. https://doi.org/10.1155/2020/3159178.
32. Hu H, Liu J, Liang Y, et al. Health literacy of ethnic minority in remote china: precise intervention is needed. Lancet Reg Health West Pac. 2021;17:100322. https://doi.org/10.1016/j.lanwpc.2021.100322.
33. Zhao T. Governance challenge and tiered state assistance: the fiscal gap in the Chinese ethnic Tibetan autonomous areas. J Contemp China. 2023;32:1000–16. https://doi.org/10.1080/10670564.2023.2193156.
34. Yan R, Chen R. Sustainable development and transformative change in Tibet, China, from 1951 to 2021. Land. 2024;13:921. https://doi.org/10.3390/land13070921.
35. Cooper LA, Roter DL, Johnson RL, et al. Patient-centered communication, ratings of care, and concordance of patient and physician race. Ann Intern Med. 2003;139:907–15. https://doi.org/10.7326/0003-4819-139-11-200312020-00009.
36. Jones MN, Falade E, Primack I, et al. The impact of structural racism on continuity of care at pediatric academic primary care clinics. Acad Pediatr. 2024;24:1116–23. https://doi.org/10.1016/j.acap.2024.05.011.
37. Yu H. Universal health insurance coverage for 1.3 billion people: what accounts for china's success? Health Policy. 2015;119:1145–52. https://doi.org/10.1016/j.healthpol.2015.07.008.
38. Robles S, Anderson GF. Continuity of care and its effect on prescription drug use among medicare beneficiaries with hypertension. Med Care. 2011;49:516–21. https://doi.org/10.1097/MLR.0b013e31820fb10c.
39. Hussey PS, Schneider EC, Rudin RS, et al. Continuity and the costs of care for chronic disease. JAMA Intern Med. 2014;174:742. https://doi.org/10.1001/jamainternmed.2014.245.
40. Bice TW, Boxerman SB. A quantitative measure of continuity of care. Med Care. 1977;15:347–9. https://doi.org/10.1097/00005650-197704000-00010.
41. Pollack CE, Hussey PS, Rudin RS, et al. Measuring care continuity *A comparison of Claims-based methods*. Med Care. 2016;54:E30–4. https://doi.org/10.1097/MLR.0000000000000018.
42. Geroldinger A, Sauter SK, Heinze G, et al. Mortality and continuity of care – Definitions matter! A cohort study in diabetics. PLoS ONE. 2018;13:e0191386. https://doi.org/10.1371/journal.pone.0191386.
43. Ejlertsson G, Berg S. Continuity of care in health care teams. A comparison of continuity measures and organisational solutions. Scand J Prim Health Care. 1985;3:79–85. https://doi.org/10.3109/02813438509013921.
44. Li X, Krumholz HM, Yip W, et al. Quality of primary health care in china: challenges and recommendations. Lancet. 2020;395:1802–12. https://doi.org/10.1016/S0140-6736(20)30122-7.
45. Tang Q, Song P, Xu L. The role of family physicians contracted healthcare in china: A cardiotonic or a Band-Aid for healthcare reform? BioSci Trends. 2016;10:325–6. https://doi.org/10.5582/bst.2016.01141.
46. Wang X, Jiang R, Li J, et al. What do patients care most about in china's public hospitals? Interviews with patients in Jiangsu Province. BMC Health Serv Res. 2018;18:97. https://doi.org/10.1186/s12913-018-2903-6.
47. Wu D, Lam TP, Lam KF, et al. Health reforms in china: the public's choices for first-contact care in urban areas. Fam Pr. 2017;34:194–200. https://doi.org/10.1093/fampra/cmw133.
48. Zhao X, Xiao J, Chen H, et al. Patient preferences and attitudes towards first choice medical services in Shenzhen, china: a cross-sectional study. BMJ Open. 2022;12:e057280. https://doi.org/10.1136/bmjopen-2021-057280.
49. Xiao Y, Qiu Q, Huang Y, et al. Patients gather in large hospitals: the current situation of Chinese hospitals and the direction of medical reform. Postgrad Med J. 2022;98:E43–. https://doi.org/10.1136/postgradmedj-2021-140147.
50. Lu J, Jiang Y, Qian M, et al. The improved effects of a multidisciplinary team on the survival of breast cancer patients: experiences from China. Int J Environ Res Public Health. 2020;17:277. https://doi.org/10.3390/ijerph17010277.
51. Zhang J, Mitchell R, Zhao R et al. What is successful integration in primary health care: qualitative insights from the Chinese public. Glob Health Action 2024;17. https://doi.org/10.1080/16549716.2024.2430811.
52. Krogstad U, Hofoss D, Hjortdahl P. Continuity of hospital care: beyond the question of personal contact. Br Med J. 2002;324:36–8. https://doi.org/10.1136/bmj.324.7328.36.
53. Sun Y, Yan X, Zhao X et al. Research on automatic recognition of Tibetan personal names based on multi-features. Proceedings of the 6th International Conference on Natural Language Processing and Knowledge Engineering(NLPKE-2010), 2010. pp. 1–5. https://doi.org/10.1109/NLPKE.2010.5587820.
54. National Healthcare Security Administration; Ministry of Finance. National Medical Security Benefit List (2020 edition). 2021-01-19. https://www.nhsa.gov.cn/art/2021/8/10/art_37_5767.html.
55. Melfi C, Holleman E, Arthur D, et al. Selecting a patient characteristics index for the prediction of medical outcomes using administrative claims data. J Clin Epidemiol. 1995;48:917–26. https://doi.org/10.1016/0895-4356(94)00202-2.
56. Sideris C, Pourhomayoun M, Kalantarian H, et al. A flexible data-driven comorbidity feature extraction framework. Comput Biol

Med. 2016;73:165–72. https://doi.org/10.1016/j.compbiomed.2016.04.014.
57. Cohen-Mekelburg S, Saini SD, Krein SL, et al. Association of continuity of care with outcomes in US veterans with inflammatory bowel disease. JAMA Netw Open. 2020;3:e2015899. https://doi.org/10.1001/jamanetworkopen.2020.15899.
58. Tammes P, Morris RW, Murphy M, et al. Is continuity of primary care declining in england? Practice-level longitudinal study from 2012 to 2017. Br J Gen Pract. 2021;71:e432–40. https://doi.org/10.3399/BJGP.2020.0935.
59. Jetty A, Jabbarpour Y, Pollack J, et al. Patient-Physician Racial concordance associated with improved healthcare use and lower healthcare expenditures in minority populations. J Racial Ethnic Health Disparities. 2022;9:68–81. https://doi.org/10.1007/s40615-020-00930-4.
60. Smith GH, Hampton C, Brandon WP, Physicians. Physician extenders and health outcomes: Race, gender and Patient-Health provider concordance in North Carolina medicaid. J Health Care Poor Underserved. 2018;29:530–55. https://doi.org/10.1353/hpu.2018.0035.
61. Shen MJ, Peterson EB, Costas-Muniz R, et al. The effects of race and Racial concordance on Patient-Physician communication: A systematic review of the literature. J Racial Ethn Health Disparities. 2018;5:117–40. https://doi.org/10.1007/s40615-017-0350-4.
62. Wu D, Lowry PB, Zhang D, et al. Patient trust in physicians Matters—Understanding the role of a mobile patient education system and patient-Physician communication in improving patient adherence behavior: field study. J Med Internet Res. 2022;24:e42941. https://doi.org/10.2196/42941.
63. Zhao Z, Zhang Z, Yang C, et al. The influence of patient experience and patient trust on willingness to see a Doctor based on SOR theory. BMC Health Serv Res. 2024;24:1278. https://doi.org/10.1186/s12913-024-11775-6.
64. Hu H, Liu J, Liang Y, et al. Health literacy of ethnic minority in remote china: precise intervention is needed. Lancet Reg Health-W Pac. 2021;17:100322. https://doi.org/10.1016/j.lanwpc.2021.100322.
65. Aseltine RHJ, Sabina A, Barclay G, et al. Variation in patient-provider communication by patient's race and ethnicity, provider type, and continuity in and site of care: an analysis of data from the Connecticut health care survey. SAGE Open Med. 2016;4:2050312115625162. https://doi.org/10.1177/2050312115625162.
66. McKesey J, Berger TG, Lim HW, et al. Cultural competence for the 21st century dermatologist practicing in the united States. J Am Acad Dermatol. 2017;77:1159–69. https://doi.org/10.1016/j.jaad.2017.07.057.
67. Schouten BC, Manthey L, Scarvaglieri C. Teaching intercultural communication skills in healthcare to improve care for culturally and linguistically diverse patients. Patient Educ Couns. 2023;115:107890. https://doi.org/10.1016/j.pec.2023.107890.
68. Jackson CS, Gracia JN. Addressing health and health-Care disparities: the role of a diverse workforce and the social determinants of health. Public Health Rep. 2014;129:57–61. https://doi.org/10.1177/00333549141291S211.
69. Wang X, Pan J. Assessing the disparity in Spatial access to hospital care in ethnic minority region in Sichuan Province, China. BMC Health Serv Res. 2016;16:399. https://doi.org/10.1186/s12913-016-1643-8.
70. World Health Organization Regional Office for the Western Pacific. Regional framework for harnessing traditional and complementary medicine for achieving health and well-being in the Western Pacific. Manila: World Health Organization Regional Office for the Western Pacific. 2022. Available at: https://www.who.int/publications/i/item/9789290619888. Accessed 22 Dec 2025.
71. Schnittker J, Liang K. The promise and limits of racial/ethnic concordance in physician-patient interaction. J Health Polit Policy Law. 2006;31:811–38. https://doi.org/10.1215/03616878-2006-004.
72. Dai H, Tang L, Wang Z, et al. Facilitate signing with the family doctor: A study of the practice in Shanghai, China. Int J Gen Med. 2021;14:6907–17. https://doi.org/10.2147/IJGM.S332890.
73. Simon MA, Zhang M, Dong X. Trust in physicians among US Chinese older adults. J Gerontol Ser A-Biol Sci Med Sci. 2014;69:S46–53. https://doi.org/10.1093/gerona/glu174.
74. Shan L, Gan Y, Yan X, et al. Uneven primary healthcare supply of rural Doctors and medical equipment in remote china: community impact and the moderating effect of policy intervention. Int J Equity Health. 2024;23:97. https://doi.org/10.1186/s12939-024-02183-7.
75. Fattore G, Petrarca G, Torbica A. Traveling for care: inter-regional mobility for aortic valve substitution in Italy. Health Policy. 2014;117:90–7. https://doi.org/10.1016/j.healthpol.2014.03.002.
76. Song T, Ma R, Zhang X, et al. Analysis of the current status and influencing factors of cross-regional hospitalization services utilization by basic medical insurance participants in China – taking a central Province as an example. Front Public Health. 2023;11. https://doi.org/10.3389/fpubh.2023.1246982.
77. Sangzhu L, Bjertness E, McNeil EB, et al. Progress and challenges in improving maternal health in the Tibet Autonomous Region, China. RMHP. 2018;11:221–31. https://doi.org/10.2147/RMHP.S170445.
78. Song P, Xia J, Rezeng C, et al. Traditional, complementary, and alternative medicine: focusing on research into traditional Tibetan medicine in China. BST. 2016;10:163–70. https://doi.org/10.5582/bst.2016.01105.
79. The 2024 National Health and Wellness System Assistance to Tibet Conference was held in Lhasa. (Tibet Autonomous Region People's Government).. Available online at: https://www.xizang.gov.cn/xwzx_406/ztzl_416/cxzt/yzgz/202410/t20241019_441875.html.
80. Lett LA, Orji WU, Sebro R. Declining Racial and ethnic representation in clinical academic medicine: A longitudinal study of 16 US medical specialties. PLoS ONE. 2018;13:e0207274. https://doi.org/10.1371/journal.pone.0207274.
81. Campinha-Bacote J. The process of cultural competence in the delivery of healthcare services: a model of care. J Transcult Nurs. 2002;13:181. https://doi.org/10.1177/10459602013003003.
82. Waibel S, Wong ST, Katz A, et al. The influence of patient–clinician ethnocultural and Language concordance on continuity and quality of care: a cross-sectional analysis. Can Med Association Open Access J. 2018;6:E276–84. https://doi.org/10.9778/cmajo.20170160.
83. Liu M, Zhang Q, Lu M, et al. Rural and urban disparity in health services utilization in China. Med Care. 2007;45:767. https://doi.org/10.1097/MLR.0b013e3180618b9a.
84. Shi Y, Song S, Peng L, et al. Utilisation of village clinics in Southwest china: evidence from Yunnan Province. Hong Kong Med J. 2022;28:306–14. https://doi.org/10.12809/hkmj209153.