

Comparison of Patients' Perceived Quality of Primary Care Between Urban and Rural Community Health Centers in Guangdong, China

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Abstract

Background: A series of reforms were implemented to improve the quality of primary care services in China. This study aims to assess patients' perceived quality of primary health care between rural and urban community health centers in Guangdong.

Methods: A cross-sectional survey was conducted from July to December 2015 in Guangdong. We surveyed 1010 respondents who visited either CHCs/CHSs in urban areas or THCs/RHSs in rural areas via face-to-face interviews. A validated Chinese version of Primary Care Assessment Tool-Adult Short Version (PCAT-AS), representing 10 primary care domains, was used to collect information on patients' primary care experiences. T-test was used for comparison on domain scores and total scores between patients from CHCs/CHSs and THCs/RHSs. Analysis of covariance was employed to compare the adjusted PCAT domain scores and total scores. Multilevel models were used to explore factors associated with PCAT total scores.

Results: Overall, patients reported a lower level of experience of community orientation and family centeredness compared to other primary care domains. Patients from THCs/RHSs settings in the rural area reported better primary care experience in four domains, including first contact, accessibility, ongoing care, and community orientation. Higher education background, and those with a chronic disease were associated with better primary care experience, after controlling for confounding factors. Patients who preferred primary care institutions when getting sick or used health services more frequently reported better primary care experience.

Conclusion: Continued efforts are needed to strengthen primary care performance, particularly in community orientation and family centeredness. Primary care delivery in CHCs/CHSs settings should be improved in four domains including first contact, accessibility, ongoing care, and community orientation.

Background

Achieving universal health coverage is an important health goal for all nations. It means individuals, regardless of gender, economic status, disease status, or health care delivery system experienced, should be provided equitable access to basic health services[1]. In 2008, the World Health Organization (WHO) urged that primary care be used as a model to provide fair and efficient care and primary care systems be strengthened in all countries[2]. Although the services and models of primary care in different countries are substantially influenced by national context and culture, a consensus has been achieved on the function of primary care. The primary care is considered to contribute to better health outcomes, lower health care cost, as well as have the potential to reduce health disparities[3-9]. The World Health Organization (WHO), the National Institute of Health (NIH), and many experts have defined the characteristics of primary care as accessibility, first-contact, comprehensiveness, continuity, and coordination. Furthermore, it has been widely accepted by experts that the participants' self-reported perspective is a reliable means to assess the quality of primary care[4,6,8,9].

As socioeconomic conditions and health care development vary in urban and rural areas in China, the health care delivery systems implemented in the city and rural area are different. In rural areas, there is a three-tiered health care delivery system, with rural health station (RHSs) at the bottom, township health centres (THSs) in the middle, and county hospitals at the top. In urban areas, the health care delivery system consists of two levels, including community health centers/stations (CHCs/CHSs) and hospitals. Both CHCs/CHSs in urban areas and THCs/RHSs in rural areas are now mostly financed by government subsidies to provide primary care, such as chronic disease management and general practitioner service. However, no restriction on medical institutions is made for seeking primary care services in both urban and rural areas. In rural areas, THCs and RHSs are the main primary care institutions, and the outpatient department of county hospitals also provide primary care services. Meanwhile, more and more residents bypassed CHCs to seek primary care in tertiary hospitals in the urban area[10-12]. The most common reason for patients' not choosing primary health facilities is their doubts about their service quality[13, 14]. However, seeking primary care in hospitals has several adverse consequences, such as lower accessibility due to long-distance and waiting time, weakened continuity because of limited patient-doctor contact, and higher health care expenditure[13, 15].

Aiming to address the problems caused by seeking hospital care for all health problems, the Chinese government has implemented a series of reforms, such as investing in infrastructure and general practitioner training, as well as the Zero-mark up for Essential Medicine Program to improve the quality and accessibility of primary care services. However, the patient's utilization of primary care service is still much lower than what policy-makers hoped for[16]. Moreover, neither health insurance policy nor the gatekeeper policy can force patients to seek primary care in primary care institutions. To address this predicament, improving the quality of primary health care delivered by primary care facilities is the best solution.

We did the literature search to obtain related evidence on patients' perceived quality of primary health care. Studies from the United States, Brazil, Canada, Argentina, South Africa, Japan, and other locations worldwide evaluated the quality of primary care in different health care models[14, 17-28]. As for China, there were studies that compared the patients' perceived quality of primary care provided in primary health care, secondary, and tertiary settings[15, 29-31], but no studies had been conducted to compare the patients' perceived quality of primary care in urban areas and rural areas.

This study aims to assess patients' perceived primary health care experience in primary care facility settings between THCs/RHSs in rural areas and CHCs/CHSs in urban areas in Guangdong province. Results of the study would provide input for policymakers to improve primary care performance and reduce the gap between urban and rural settings.

Methods

Study site

Guangdong is a developed coastal province located in Southern China, with the largest provincial population in China totaling 111,690,000 at the end of 2017. There are 78,020,000 of the population in cities, while 33,670,000 live in rural areas. With rapid economic development, Guangdong province plays a leading

role in the implementation of health policy initiatives aimed at enhancing primary care.

Study design and participants

This study was a cross-sectional survey conducted from July to December 2015 in Guangdong, China. The minimum sample size of this study was estimated as 900 with a 99% confidence interval and a power of 80% [17]. Multistage stratified sampling was adopted for this study. In the first stage, 21 cities in Guangdong province were divided into two groups according to per capita GDP, above \$10,000 of 2014 USD and below \$10,000. In each group, we randomly selected two cities. In the second stage, we stratified between rural and urban areas within each city. We randomly chose a district in urban areas and an adjacent town in rural areas in each city. In rural areas, we enrolled patients in township health centers (THCs) and rural health stations (RHSs), while in urban areas we enrolled patients from community health centers/stations (CHCs/CHSs). In each district, two CHCs (or one CHC and two CHSs) were randomly chosen. In each town, two THCs (or one THC and two RHSs) were randomly chosen. In each selected facility, we set the minimum sample size at 30 and the maximum sample size at 80, and the exact number depended on the number of patients visited when we surveyed. The study subjects were individuals aged 18 or above who ever visited the selected facility at least once. We interviewed 1120 patients with a refusal rate of approximately 10%, and the most common reason for refusal was having no time, which didn't lead to sample bias (based on baseline comparisons of the two groups, i.e., participants vs. nonparticipants). The final number of included respondents was 1010, 405 from CHCs/CHSs and 605 from THCs or RHSs. Figure 1. illustrates the source of the sample. *(Insert Fig.1 here)*

Data collection

The instrument used in our research was the Primary Care Assessment Tool, which has been widely used and tested in the US and some other countries[3,4,8,11,15-18]. We choose the Chinese version of Primary Care Assessment Tool-Adult Short Version (PCAT-AS) for data collection after the author's consent. We tested the scale in our study. The reliability of the evaluation scale was assessed with Cronbach's $\alpha = (1 - S_i^2 / S_p^2)$ and the validity was assessed by the Kaiser-Meyer-Olkin (KMO) test. The reliability and validity were high (Cronbach's $\alpha = 0.81$ and KMO = 0.79). The PCAT-AS was developed based on the theoretical model of primary care attributes established by the John Hopkins Primary Care Policy Center and consisted of 36 items. There were 27 items assessing the four core dimensions (the total number is seven including sub-domains) of primary care-first contact (including first contact and accessibility), ongoing care, comprehensiveness (consist of services available and service provided), and coordination (including referrals and information systems), and three derivative dimensions-family centeredness, community orientation, and cultural competence. A Four-point Likert-type scale was adopted as the measurement scale where 1 = definitely not, 2 = probably not, 3 = probably, 4 = definitely. An additional option of do not know/not sure was added in case of lack of knowledge of a certain item, which was assigned value 2 when conducting the analyses.

The survey also covered information including respondents' socio-demographic characteristics and health status. After reading previous literature extensively, as well as experts' opinion, we obtained variables that may influence patients' perceived quality of primary medical services[7,11,14,15,25,26]. All variables, as well as the coding method involved in this study, are presented in Table 1.

Students from the School of Health Management of Guangzhou Medical University were recruited as interviewers. A one-week training was given to train the investigators the survey skills and explain the meaning of each item in the questionnaire.

The questionnaire was completed mainly by the respondents themselves, and items and response choices were read to participants who had difficulty in reading (because of illiteracy or poor vision). The time to complete a questionnaire was 18 to 22 minutes. A valid questionnaire was defined as having <5% missing data. Subjects with missing data were excluded from the final analyses. Since only less than 5% of the subjects had missing data, their exclusion did not affect either the sample size or the representativeness of the sample (based on baseline comparisons of the two groups, i.e., those with significant missing values and those without).

Data analysis

The overall aim of the analysis was to compare the primary health care quality (represented by PCAT scores) between CHCs/CHSs in urban areas and THCs/RHSs in rural areas, and factors influencing PCAT total scores in Guangdong. Data were double-entered into the Epidata 3.1 and exported to PASW Statistics 18.0 for analysis. PCAT scores were calculated for item scores, domain scores, and total scores, respectively. The score of each domain was the sum scores of each item within the domain. The total PCAT scores were calculated by summing the scores for the nine domains except for the coordination (referrals) domain since only 601 participants reported experience of referral. Higher scores indicate better patient primary care experience, according to the PCAT Manual.

Chi-square test was conducted to test for differences of characteristics between the respondents accessing different types of medical institutions. T-test was used for comparison on domain scores and total scores between patients from CHCs/CHSs and THCs/RHSs. Analysis of covariance (ANCOVA) was employed to compare the adjusted PCAT domain scores and total scores. Considering the possible clustering effect in stratified sampling, we apply multilevel models to explore factors associated with PCAT total scores.

Ethics

This study was approved by the Ethics Committee of Guangzhou Medical University and was carried out following the principles of the Declaration of Helsinki. All the study participants were informed of the purpose of the study and assured of keeping their identity and responses confidential. Written informed consent was signed before they were interviewed. Refusal to participate or to discontinue participation at any time was allowed.

Results

Table 1 summarizes the characteristics of the participants. Patients accessed primary care in CHCs/CHSs in urban areas or THC/RHSs in rural areas, and differed in gender, age, education background, income, self-reported health status, the time it takes to walk to the nearest primary care institution, whether uses primary care institution as the first choice when getting sick, and the number of visits to primary care institution the previous year. The CHCs/CHSs users were more likely to be female, aged 65 years and above, graduated from middle school, and had family monthly income under \$1157 (of 2014 USD). THC/RHSs users were more likely to take less than 30 minutes walking to the nearest primary care institution, and prefer to use THC/RHSs when getting sick. *(Insert Table.1 here)*

Table 2 presents the results of the comparison of PCAT total scores and domain scores between patients in urban and rural areas. After adjustments were made, the means of PCAT total score were 70.43 among all participants. The top three domain scores after standardization were cultural competence, comprehensiveness (services provided), and first contact. The scores were 9.74, 9.43, and 6.98, respectively. The three domains with the lowest scores after standardization were community orientation, family centeredness, and accessibility. Means of the three domain scores were 5.26, 5.47, and 7.68, respectively. *(Insert Table.2 here)*

After controlling for confounding factors including socio-demographic characteristics, health status, medical expenditures and utilization of primary care services, means of PCAT total score reported by THC/RHSs respondents were higher than those from CHCs/CHSs users in urban areas; the scores were 72.17 and 68.69, respectively. In addition, means of the first contact, accessibility, ongoing care, and community orientation in THC/RHSs respondents in rural areas were significantly higher than those from CHCs/CHSs users in urban areas. Nevertheless, means of coordination (referrals) reported by CHCs/CHSs users in urban areas were higher than THC/RHSs users in rural areas. Comparison between the two groups on the ten domains was shown in Fig 2. *(Insert Fig.2 here)*

The linear mixed models show that medical institutions' type, education background, chronic diseases, preferred medical institution, and the number of visits to primary care institution, were significantly associated with the PCAT total scores. Considering that there are many independent variables, and there may be interactions, we applied the Variance Inflation Factor(VIF) to test the multi-collinearity. The results showed that all VIF values were less than 5, suggesting that no significant collinearity existed. In model IV, after controlling for various characteristics of the respondents, the respondents whose education was college and above had significantly lower PCAT total scores when compared with those who had primary school and below education. Respondents without chronic diseases had lower PCAT total scores than those who had chronic diseases. Furthermore, compared to those who preferred THC/RHSs when getting sick, participants who went to secondary and above hospitals had lower PCAT total scores. Patients who visited primary care institution more than 7 times reported higher PCAT total scores than those whose number of visits to primary care institution was less than 3 times. Details were presented in Table 3. *(Insert Table.3 here)*

Discussion

This study aimed to compare patients' perceived quality of primary health care delivered by CHCs/CHSs in urban areas and THC/RHSs in rural areas in China. The study added evidence that community based primary care institutions could perform well in cultural competence, comprehensiveness (services provided), and first contact domains. However, the two domains of community orientation and family centeredness did not receive a high evaluation.

Cultural competence received the highest scores in all domains, indicating patients would recommend familiar doctors to their relatives, the doctors in the primary care institutions can speak both Mandarin and Cantonese, and provide traditional Chinese medicine to patients in need. Since both Mandarin and Cantonese are the most common languages spoken in Guangdong, medical staff, especially those working in primary care facilities, are required to speak Cantonese in addition to Mandarin. Traditional Chinese medicine has a long tradition in use in Guangdong, which has been promoted in grassroots medical institutions and widely accepted by residents.

THC/RHSs received higher PCAT total scores than CHCs/CHSs even after controlling for patients' demographic characteristics, health status, and health service utilization, suggesting that THC/RHSs in the rural area provide higher level primary care compared to the CHCs/CHSs settings in urban areas. Primary care delivery in THC/RHSs settings performed better in four domains, including first contact, accessibility, ongoing care, and community orientation.

The results of well-performed first contact and accessibility in THC/RHSs may be explained by the following factors: convenient travel distance to THC/RHSs, patients and doctors were familiar to each other, and doctors were not limited to workdays. The higher performance in ongoing care suggested patients would keep a closer relationship with doctors, such as seeing the same doctor every time and called doctors for medical consultation. This finding is consistent with the previous research [31]. Compared to CHCs/CHSs in urban areas, THC/RHSs in rural areas are smaller medical institutions; the provider and the patient are more willing to build a long-term relationship to foster mutual understanding and knowledge of the other's expectations and needs.

However, CHCs/CHSs in urban areas performed better in coordination (referrals), which means doctors in CHCs/CHSs were likely to advise their patients to seek medical service in the upper-level hospitals and provide referrals service to the patients in need. This should be due to the health insurance reimbursement stipulation. Since 2014, some cities in Guangdong implemented a preferential policy that patients upward referred from CHCs/CHSs receive an extra 10 or 15 percent reimbursement for healthcare expenditures occurring at hospitals.

Consistent with findings from the previous studies[30, 31], the standardized mean score for community orientation was the lowest among all domains, which suggested that community-based health services were not well-performed. Community-oriented primary care requires meeting the health care needs of not only the patients and families but also residents in the community[32]. Though scores of THC/RHSs were significantly higher when compared with CHCs/CHSs, scores in this domain barely met minimum expectation and should be further improved.

Family-centeredness was the other domain not receiving a satisfying evaluation in THCs/RHSs as well as CHCs/CHSs. It suggested that doctors would not seek advice from patients or their family members when making treatment plans. This finding was in line with several previous studies[33–35]. Though many experts called for more autonomy and participation for patients, it was difficult for patients to achieve equality in their medical decisions due to insufficient medical knowledge or communication barriers[13, 36]. This situation usually occurred not only in primary care institutions but also in hospitals.

The results indicated that education background was the only demographic character affecting patients' experience of primary care when controlling for confounding factors. Compared to those with primary school and below education, those who had a college degree and above reported lower primary care score. This may be explained by the fact that patients with high education level have more diversified access to medical services and higher expectations for quality of medical service.

Consistent with other studies[37, 38], having chronic diseases was associated with better primary care quality, after controlling for other influencing factors. Further sub-analyses showed that better coordination in terms of referrals and information system, and comprehensiveness (services provided), may account for the higher PCAT scores among those who had a chronic disease. Coordination in terms of the information system can be explained by health record system and regular follow-up service for patients with chronic diseases due to an effective implementation of the basic public health service package in 2009, which was funded by the central or local governments. This finding was consistent with the conclusion that patients with the chronic condition reported better coordination in terms of an information system[37]. Better coordination in terms of referrals may be due to the implementation of general practitioner system since 2014 in Guangdong, which aimed to deliver integrated health care, including referrals for patients with chronic diseases. Furthermore, this study showed primary care institutions performed well in providing comprehensiveness (services provided) service for patients with chronic disease, which was important in dealing with the mounting challenge of addressing non-communicable diseases.

Compared to those who preferred hospitals, patients who preferred primary care institutions when getting sick rated higher scores on their primary care experience. There are significant differences in 8 domains between the two groups, except for coordination and family-centeredness. This may be explained by the fact that patients who preferred primary care institutions tended to be more satisfied with primary care facilities, and patients who were more satisfied with primary care facilities also gave higher scores for the quality of their primary care experience. The conclusion that higher patient satisfaction was associated with higher PCAT total scores was corroborated by several previous studies[15, 29].

More health service utilization was positively associated with a better assessment of primary care quality after controlling for confounding factors. Patients who visited primary health institutions 7 times or more in the previous year gave a higher score. This finding is in line with a previous study in Guangdong, which reported that those who visited medical facilities with higher frequency tended to report better primary care experience[29]. Further sub-analyses showed that better ongoing care, better coordination in terms of an information system, superior comprehensiveness (services provided), and better cultural competence might account for the higher PCAT scores among those who made more use of primary care services. This may be due to the fact that the patients who visited medical facilities with higher frequency are mainly those in chronic condition or the senior citizen, who were included in the basic public health service package which allowed them access to more primary care services.

Consistent with a previous study, the presence of health insurance was not associated with the PCAT total scores[31]. Respondents' socio-demographic characteristics, such as gender, age, and family monthly income, did not influence the perceived quality of primary care service, which was inconsistent with former studies[15, 29, 38].

There were several limitations in the study. First, some unmeasured confounders could lead to potential residual confounding of data. Second, we conducted a cross-sectional survey from July to December. The patients' disease patterns we met may be different from those collected in other seasons, which may affect the evaluation of their perceived service quality. Furthermore, the impact of time should be considered, especially with the implementation of a series of reforms aimed at strengthening community-based primary care delivery system. Further study about whether the patients' perceived quality of primary medical service has improved should be conducted. Third, the survey data were based entirely on self-reports, and recall bias could be a potential limitation that reduces the reliability in our analysis. Fourth, this study examined patients' perceived experiences. Differences in patients' characteristics may influence their assessment of primary care services. Further research is needed to investigate providers to verify the consistency of the demand side and provider side.

Conclusion

Despite these limitations, this study provides new evidence in comparing primary care quality between THCs/RHSs in rural areas and CHCs/CHSs in urban areas of China. Results of the study shows that community based primary care institutions performed well in cultural competence, comprehensiveness (services provided), and first contact domains. However, two domains including community orientation and family centeredness did not meet patients' expectations. Additionally, primary care delivery in THCs/RHSs settings had better overall performance and performed better in four domains, including first contact, accessibility, ongoing care, and community orientation. These findings will be significant in directing policy-makers reducing health inequity in patients between cities and countryside.

Declaration

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Guangzhou Medical University (IORG No: IORG20150416) and was carried out following the principles of the Declaration of Helsinki. All the study participants signed written informed consent before they were interviewed.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analyzed during the current study available from the corresponding author on reasonable request (send email to lshi2@jhu.edu)

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

LYS and AYC designed the study. AYC, SSF conducted the investigation and helped to build the database. AYC analyzed the data and wrote the draft of the paper. LYS and LZ revised and edited the paper. All authors contributed to writing or reviewing the paper. All authors read and approved the final manuscript.

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Abbreviations

CHCs: Community health centres; CHSs: Community health stations;

THCs: Township health centres; RHSs: Rural health stations;

SE: Standard Error; CI: Confidence Interval;

ANCOVA: Analysis of Covariance.

References

1. Starfield B: Is primary care essential? *Lancet* 1994, 344(8930):1129-33.
2. World Health Organization: The world health report 2008 : primary health care now more than ever. [<http://www.who.int/whr/2008/en/index.html>].
3. Hutchison B, Levesque JF, Strumpf E, Coyle M: Primary Health Care in Canada: Systems in Motion. *The Milbank Quarterly* 2011, 89(2):256-88.
4. Shi L, Stevens GD: The Role of Community Health Centers in Delivering Primary Care to the Underserved: Experiences of the Uninsured and Medicaid Insured. *J Ambulatory Care Manage* 2007, 30(2):159-70.
5. Kousgaard MB, Joensen AS, Thorsen T: The challenges of boundary spanners in supporting inter-organizational collaboration in primary care-a qualitative study of general practitioners in a new role. *BMC Family Practice* 2015(16):17.
6. Politzer RM, Yoon J, Shi L, Hughes RG, Regan J, Gaston MH: Inequality in America: The Contribution of Health Centers in Reducing and Eliminating Disparities in Access to Care. *Medical Care Research and Review* 2001, 58(2):234-248.
7. Shi L, Starfield B: Primary Care, Income Inequality, and Self-Rated Health in the United States: A Mixed-Level Analysis. *International Journal of Health Services* 2000, 30(3):541-555.
8. Hespe C, Rychetnik L, Peiris D, Harris M: Informing implementation of quality improvement in Australian primary care. *BMC Health Services Research* 2018,18(1):287.
9. Thomas SL, Wakeman J, Humphreys JS: Ensuring equity of access to primary health care in rural and remote Australia- what core services should be locally available? *International Journal for Equity in Health* 2015,14:111.
10. W Yip, W Hsiao: China's health care reform: A tentative assessment. *China Economic Review* 2009, 20(4):613-619.
11. Shi L, Makinen M, Lee DC, Kidane R, Blanchet N, Liang H, Li J, Lindelow M, Wang H, Xie S, Wu J: Integrated care delivery and health care seeking by chronically-ill patients - a case-control study of rural Henan province, China. *International Journal for Equity in Health* 2015,14:98.
12. Yip WC, Hsiao WC, Chen W, Hu S, Ma J, Maynard A: Early appraisal of China's huge and complex health-care reforms. *Lancet* 2012, 379(9818):833-42.
13. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H, Krumholz HM, Jiang L, Hu S: The primary health-care system in China. *Lancet* 2017, 390(10112):2584-2594.
14. Tourigny A, Aubin M, Haggerty J, Bonin L, Morin D, Reinhartz D, Leduc Y, St-Pierre M, Houle N, Giguère A, Benounissa Z, Carmichael PH: Patients' perceptions of the quality of care after primary care reform. *Can Fam Physician*, 56(7):e273-82.
15. Hu R, Liao Y, Du Z, Hao Y, Liang H, Shi L: Types of health care facilities and the quality of primary care: a study of characteristics and experiences of Chinese patients in Guangdong Province, China. *BMC Health Serv Res* 2016, 16(a):335.
16. Center for Health Statistics and Information. An Analysis Report of National Health Services Survey in China, 2016. 2017.p.36-41.

17. Shi L, Starfield B, Xu J, Politzer R, Regan J.: Primary care quality: community health centre and health maintenance organization. *South Med J* 2003, 96(8):787-95.
18. D'Avila OP, Pinto LF, Hauser L, Gonçalves MR, Harzheim E: The use of the Primary Care Assessment Tool (PCAT): an integrative review and proposed update. *Cien Saude Colet* 2017, 22(3):855-865.
19. Macinko J, Almeida C, de Sá PK: A rapid assessment methodology for the evaluation of primary care organization and performance in Brazil. *Health Policy Plan* 2007, 22(3):167-77.
20. Haggerty JL, Pineault R, Beaulieu MD, Brunelle Y, Gauthier J, Goulet F, Rodrigue J : Room for improvement: Patients' experiences of primary care in Quebec before major reforms. *Can Fam Physician* 2007, 53(6): 1057.
21. Bresick GF, Sayed AR, Le Grange C, Bhagwan S, Manga N, Hellenberg D: Western Cape Primary Care Assessment Tool (PCAT) study: Measuring primary care organisation and performance in the Western Cape Province, South Africa (2013). *Afr J Prim Health Care Fam Med* 2016, 8(1):e1-e12.
22. Ameh S, Gómez-Olivé FX, Kahn K, Tollman SM, Klipstein-Grobush K: Relationships between structure, process and outcome to assess the quality of integrated chronic disease management in a rural South African setting: applying a structural equation model. *BMC Health Serv Res* 2017(17):229.
23. Aoki T, Inoue M, Nakayama T: Development and validation of the Japanese version of Primary Care Assessment Tool. *Fam pract* 2016, 33(1):112-7.
24. Lee JH, Choi YJ, Sung NJ, Kim SY, Chung SH, Kim J, Jeon TH, Park HK; Korean Primary Care Research Group: Development of the Korean primary care assessment tool—measuring user experience: tests of data quality and measurement performance. *Int J Qual Health Care* 2009, 21(2):103-11.
25. Mei J, Liang Y, Shi L, Zhao J, Wang Y, Kuang L: The Development and Validation of a Rapid Assessment Tool of Primary Care in China. *BioMed Res Int* 2016, 2016:6019603.
26. Yang H, Shi L, Lebrun LA, Zhou X, Liu J, Wang H: Development of the Chinese primary care assessment tool: data quality and measurement properties. *Int J Qual Health Care* 2013, 25(1):92-105.
27. Zou Y, Zhang X, Hao Y, Shi L, Hu R: General practitioners versus other physicians in the quality of primary care: a cross-sectional study in Guangdong Province, China. *BMC Fam Pract* 2015, 16:134.
28. Zhong C, Kuang L, Li L, Liang Y, Mei J, Li L: Equity in patient experiences of primary care in community health centres using primary care assessment tool: a comparison of rural-to-urban migrants and urban locals in Guangdong, China. *Int J Equity Health* 2018, 17(1):51.
29. Feng S, Shi L, Zeng J, Chen W, Ling L: Comparison of Primary Care Experiences in Village Clinics with Different Ownership Models in Guangdong Province, China. *PLoS one* 2017, 12(1):e0169241.
30. Wang W, Maitland E, Nicholas S, Loban E, Haggerty J: Comparison of patient perceived primary care quality in public clinics, public hospitals and private clinics in rural China. *Int J Equity Health* 2017, 16(1):176.
31. Zeng J, Shi L, Zou X, Chen W, Ling L: Rural-to-Urban Migrants' Experiences with Primary Care under Different Types of Medical Institutions in Guangzhou, China. *PLoS One* 2015, 10(10):e0140922.
32. Shi L, Lee DC, Liang H, Zhang L, Makinen M, Blanchet N, Kidane R, Lindelow M, Wang H, Wu S: Community health centres and primary care access and quality for chronically-ill patients - a case-comparison study of urban Guangdong Province, China. *Int J Equity Health* 2015, 14:90.
33. Du Z, Liao Y, Chen CC, Hao Y, Hu R: Usual source of care and the quality of primary care: a survey of patients in Guangdong province, China. *Int J Equity Health* 2015, 14:60.
34. Kuang L, Liang Y, Mei J, Zhao J, Wang Y, Liang H, Shi L: Family practice and the quality of primary care: a study of Chinese patients in Guangdong Province. *Fam pract* 2015, 32(5):557-63.
35. Li H, Chung RY, Wei X, Mou J, Wong SY, Wong MC, Zhang D, Zhang Y, Griffiths S: Comparison of perceived quality amongst migrant and local patients using primary health care delivered by community health centres in Shenzhen, China. *BMC Fam Pract* 2014, 15:76.
36. Wang HH, Wong SY, Wong MC, Wang JJ, Wei XL, Li DK, Tang JL, Griffiths SM: Attributes of primary care in community health centres in China and implications for equitable care: a cross-sectional measurement of patients' experiences. *QJM* 2015, 108(7):549-60.
37. Wong SY, Kung K, Griffiths SM, Carthy T, Wong MC, Lo SV, Chung VC, Goggins WB, Starfield B: Comparison of primary care experiences among adults in general outpatient clinics and private general practice clinics in Hong Kong. *BMC Public Health* 2010, 10:397.
38. Wei X, Li H, Yang N, Wong SY, Owolabi O, Xu J, Shi L, Tang J, Li D, Griffiths SM: Comparing quality of public primary care between Hong Kong and Shanghai using validated patient assessment tools. *PLoS One* 2015, 10(3):e0121269.

Tables

Table 1. Comparison of characteristics between respondents accessing primary care in CHC/CHS and THC/RHS

Characteristics	All participants n = 1010(100.0)	CHC/CHS n=405(%)	THC/RHS n=605(%)	χ^2	P-value
Gender					
Male	412(40.79)	134(33.09)	278(45.95)	16.62	<0.001
Female	598(59.21)	271(66.91)	327(54.05)		
Age					
18-34	72(7.13)	22(5.43)	50(8.26)	13.07	0.011
35-49	123(12.18)	36(8.89)	87(14.38)		
50-64	336(33.27)	137(33.83)	199(32.89)		
≥65	479(47.42)	210(51.85)	269(44.47)		
Marital status					
Married	840(83.17)	328(80.99)	512(84.63)	2.30	0.130
Unmarried(single/divorced/windowed)	170(16.83)	77(19.01)	93(15.37)		
Education background					
Primary school and below	492(48.71)	148(36.54)	344(56.86)	42.81	<0.001
Middle school	433(42.87)	208(51.36)	225(37.19)		
College degree and above	85(8.42)	49(12.10)	36(5.95)		
The income of family monthly (of 2014 USD)					
<\$495.9	706(69.90)	208(51.36)	498(82.31)	112.99	<0.001
\$495.9-\$1157.0	253(25.05)	169(41.73)	84(13.88)		
≥\$1157.0	51(5.05)	28(6.91)	23(3.81)		
Medical insurance					
Have	988(97.82)	397(98.02)	591(97.69)	3.24	0.293
No	22(2.18)	8(1.98)	14(2.31)		

The proportion of medical expenditure to total family expenditures	853(84.46)	334(82.47)	519(85.78)	3.62	0.308
<30%	853(84.46) 0.308	334(82.47)	519(85.78)	3.62	0.308
≥30%	157(15.54)	71(17.53)	86(14.22)		
Self-reported health status					
Well	374(37.03)	126(31.11)	248(40.99)	10.91	0.004
General	454(44.95)	204(50.37)	250(41.32)		
Bad	182(18.02)	75(18.52)	107(17.69)		
Chronic conditions					
Yes	462(45.74)	200(49.38)	262(43.31)	6.89	0.122
No	548(54.26)	205(50.62)	343(56.69)		
Walking to the nearest primary care institutions(minutes)					
<30	858(84.95)	326(80.49)	532(87.93)	10.50	0.001
≥30	152(15.05)	79(19.51)	73(12.07)		
Preferred primary care institutions					
Yes	696(68.91)	143(35.31)	553(91.40)	180.82	<0.001
No	314(31.09)	262(64.69)	52(8.60)		
Number of visiting primary care institutions					
≤3	428(42.38)	146(36.05)	282(46.61)	14.79	0.001
4-6	218(21.58)	86(21.23)	132(21.82)		
≥7	364(36.04)	173(42.72)	191(31.57)		

Note: CHC = Community health center; CHS = Community health station; THC =Township health center; RHS = Rural health station.

Table 2. Comparison of primary care assessment scores in CHC/CHS and THC/RHS

	All participants(n=1010)		CHC/CHS (n=405)		THC/RHS (n=605)		<i>t</i> -value	<i>P</i> -value
	Mean (SE)	Standardized score	Mean (SE)	Standardized score	Mean (SE)	Standardized score		
Unadjusted								
First contact **	7.01(0.06)	7.79	6.78(0.98)	7.53	7.16(0.73)	7.96	3.13	0.002
Accessibility **	7.77(0.09)	6.48	6.96(0.14)	5.80	8.32(0.12)	6.93	7.42	<0.001
Ongoing care **	7.89(0.09)	6.58	7.24(0.14)	6.03	8.31(0.11)	6.93	6.08	<0.001
Coordination (Referrals) **	10.82(0.38)	7.21	11.76(0.61)	7.84	10.13(0.47)	6.75	-2.24	0.026
Coordination (Information systems) **	6.60(0.07)	7.33	6.83(0.13)	7.59	6.44(0.09)	7.16	-2.60	0.009
Comprehensiveness (Services available)	11.49(0.09)	7.73	11.33(0.16)	7.55	11.60(0.12)	7.73	1.40	0.163
Comprehensiveness (Services provided)	9.45(0.10)	7.88	9.36(0.15)	7.80	9.51(0.12)	7.93	0.76	0.451
Family centeredness	5.45(0.08)	6.06	5.47(0.12)	6.08	5.44(0.09)	6.04	-0.21	0.833
Community orientation**	5.35(0.07)	5.94	4.69(0.10)	5.21	5.80(0.09)	6.44	7.85	<0.001
Culturally competent	9.75(0.07)	8.13	9.63(0.11)	8.03	9.83(0.09)	8.19	1.43	0.152
Total scores**	70.70(0.47)	73.65	68.32(0.73)	71.17	72.41(0.59)	75.43	4.37	<0.001
Adjusted								
First contact **	6.98(0.06)	7.76	6.83(0.09)	7.59	7.13(0.08)	7.92	5.47	0.024
Accessibility **	7.68(0.09)	6.40	7.18(0.15)	5.98	8.18(0.12)	6.82	25.56	<0.001
Ongoing care **	7.80(0.09)	6.50	7.35(0.14)	6.13	8.24(0.11)	6.87	22.99	<0.001
Coordination (Referrals) **	10.91(0.38)	7.27	11.89(0.59)	7.93	10.03(0.53)	6.69	5.71	0.017
Coordination (Information systems)	6.61(0.08)	7.34	6.65(0.12)	7.39	6.57(0.10)	7.30	0.26	0.608
Comprehensiveness (Services available)	11.48(0.09)	7.65	11.42(0.15)	7.61	11.54(0.12)	7.69	0.30	0.587
Comprehensiveness (Services provided)	9.43(0.10)	7.86	9.31(0.16)	7.76	9.54(0.13)	7.95	1.22	0.271
Family centeredness	5.47(0.08)	6.08	5.52(0.12)	6.13	5.41(0.10)	6.01	0.48	0.493
Community orientation**	5.26(0.07)	5.84	4.76(0.12)	5.29	5.75(0.09)	6.39	40.78	<0.001
Culturally competent	6.74(0.07)	7.49	6.74(0.11)	7.49	6.74(0.09)	7.49	0.16	0.983
Total scores**	67.76(0.45)	70.58	65.43(0.71)	68.16	69.32(0.58)	72.21	18.14	0.001

Note: CHC = Community health center; CHS = Community health station; THC =Township health center; RHS = Rural health station.

601 respondents reported having an experience of referral, including 272 from CHC/CHS, and 329 from THC/RHS.

the total scores were calculated by summing the mean scores for 9 domains except for the Coordination (Referrals) domain.

The standardized score of every domain is the means of item score divided by the item total score*10, aims to compare the level of domains.

T-Test carried out for unadjusted domain scores and ANCOVA carried out for adjusted domain scores, which were adjusted for gender, age, marital status, education background, family monthly income, proportion of medical expenditure to total family expenditures, Self-reported health status, Chronic conditions, Walking to the nearest primary care institutions, Preferred primary care institutions, and Number of visiting primary care institutions.

Table 3. Linear Mixed Models results on primary care assessment total scores.

Note:Considering the possible clustering effect in stratified sampling, we apply multilevel models in analysis.It means that we set patients as low-level units and medical institutions as high-level units and use linear mixed models. Model I: Included only medical institution type. Model II: Controlled for socio-demographic characteristics. Model III: Controlled for socio-demographic characteristics, health status. Model IV: Controlled for socio-demographic characteristics, health status and Utilization of primary health care.

CHC = Community health center; CHS = Community health station; THC = Township health center; RHS = Rural health station.

Figures

Variables	Model I		Model II		Model III		Model IV	
	β (95%CI)	P-value	β (95%CI)	P-value	β (95%CI)	P-value	β (95%CI)	P-value
Medical institution type								
THC/RHS(ref)								
CHC/CHS	-2.17(-3.34,-0.61)	<0.001	-1.19(-2.91,-0.11)	0.005	-2.55(-4.96,-1.23)	<0.001	-3.58(-7.69,-1.12)	<0.001
Gender								
Male(ref)								
Female			-0.23(-1.08,0.71)	0.783	-0.25(-1.10,0.60)	0.798	0.46(-0.37,1.18)	0.650
Age								
18-34 (ref)								
35-49			0.17(-0.52,0.76)	0.877	0.99(-0.60,2.58)	0.613	1.21(-0.32,2.88)	0.332
50-64			-1.02(-3.18,1.71)	0.582	-1.41(-2.24,0.53)	0.365	-0.86(-3.07,1.87)	0.814
≥65			-0.05(-0.67,0.81)	0.886	-0.38(-1.55,1.45)	0.756	-0.38(-1.92,1.39)	0.806
Marital status								
Married(ref)								
Unmarried (single/divorced/windowed)			-1.77(-4.52,-0.21)	0.063	-2.77(-5.22,-0.23)	0.076	-1.49(-3.85,0.86)	0.208
Education background								
Primary school and below(ref)								
Middle school			-1.32(-3.22,0.51)	0.122	-1.34(-3.23,0.52)	0.133	-0.46(-1.77,2.39)	0.206
College degree and above			-6.61(-10.07,-1.27)	0.001	-5.45(-9.12,-2.44)	0.001	-3.89(-8.51,0.71)	0.001
Income of family monthly (of 2014 USD)								
<\$495.9(ref)								
\$495.9-\$1157.0			-0.81(-1.97,1.12)	0.383	-1.28(-3.25,0.91)	0.208	-1.10(-3.13,0.97)	0.290
≥\$1157.0			-2.41(-5.23,-1.03)	0.065	-2.76(-4.98,-1.34)	0.178	-2.88(-6.68,1.53)	0.353
Self-reported health status								
Well(ref)								
General					-0.09(-0.53,0.46)	0.893	-0.21(-1.92,0.76)	0.488
Bad					-2.46(-5.24,0.11)	0.071	-2.11(-5.78,-0.15)	0.191
Chronic conditions								
Yes(ref)								
No					-4.61(-9.23,-1.24)	<0.001	-3.52(-5.32,-1.69)	<0.001
Medical insurance								
Have(ref)								
No					-2.16(-4.53,1.21)	0.657	-2.87(-6.33,1.42)	0.511
The proportion of medical expenditure to total family expenditures								
<30%(ref)								
≥30%					0.37(-0.07,1.54)	0.689	0.92(-0.38,2.32)	0.564
Walking to the nearest primary care institutions(minutes)								
<30(ref)								
≥30							-0.59(-1.07,0.89)	0.643
Preferred primary care								

institutions		
Yes(ref)		
No	-6.64(-9.76,-3.52)	<0.001
Number of visiting primary care institutions		
≤3(ref)		
4-6	1.55(-0.57,3.66)	0.1524
≥7	4.01(1.66,6.34)	0.002

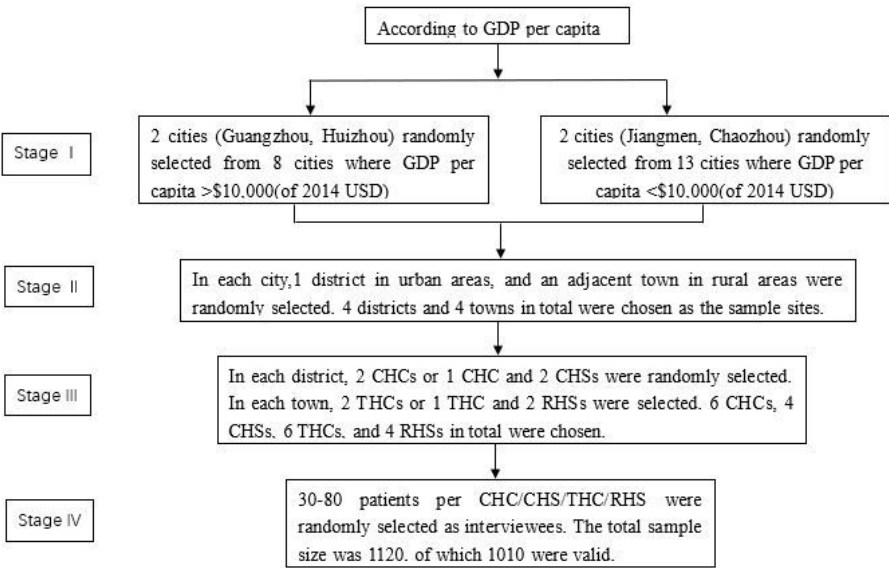


Figure 1

The Flow Chart of Sampling. Note: CHC = Community health center; CHS = Community health station; THC =Township health center; RHS = Rural health station. The number of cities whose GDP per capita >10,000 was 8 in 2014, but the population covered was nearly 46% of the whole province. Therefore, 2 cities of GDP per capita >10,000, as well as 2 cities of GDP per capita <10,000 were selected.The exact number of patients recruited from each sample site depends on the number of patients visited PHCs when we surveyed.

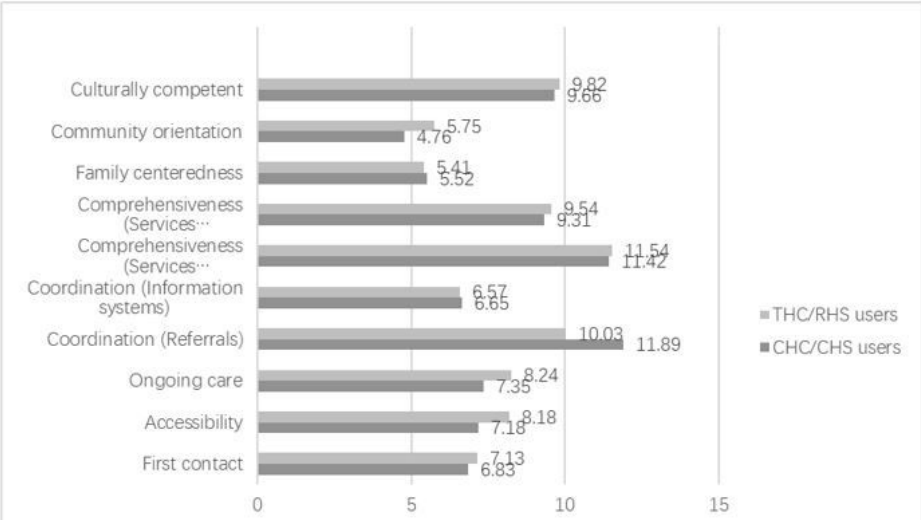


Figure 2

Comparison of PCAT scores in each domain between two groups