

Utilisation of village clinics in Southwest China: evidence from Yunnan Province

Y Shi, S Song, L Peng, J Nie, Q Gao *, H Shi, DE Teuwen, H Yi

ABSTRACT

Introduction: Primary healthcare in rural China is underutilised, especially in village clinics in Southwest China. The aim of this study was to explore any relationships among the ethnicity of the healthcare provider, the clinical competence of the healthcare provider, and the utilisation of village clinics in Southwest China.

Methods: This cross-sectional survey study involved 330 village healthcare providers from three prefectures in Yunnan Province in 2017. Multiple logistic regressions were adopted to investigate the utilisation of primary healthcare among different ethnic healthcare providers.

Results: Primary healthcare utilisation was higher in village clinics where healthcare providers were Han Chinese than those where healthcare providers were ethnic minority (151 vs 101, $P=0.008$). The logistic regression analysis showed that clinical competence was positively associated with the utilisation of primary healthcare (odds ratio [OR]=1.49, 95% confidence interval [CI]=1.12-2.00; $P=0.007$) and that inadequate clinical competence of ethnic minority health workers may lead to a lag in the utilisation of primary healthcare (OR=0.45, 95% CI=0.23-0.89; $P=0.022$).

Conclusion: Our results confirm differences in the

utilisation of primary healthcare in rural Yunnan Province among healthcare providers of different ethnicities. Appropriate enhancements of clinical competence could be conducive to improving the utilisation of primary healthcare, especially among ethnic minority healthcare providers.

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New knowledge added by this study

- The results of our study confirmed that differences exist in the utilisation of primary healthcare in rural Yunnan Province among different ethnic minority healthcare providers.
- Significant differences in clinical competence were observed between ethnic minority and Han Chinese majority healthcare providers.
- The underdeveloped clinical competence of ethnic minority healthcare providers likely contributes to the difference in utilisation of village clinics.

Implications for clinical practice or policy

- Proper enhancements for ethnic minority providers could be conducive to improving their clinical competence.
- More involvement from the government and adequate in-service training for ethnic minority healthcare providers could help improve the utilisation of primary healthcare.

Introduction

For rural residents, who account for approximately 41% of China's population, primary healthcare is the main source of medical care.¹ To meet their healthcare needs, China promoted a tiered medical system in 2015 to encourage people to fully utilise primary healthcare.^{2,3} Nevertheless, while the

government invests various resources, primary healthcare in rural areas remains underused.⁴⁻⁶ From 2015 to 2018, the total number of out-patient visits in rural primary healthcare institutions decreased from 2.90 billion to 2.70 billion, while the number of hospital visits increased from 3.10 billion to 3.60 billion.⁷

Disparity exists in the utilisation of primary healthcare across different regions of China. Compared with rural residents in eastern China, the utilisation of primary healthcare among those in western China is relatively low.^{8,9} The lack of medical resources and sparseness of the land in western China contributes to the inconvenience of accessing primary healthcare among rural residents.¹⁰⁻¹² In addition to the difference between eastern and western China, differences in the utilisation of primary healthcare exists among the provinces in western China.¹¹ Although many studies have reported on the utilisation of primary healthcare in Southwest China, most have focused on the perspective of rural residents while neglecting the importance of providers, who play important roles in primary healthcare.^{3,4} Therefore, research concerning village healthcare providers in Southwest China could be conducive to understanding the utilisation of primary healthcare.

Southwest China is home to more ethnic minority village healthcare providers than other areas in China.¹¹ To investigate village healthcare providers in Southwest China, the ethnicity of providers, which may be linked to the utilisation of healthcare, is a factor that cannot be ignored. Previous studies have illustrated that ethnic minority providers are more likely to attract patients from the same ethnicity, and this finding has been attributed to the patients' preference instead of the capability of minority providers.^{13,14} Existing studies were mainly conducted outside China or were related to providers who performed traditional Chinese medicine.¹³⁻¹⁵ Therefore, knowledge regarding whether differences exist in the utilisation of primary healthcare among Chinese ethnic minority providers and Han Chinese majority providers is limited.

Clinical competence may influence the utilisation of healthcare and serves as a practical way to measure a doctor's working performance and quality.^{16,17} Some studies in China have shown that the ethnicity of medical students might be related to their future clinical competence.¹⁸⁻²² Studies conducted in Southwest China confirmed the underdeveloped clinical competence of village providers, but most studies failed to distinguish the ethnicity of the healthcare providers.²³⁻²⁶ Whether ethnic minority healthcare providers in rural areas of China have underdeveloped clinical competence remains unclear.

Considering the above, the purpose of the present study was to investigate the utilisation of primary healthcare in western China. In particular, the aims were to clarify whether the ethnicity of healthcare providers affects utilisation of primary healthcare; whether there are differences in clinical competence among different ethnic groups; and whether clinical competence of healthcare providers

中國西南地區村衛生室的利用情況：來自雲南省的證據

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引言：中國農村的初級衛生保健沒有得到充分利用，中國西南地區的村衛生室更是如此。本研究旨在探討醫療服務提供者的民族、臨床能力和中國西南地區村衛生室利用情況之間的關係。

方法：這項橫截面研究調查涉及2017年雲南省三個縣共330名村級醫療服務提供者。通過多元邏輯迴歸分析研究初級衛生保健在不同民族醫療服務提供者中的利用情況。

結果：漢族醫療服務提供者所在村衛生室的初級衛生保健利用率高於少數民族醫療服務提供者所在的村衛生室（151比101， $P=0.008$ ）。邏輯迴歸分析顯示醫療服務提供者的臨床能力與初級衛生保健的利用呈正相關（比值比=1.49，95%置信區間=1.12-2.00； $P=0.007$ ），少數民族醫療服務提供者的臨床能力不足可能導致初級衛生保健的利用滯後（比值比=0.45，95%置信區間=0.23-0.89； $P=0.022$ ）。

結論：研究結果顯示在雲南省農村地區不同民族的醫療服務提供者中初級衛生保健的利用情況存在差異。適當提高醫療服務提供者的臨床能力有助於提高初級衛生保健的利用率，特別是對少數民族保健醫療服務提供者而言。

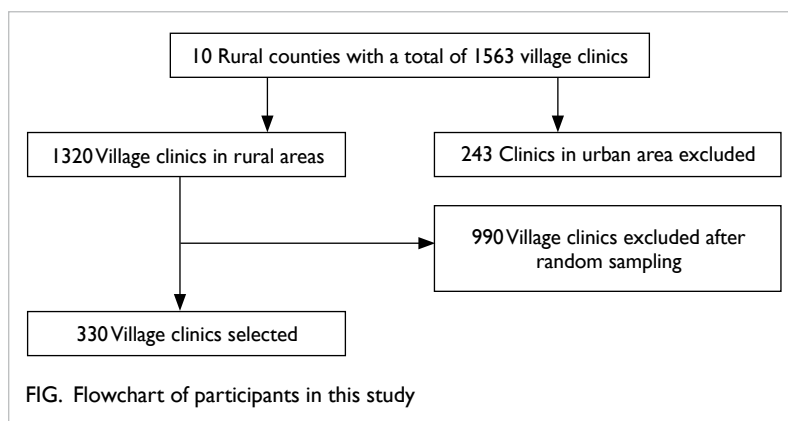
affects utilisation of primary healthcare.

Methods

Study design, setting and sampling method

This study was a cross-sectional survey conducted in three prefectures (ie, prefecture-level cities) in Yunnan Province, an economically developing area in Southwest China. In 2017, the per capita gross domestic product in Yunnan Province was US\$5068, which is lower than the national average (US\$8777).²⁷ The total population in Yunnan Province was 47.71 million, and the proportion of the rural population in Yunnan Province was 53.31%, which is much higher than the overall proportion of rural population in China (41.48%).²⁷ The three prefectures included in our study have a total rural population of 6.50 million, accounting for 20.00% of the total rural population in Yunnan Province.

To investigate the utilisation of primary healthcare in rural China, we conducted a cross-sectional study in 330 village clinics (VCs), representing the first tiers of China's three-tiered rural health system.⁴ In summary, we selected a random sample of 330 healthcare providers from three prefectures in three steps (Fig). First, we selected 10 counties (in three prefectures) at random, after excluding three urban counties and 13 counties with a minority population greater than 20%. Second, we used probability proportional to size sampling to randomly select 330 VCs proportional to the number



of VCs in each county. Finally, we asked each clinic to list all staff serving in the clinic and describe their responsibilities. Considering the measurement of different types of medical practitioners, we excluded healthcare providers other than Western medicine practitioners (ie, traditional Chinese medicine practitioners or those responsible for public health services only). Then, we randomly selected one of the remaining village healthcare providers as our sample.

Data collection

The data collection was carried out in July 2017 by trained investigators. The survey consisted of a clinic form administered to the head of the VC and a clinician form administered to providers in each clinic verbally.

The clinic form (Supplementary Table 1) was used to collect basic information regarding the VCs, including the number of equipment per clinic, whether the drugs sold by the clinics met the zero price difference of medicine (a policy requires no mark-ups above the cost of drugs),⁶ the number of clinics within 5 km, the number of out-patient visits per clinic, and the number of providers per clinic.

The clinician form (Supplementary Table 2) consisted of two parts. The first part was used to obtain information regarding the provider's demographics, working time allocation and income. This part included age, sex, ethnicity, basic salary, local residence (whether he/she was born and raised in the sample village), and time spent performing public health services. The second part was used to obtain detailed information on the providers' in-service training participation in 2016 (the year before the survey year) and their clinical competence, including education level, certificate in rural medicine or higher, length of experience, and medical study.

Assessment of the utilisation of village clinics

The primary healthcare system provides generalist clinical care and basic public health services.¹ China has promoted the three-tiered healthcare system to improve the use of primary healthcare. In rural China, the three-tiered healthcare system consists of VCs, township health centres, and county hospitals. Township health centres and VCs play a role in primary healthcare, and VCs mainly provide out-patient services under common clinical conditions. To assess the utilisation of VCs, the investigators asked the heads of the VCs to estimate (on average) the total number of out-patient visits during the previous month. The utilisation of the VCs was calculated using data related to the total number of out-patient visits, intramuscular injection visits, intravenous infusion visits, and number of healthcare providers in the clinics. Specifically, the utilisation of VCs in our research is measured on a per-provider basis. Thus, the utilisation of VCs equals the total number of out-patient visits divided by the number of healthcare providers.

Measurement of the providers' clinical competence

Providers' clinical competence is the quality of healthcare providers pertaining to medical knowledge, treatment quality, medical experience, medical study background, and medical training.²⁸ In our study, we evaluated the providers' clinical competence in the following dimensions: education above college level (measured medical knowledge); attainment of certificates in rural medicine or higher (measured treatment quality); length of experience (measured medical experience); participation in medical studies (measured medical study background); and completion of in-service training (measured medical training).

In clinical competence, multiple characteristics are often correlated; multicollinearity is a limitation of applying a multiple logistic regression analysis to measure clinical competence. A principal component analysis is often used to address this issue by transforming the data into one or two dimensions that serve as a summary of the characteristics, such as constructing an index.²⁹ Therefore, we constructed the Clinical Competence Index to assess the overall clinical competence of the providers using a principal component analysis approach.

Statistical methods

To explore the relationships between the healthcare providers and the utilisation of VCs, we used a multiple logistic regression. We conducted three types of regressions, and the outcome variable was out-patient visits per doctor. In the first regression, we measured the relationship between the village providers' ethnicity and the utilisation of VCs. In the

second regression, we included only the variables measuring the providers' clinical competence. This relationship might vary across different ethnicities, and a heterogeneity analysis is needed. In the third regression, we performed a heterogeneity analysis by including the interaction term 'Clinical Competence Index ethnic minority providers' to measure the providers' clinical competence and its relationship with the utilisation of VCs across different ethnicities.

In each regression mentioned above, we assessed the correlations with a fixed set of facility-level and provider-level characteristics. These characteristics included the number of equipment per clinic, whether the drugs sold by the clinics met the zero price difference of medicine, the number of clinics within 5 km, the percentage of minority residents in the town, the providers' sex, salary, local residency, and time spent providing public health services. Notably, in all regressions, we also controlled for county-fixed effects.

All statistical analyses were performed using Stata version 15.0 statistical software (Stata Corp, College Station [TX], United States). The results with a P value <0.05 were considered statistically significant.

Results

Characteristics and the utilisation of village clinics

The questionnaire surveys were sent to 330 VCs and 330 healthcare providers, and valid results were obtained from all (participation rate 100%). There were no significant differences in terms of

the amount of clinic equipment (P=0.395) and the implementation of the zero price difference of medicine (P=0.396) among the VCs (Table 1). However, the proportion of minority residents in the towns significantly differed with type of VCs (P<0.001). We also found that VCs where Han Chinese providers worked faced more competition, as the number of clinics within 5 km of these clinics was significantly higher than that for clinics where ethnic minority providers worked (P=0.002). The average number of healthcare providers in the VCs was 2.79. There was a significant difference in the number of providers across clinics (P=0.016), and this difference was mainly due to the number of providers who treat patients (P=0.044). Among the 330 VCs, mean number of out-patient visits per doctor was 146. The results indicate that the Han Chinese providers conducted a significantly higher average number of out-patient visits than the ethnic minority providers (151 vs 101; P=0.008) [Table 1]. In addition, we documented intramuscular injection visits and intravenous infusion visits. There was also a significant difference between the ethnic minority and Han Chinese majority providers in intravenous infusion visits (P=0.023), but no significant difference was found in intramuscular injection visits (P=0.834).

Characteristics of the providers and their clinical competence

Most healthcare providers were male (64.5%), and 81.8% of providers were local residents (Table 2). The mean ± standard deviation annual salary of all providers was US\$926±399, with no significant

TABLE 1. Facility characteristics and the utilisation of village clinics*

	All (n=330)	Ethnic minorities (n=35)	Han Chinese majority (n=295)	P value†
Clinic characteristics				
No. of equipment per clinic†	18.92 ± 3.67	18.80 ± 3.21	18.94 ± 3.73	0.395
Implementation of zero price difference of medicine	324 (98.2%)	35 (100.0%)	289 (98.0%)	0.396
Percentage of minority residents in town	0.11 ± 0.08	0.20 ± 0.08	0.10 ± 0.08	<0.001
No. of clinics within 5 km	4.23 ± 3.85	2.40 ± 1.42	4.45 ± 3.99	0.002
No. of providers	2.79 ± 1.22	2.43 ± 0.85	2.83 ± 1.25	0.016
No. of providers who treated patients	2.11 ± 1.01	1.83 ± 0.82	2.14 ± 1.03	0.044
No. of providers who do not treat patients	0.68 ± 0.95	0.60 ± 0.81	0.68 ± 0.96	0.555
Utilisation of out-patient visits per provider				
No. of out-patient visits (× 100 patients)	1.46 ± 1.53	1.01 ± 0.94	1.51 ± 1.57	0.008
No. of intramuscular injection visits (× 100 patients)	0.28 ± 0.43	0.26 ± 0.32	0.28 ± 0.44	0.834
No. of intravenous infusion visits (× 100 patients)	0.52 ± 0.58	0.36 ± 0.40	0.54 ± 0.59	0.023

* Observations are at the clinic level. Data are shown as No. (%) or mean ± standard deviation, unless otherwise specified

† Details of the devices are shown in Supplementary Table 3

‡ Welch's t test method

TABLE 2. Healthcare provider characteristics*

	All (n=330)	Ethnic minorities (n=35)	Han Chinese majority (n=295)	P value [§]
Provider characteristics				
Male	213 (64.5%)	22 (62.9%)	191 (64.7%)	0.826
Local resident	270 (81.8%)	28 (80.0%)	242 (82.0%)	0.768
Basic salary, US\$	926 ± 399	893 ± 368	929 ± 403	0.327
Share of work time spent providing public health services (1: ≥60%; 0: others) [†]	175 (53.0%)	17 (48.6%)	158 (53.6%)	0.577
Index of clinical competence				
Providers' education, college or higher	87 (26.4%)	9 (25.7%)	78 (26.4%)	0.927
Providers' certificate [‡] , rural physician or higher	297 (90.0%)	26 (74.3%)	271 (91.9%)	0.001
Providers' length of experience, y	21.05 ± 11.65	17.14 ± 12.64	21.51 ± 11.46	0.013
Providers' medical study, full-time medical study	174 (52.7%)	18 (51.4%)	156 (52.9%)	0.871
Providers' in-service training	181 (54.8%)	24 (68.6%)	157 (53.2%)	0.085

* Observations are at the provider level. Data are shown as No. (%) or mean ± standard deviation, unless otherwise specified

[†] The median share of work time spent providing public health services is 60%

[‡] There are three levels of medical certifications for physicians in rural China, and the practising physician certificate is the highest level

[§] All P values are generated by Chi squared test, except for the variable "Provider's length of experience", which is tested by Wilcoxon signed-rank test

difference between the ethnic minority and Han Chinese majority providers ($P=0.327$). More than half of the healthcare providers devoted close to 60% of their work time to providing public health services ($P=0.577$).

Among the 330 providers, 26.4% had a college degree or higher, and the proportion among the Han Chinese providers was similar to that (26.4%) among the ethnic minority providers (25.7%, $P=0.927$) [Table 2]. In total, 91.9% of the Han Chinese providers were confirmed to have at least certificates in rural medicine; however, the proportion was 74.3% among the ethnic minority providers ($P=0.001$). In addition, the length of experience of the Han Chinese providers was significantly higher than that of the ethnic minority providers ($P=0.013$). The proportion of full-time medical studies conducted by all providers was 52.7%, and more ethnic minority providers than Han Chinese providers received in-service medical training ($P=0.085$).

Determinants of the utilisation of village clinics

The ethnicity of the providers was negatively associated with the utilisation of VCs (odds ratio [OR]=0.53, 95% confidence interval [CI]=0.29-0.96; $P=0.037$) [Table 3]; the providers' clinical competence was positively associated with the utilisation of VCs (OR=1.49, 95% CI=1.12-2.00; $P=0.007$) [Table 3]. To better examine this relationship, we performed a heterogeneity analysis (Table 4). The results suggest

that ethnic minority providers were likely to have underdeveloped clinical competence, which could further limit the utilisation of VCs (OR=0.45, 95% CI=0.23-0.89; $P=0.022$) [Table 4]. We also measured the determinants of intravenous infusion visits, and the results suggest that the providers' clinical competence (OR=1.43, 95% CI=1.16-1.77; $P=0.001$) [Supplementary Table 4] was associated with the utilisation of VCs.

Discussion

The data enabled an analysis of the utilisation of primary healthcare in rural areas in Southwest China. In general, there are three key findings in this study. First, we found significant differences between Han Chinese and ethnic minority providers in the utilisation of VCs. Second, compared with Han Chinese providers, ethnic minority providers in our sample had poorer clinical competence in two dimensions (possession of rural physician certificate or length of experience). Finally, our results indicate that underdeveloped clinical competence is a factor responsible for the lower utilisation of VCs among ethnic minority providers.

Our survey data show that the average number of out-patient visits in the sampling VCs is 146 per month per doctor, which is lower than the number of out-patient visits in eastern China (188 per month per doctor, 2017).⁹ Consistent with previous studies, we believe that the inconvenience of accessing primary healthcare among rural residents contributes to

TABLE 3. Logistic regression model of the utilisation of village clinics among 330 providers (n=330)*

Dependent variable	Out-patient visits per doctor†					
	Ethnicity			Clinical competence		
	Odds ratio	95% Confidence interval	P value	Odds ratio	95% Confidence interval	P value
Ethnic minority providers	0.53	0.29-0.96	0.037			
Providers' CCI‡				1.49	1.12-2.00	0.007
Control variable						
Male	1.34	0.83-2.18	0.229	1.27	0.79-2.05	0.328
Percentage of minority residents in town	1.77	0.48-6.53	0.389	1.41	0.40-4.95	0.594
Local resident	0.67	0.29-1.59	0.367	0.63	0.28-1.45	0.277
Basic salary (1: US\$≥1011; 0: others)§	1.08	0.43-2.73	0.865	0.87	0.29-2.65	0.811
Share of work time spent providing public health services (1: ≥60%; 0: others)¶	0.48	0.23-1.03	0.058	0.48	0.22-1.05	0.066
Implementation of zero price difference of medicine	3.98	0.64-24.85	0.140	5.10	0.81-32.34	0.084
Clinic equipment	1.24	1.05-1.47	0.010	1.25	1.05-1.48	0.014
No. of clinics within 5 km	1.72	1.00-2.95	0.051	1.91	1.12-3.26	0.017

Abbreviation: CCI = Clinical Competence Index

* Logistic regression was controlled for county-fixed effects. Considering the multicollinearity of the providers' age and their length of experience (as they started working after graduation, which is highly relevant to their age), we controlled for only the providers' length of experience in the above regressions

† Dependent variable: median out-patient visits per doctor is 105 (1: ≥105; 0: others)

‡ Providers' CCI is the result of the principal component analysis

§ Median basic salary is US\$1011

¶ Median share of work time spent providing public health services is 60%

TABLE 4. Logistic regression model of the utilisation of VCs among 330 providers (n=330)*

Dependent variable	Out-patient visits per doctor†		
	Odds ratio	95% Confidence interval	P value
Ethnic minority providers	0.61	0.36-1.03	0.066
Providers' CCI	1.64	1.19-2.26	0.003
Providers' CCI, ethnic minority providers	0.45	0.23-0.89	0.022
Control variables			
Male	1.32	0.82-2.13	0.257
Percentage of minority residents in town	1.53	0.46-5.03	0.485
Local resident	0.69	0.30-1.57	0.372
Basic salary (1: US\$≥1011; 0: others)‡	1.02	0.34-3.02	0.975
Share of work time spent providing public health services (1: ≥60%; 0: others)§	0.47	0.22-0.99	0.047
Implementation of zero price difference of medicine	6.12	0.89-42.04	0.065
Clinic equipment	1.25	1.06-1.49	0.014
No. of clinics within 5 km	1.93	1.17-3.17	0.010

Abbreviations: CCI = Clinical Competence Index; VC = village clinics

* Logistic regression was controlled for county-fixed effects. Considering the multicollinearity of the providers' age and their length of experience (as they started working after graduation, which is highly relevant to their age), we controlled for only the providers' length of experience in the above regressions

† Dependent variable: the median out-patient visits per doctor is 105 (1: ≥105; 0: others)

‡ Median basic salary is US\$1011

§ Median share of work time spent providing public health services is 60%

this difference.²³ Compared with Yunnan Province (116 per month per doctor, 2017), the utilisation of VCs in the sampling area was higher.⁹ Based on our investigation, the high utilisation of VCs in the sampling area could be explained by both the population density and local economic development. According to the China Statistical Yearbook, the rural residents in the three prefectures we studied accounted for 20.00% of the total rural residents in Yunnan Province, which is quite large compared with the rate in other regions.³⁰ The gross domestic product of the sampling area is also relatively high in Yunnan Province.²⁷

However, the number of out-patient visits to VCs where the main providers are ethnic minorities is significantly lower than that of VCs where the main providers are Han Chinese individuals. Previous studies have shown that patients visiting providers of their own race were more satisfied and deliberately chose providers of their own race because of personal preference and language issues.^{13,14} In contrast to these studies, we excluded the preference and language issues of patients. First, their studies were generally conducted in large hospitals with many providers, but the average number of providers in our sampled VCs was approximately two, limiting the patients' choices. Second, regarding language, most (81.8%) providers in our study were local residents who were fluent in the local dialect. These providers rarely have communication problems with their patients. After the above exclusions, an investigation of the characteristics of different ethnic providers was performed. Consistent with previous studies, there was no significant difference in provider characteristics and income, and the amount of clinic equipment and implementation of zero price difference of the medicine did not differ.^{19,20}

Furthermore, we find significant differences between ethnic minority and Han Chinese village providers in their clinical competence. As a crucial aspect of primary healthcare services in rural China, village providers are obligated to provide qualified medical services, which require abundant clinical competence.^{31,32} However, based on our evidence, even if rural patients in Southwest China were asked to follow the instructions of policymakers and seek care primarily in VCs, they would visit higher-level facilities with a relatively high cost considering the local providers' poor clinical competence. In fact, this type of situation is already very common in rural China.^{3,16,25}

Under such circumstances, our findings imply that the difference in the utilisation of VCs might be related to ethnic minority providers' underdeveloped clinical competence. Despite the small number of previous studies, the current evidence is consistent with the main findings.^{1,24} On the one hand, early studies suggested that the quality of health providers

limited the utilisation of primary healthcare.^{3,4,16} On the other hand, ethnic minority providers usually experience less supportive learning environments during their medical studies, which might help explain the lag in their clinical competence.³³⁻³⁵ Therefore, we believe that uniformly improving the clinical competence of village providers, especially that of ethnic minority village providers, is conducive to improving the utilisation of primary healthcare.^{1,36}

The Government of the People's Republic of China understands the benefits of improving the clinical competence of village providers. A series of human resource policies for health launched in 2010 had a positive impact in rural China.³⁷ Among these policies, the encouragement of external training for healthcare providers has been proven effective and necessary.^{36,38,39} In-service training for village providers could help these providers be informed of the latest knowledge and skills to manage diseases, which could significantly improve the quality of their medical services.³⁶ The government has implemented actions to encourage the training of ethnic minorities since 2009.⁴⁰ Thus, the appropriate introduction of re-education and more medical training should be adopted among ethnic minority providers.

Considering previous studies with analyses based mainly on the utilisation of healthcare from the patient perspective, our study might be the first investigation to examine healthcare providers' ethnicity and clinical competence.^{10,11,32} In addition, our quantitative data include a rich set of detailed information of VCs regarding out-patient visits and providers' clinical competence. We hope that our findings offer key insights into the utilisation of primary healthcare in rural China.

Our study has two main limitations. First, the participants in this study were recruited from rural Southwest China, so unavoidably, the nationwide validity of our findings is limited. Second, the results were limited by the cross-sectional nature of the study, and no causal effect between the providers' clinical competence and the utilisation of primary healthcare was detected. Future research could investigate how different ethnic providers influence the utilisation of VCs and seek to adopt multiple measures to reduce bias in investigations.

Conclusions

In conclusion, this study reveals differences in the utilisation of primary healthcare between ethnic minority providers and Han Chinese providers at VCs in rural areas in Southwest China. Notably, the results indicate that higher clinical competence is more likely to drive the utilisation of VCs. We believe that the results of this study provide compelling evidence that ethnic minority healthcare providers in Southwest China require further enhancement with respect to their clinical competence.

Author contributions

Concept or design: All authors.

Acquisition of data: All authors.

Analysis or interpretation of data: All authors.

Drafting of the manuscript: All authors.

Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

As an adviser of the journal, Y Shi was not involved in the peer review process. Other authors have disclosed no conflicts of interest.

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Ethics approval

The study was approved by the Peking University Institutional Review Board (Ref IRB 00001052-17033). The board approved the verbal consent procedure. Informed consent from all respondents as a requirement for completing the survey.

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