Contribution of primary care to health: an individual level analysis from Tibet, China

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Abstract

Introduction: There have been significant improvements in health outcomes in Tibet, health disparities between Tibet and the rest of China has been greatly reduced. This paper tests whether there was a positive association between good primary care and better health outcomes in Tibet.

Method: A validated Tibetan version of the Primary Care Assessment Tool (PCAT-T) was used to collect data on 1386 patients aged over 18 years old accessing primary care. Self-rated health (SRH) was employed to measure health outcomes. A multiple binary logistic regression model was used to explore the association between primary care quality and self-rated health status after controlling for socio-demographic and lifestyle variables.

Results: This study found that primary care quality had a significant positive association with self-rated health status. Among the nine domains of PCAT-T, family centeredness domain had the highest Odds Ratio (OR = 1.013) with SRH. Patients located in rural area, with higher education levels, without depression, and less frequent drinking were more likely to self-rate as "good health" compared with the reference group.

Conclusions: In Tibet, higher quality primary care was associated with better self-rated health status. Primary care should be much strengthened in future health system reform in Tibet.

Keywords: Primary care quality, Self-rated health, Primary care assessment tool

Introduction

The positive relationship between good quality primary health care and beneficial health outcomes has been well-established. Good primary care can lower under-five mortality rates, decrease infant mortality, reduce incidence of low birth weight, decrease inpatient admission, result in fewer outpatient visits, decrease emergency room visits, and lower health care costs [1–11]. Starfield showed that the beneficial effects of primary care were evident not only in industrialized countries, but also in middle and lower income countries [11]. Further, good primary care can reduce racial, ethnic, and income inequality-led health disparities. This relationship is particularly pronounced for the racial and ethnic minorities living at or below poverty level, and good primary care quality was especially beneficial in areas with highest income inequality [12, 13].

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declining infant mortality rates (from 430/1000 to 19.97/1000) and increasing life expectancy (from 35.5 to 68 years) [17]. It is believed the great primary care capacity enhancement contributes directly to the significant health outcome improvement in Tibet [17]. However, there is no empirical evidence to confirm a positive association between good primary care and better health outcome. This paper addresses this lacuna.

Self-rated health (SRH) is a widely used measure by which a person reflects and intuitively summarizes his/her own health state [18]. This indicator has become increasingly popular for assessing health status because of its simplicity and solid well-established links with various health indicators such as mortality, morbidity and biological markers [19–23]. Previous studies have showed that individuals living in states with a higher ratio of primary care physician to population were more likely to report good health, and good primary-care experience, in particular enhanced accessibility and continuity, was positively associated with better self-rated health [12, 13, 24]. These evidences confirm that SRH can be used as a reliable surrogate variable for overall health outcomes.

SRH is based on a respondent’s evaluation of his/her health status on a Likert scale using a global health question (“In general, how would you rate your health today?”) [18, 25]. There exists a comprehensive measure to Tibetan primary care, the Primary Care Assessment Tool-Tibetan version (PCAT-T), which assesses patient perceived primary care quality [15]. Our study in Tibet adds to the few existing studies to explore the association between primary care and health outcome at individual level in Tibet.

**Methods**

**Study design and data collection**

The Ethics Committee of Tibet Autonomous Regional Health and Family Planning Commission approved the study. The study was based on face-to-face patient surveys conducted on-site at the sampled primary care providers. A stratified, purposive sampling method was adopted to select 13 representative primary care practices, including two prefecture traditional Tibetan medicine (TTM) hospital outpatient departments, two prefecture western medicine (WM) hospital outpatient departments, three county hospital (CH) outpatient departments, and six township health centers (THC). All patients aged 18 years or older who visited our sampled primary care practices were eligible to participate in the survey. Only patients who reported that the practice they visited was their regular source of primary care were interviewed. Each potential participant was given an explanation of the research purpose and asked for permission to participate in the interview.

For our previous original comparative analysis study, the sample sizes were estimated with reference to other similar studies that showed a sample size of 300 per group was needed for a significance level of 5 % with a power of 90 %. There are four types of primary care practice in our study, so the minimum sample size is 1200. 20 % were added to the estimated sample size in consideration of potential missing data. Therefore, the estimated sample size was 1440 in total. While most of patients approached accepted our invitation to complete this survey, some patients refused, mainly because they needed to travel a long distance back to their home immediately after having the outpatient service. 54 questionnaires were deleted due to missing data, leaving 1386 completed questionnaires. The methodological details were reported in previous studies [15, 16].

**Measures**

The PCAT-T consisted of seven multi-item scales and two single-item scales: first contact and continuity, comprehensiveness (medical care), comprehensiveness (social care), first contact (access), coordination, family centeredness, community orientation, same doctor and stableness [16]. We converted Likert scales to scores ranging from 25 to 100 by dividing the Likert scale by 4 and multiplying by 100. Means of item scores in the same scale yielded scale scores, and the primary care total score was the mean of these nine scale scores. The PCAT-T captured patient perceived primary care quality. The certainty as to whether a service was received or not was measured on a 4 point Likert scale, ranging from “1” (“Definitely not”) to “4” (“Definitely”) and the question “In general, how would you rate your health today?” was used to measure patients’ self-rated health status. We coded the five-point Likert scale items “Very good, Good, Neutral, Poor, and Very poor”, to a binary scale as 1 for respondents reporting Very good, good health (labeled good health) and 0 for those reporting Neutral, Poor or Very poor health (labeled poor health), which is consistent with the method employed by comparable previous studies [12, 13, 24]. We also collected a range of individual socio-demographic and lifestyle characteristics known to influence health, including location, gender, age, education, income level, marital status, presence of depression, smoking and drinking habits and physical activity, which were included as control variables in the multiple logistic regression model.

**Statistical analysis**

Association between socio-demographic data of the participants and their self-rated health status were analyzed using chi-square tests. Independent sample t-tests were performed to compare primary care assessment scores. Multiple binary logistic regression analysis was conducted to explore the association between primary care quality and self-rated health status after controlling for socio-demographic and life style behavior variables.
Results

Self-rated health status by different characteristics

Table 1 shows significant differences in self-rated health status by different socio-economic status and life style behaviors. The good health group tended to locate in rural area, be female, younger, with a higher education, without depression and more likely to be non-smoking and non-drinking, than the poor health group. There were no significant differences in health status among groups in different income level, marital status and exercise frequency.

Primary care quality by self-rated health status

The t-test for the nine domains of primary care quality revealed that first contact and continuity, comprehensiveness (social care), first contact (access), coordination, family centeredness, and community orientation was significantly higher for the good health group than the poor health group. While the good health group reported lower score on the stableness domain. There were no significant differences between the two groups on the comprehensiveness (medical care) domain and same doctor domain (Table 2).

Association between primary care quality and self-rated health status

Multiple binary logistic regression analysis showed that the primary care assessment total score was positively associated with good health. When the total primary care assessment score increased by 1 point, the probability that the patient rated “good health” increased 2.0% (Table 3). The scores of all PCAT domains were also associated with good health, except for the first contact and continuity, community orientation, and same doctor. The odd ratio value of family centeredness was the highest (Table 4). For other factors, patients located in rural area, with higher

Table 1 Patients’ self-rated health status by different characteristics

| Characteristics                  | Poor health (%) | Good health (%) | P-value*  |
|----------------------------------|-----------------|-----------------|-----------|
| Location                         |                 |                 | <0.01     |
| Urban                            | 448 (64.7)      | 244 (35.3)      |           |
| Rural                            | 354 (51.0)      | 340 (49.0)      |           |
| Gender                           |                 |                 | <0.05     |
| Male                             | 394 (61.4)      | 248 (38.6)      |           |
| Female                           | 408 (54.8)      | 336 (45.2)      |           |
| Age                              |                 |                 | <0.01     |
| ≤ 44 years                       | 462 (54.6)      | 384 (45.4)      |           |
| 45–59 years                      | 223 (59.0)      | 155 (41.0)      |           |
| ≥ 60 years                       | 117 (72.2)      | 45 (27.8)       |           |
| Education                        |                 |                 | <0.01     |
| Never attend school              | 337 (67.4)      | 163 (32.6)      |           |
| Primary school                   | 241 (55.9)      | 190 (44.1)      |           |
| Junior high school and above     | 224 (49.2)      | 231 (50.8)      |           |
| Income* (annual household income)|                 |                 | 0.76      |
| ≤ 31400RMB                       | 561 (57.6)      | 413 (42.4)      |           |
| > 31400RMB                       | 241 (58.5)      | 171 (41.5)      |           |
| Marital status                   |                 |                 | 0.25      |
| Singled                          | 194 (60.6)      | 126 (39.4)      |           |
| Married                          | 608 (57.0)      | 458 (43.0)      |           |
| Depression                       |                 |                 | <0.01     |
| Yes                              | 426 (78.2)      | 119 (21.8)      |           |
| No                               | 376 (44.7)      | 465 (55.3)      |           |
| Smoking                          |                 |                 | <0.01     |
| Current smoker                   | 177 (64.6)      | 97 (35.4)       |           |
| Ex-smoker                        | 100 (64.1)      | 56 (35.9)       |           |
| No smoker                        | 525 (54.9)      | 431 (45.1)      |           |
| Drinking (times per week)        |                 |                 | <0.01     |
| ≥ 3                              | 199 (70.1)      | 85 (29.9)       |           |
| 1–2                             | 145 (58.2)      | 104 (41.8)      |           |
| 0                               | 458 (53.7)      | 395 (46.3)      |           |
| Exercise (times per week)        |                 |                 | 0.10      |
| ≥ 3                              | 190 (53.4)      | 166 (46.6)      |           |
| 1–2                             | 239 (58.0)      | 173 (42.0)      |           |
| 0                               | 373 (60.4)      | 245 (39.6)      |           |

Poor health: people with low self-rated health (neutral, poor or very poor)
Good health: people with high self-rated health (very good, good)
*P-value by chi-square test. Significance level is 0.05
Average annual household income was 31400 RMB among the participants

Table 2 Comparison of primary care assessment score among adult patients by self-rated health

| Scales                              | Poor health Score Mean(SE) | Good health Score Mean(SE) | P-value* |
|-------------------------------------|-----------------------------|-----------------------------|----------|
| First contact and continuity         | 88.10(0.44)                 | 90.80(0.46)                 | <0.01    |
| Comprehensiveness (medical care)     | 79.31(0.61)                 | 80.93(0.81)                 | 0.11     |
| Comprehensiveness (social care)      | 83.75(0.54)                 | 86.55(0.67)                 | <0.01    |
| First contact (access)               | 65.46(0.84)                 | 70.21(1.05)                 | <0.01    |
| Coordination                         | 81.58(0.64)                 | 84.72(0.78)                 | <0.01    |
| Family centeredness                 | 85.92(0.48)                 | 87.72(0.53)                 | <0.05    |
| Community orientation                | 74.73(0.72)                 | 77.35(0.84)                 | <0.05    |
| Same doctor                          | 71.15(0.90)                 | 72.04(1.09)                 | 0.53     |
| Stableness                           | 47.62(0.80)                 | 45.00(0.93)                 | <0.05    |
| Total                                | 79.94(0.36)                 | 82.25(0.42)                 | <0.01    |

Higher value indicate a more positive experience
Poor health: people with low self-rated health (neutral, poor or very poor)
Good health: people with high self-rated health (very good, good)
*P-value by t test. Significance level is 0.05
SE standard error
education levels, without presence of depression, less frequent drinking were more likely to rate “good health” compared with the reference group (Table 3).

**Table 3** Factors associated with good health compared to poor health

| Dependent variable: self-rated health | OR (95 % CI) | SE  | P-valuea |
|--------------------------------------|-------------|-----|----------|
| Primary care assessment total score  | 1.020(1.008–1.033) | 0.006 | 0.002   |
| Location                             |             |     |          |
| Urban                                |             |     |          |
| Rural                                | 1.876(1.415–2.487) | 0.144 | <0.001  |
| Gender                               |             |     |          |
| Male                                 |             |     |          |
| Female                               | 1.078(0.821–1.415) | 0.139 | 0.591   |
| Age                                  |             |     |          |
| 18–44 years                          |             |     |          |
| 45–59 years                          | 1.023(0.771–1.357) | 0.144 | 0.876   |
| ≥ 60 years                           | 0.797(0.522–1.218) | 0.216 | 0.294   |
| Incomeb (annual household income)    |             |     |          |
| ≤ 31400RMB                           |             |     |          |
| > 31400RMB                           | 0.797(0.609–1.043) | 0.137 | 0.098   |
| Education                            |             |     |          |
| Never attend school                  |             |     |          |
| Primary school                       | 1.567(1.160–2.116) | 0.153 | 0.003   |
| Junior high school and above         | 2.976(2.111–4.195) | 0.175 | <0.001  |
| Marital status                       |             |     |          |
| Singled                              |             |     |          |
| Married                              | 1.319(0.988–1.762) | 0.148 | 0.060   |
| Depression                           |             |     |          |
| Yes                                  |             |     |          |
| No                                   | 3.961(3.057–5.130) | 0.132 | <0.001  |
| Smoking                              |             |     |          |
| Current smoker                       |             |     |          |
| Ex-smoker                            | 1.129(0.712–1.792) | 0.236 | 0.060   |
| No smoker                            | 1.166(0.818–1.662) | 0.181 | 0.396   |
| Drinking (times per week)            |             |     |          |
| ≥ 3                                  |             |     |          |
| 1–2                                  | 1.762(1.181–2.630) | 0.204 | 0.006   |
| 0                                    | 2.039(1.440–2.887) | 0.177 | <0.001  |
| Exercise (times per week)            |             |     |          |
| ≥ 3                                  |             |     |          |
| 1–2                                  | 1.101(0.801–1.515) | 0.163 | 0.553   |
| 0                                    | 0.976(0.723–1.318) | 0.153 | 0.876   |

**Table 4** Domain scores associated with good health compared to poor health

| Domains                  | OR (95 % CI) | SE  | P-valuea |
|--------------------------|-------------|-----|----------|
| First contact and continuity | 1.011(1.000–1.022) | 0.006 | 0.054   |
| Comprehensiveness (medical care) | 1.009(1.002–1.015) | 0.003 | 0.010   |
| Comprehensiveness (social care) | 1.010(1.002–1.018) | 0.004 | 0.011   |
| First contact (access)    | 1.008(1.003–1.013) | 0.003 | 0.003   |
| Coordination              | 1.010(1.003–1.017) | 0.003 | 0.003   |
| Family centeredness       | 1.013(1.004–1.023) | 0.005 | 0.005   |
| Community orientation     | 1.001(0.995–1.007) | 0.003 | 0.763   |
| Same doctor               | 1.003(0.998–1.007) | 0.002 | 0.228   |
| Stableness                | 0.993(0.988–0.999) | 0.003 | 0.016   |

All models were adjusted for location, gender, age, education, income level, marital status, depression, smoking, drinking habits and exercise factors. SE standard error, OR odds ratio, CI confidence interval. *P*-value by multiple logistic regression analysis. Significance level is 0.05

Poor health: people with low self-rated health (neutral, poor or very poor)
Good health: people with high self-rated health (very good, good)

**Discussion**

This study examined the association between patient perceived primary care quality and self-rated health status in an autonomous region in China. Our results revealed that the primary care assessment total score was positively associated with self-rated health status. The findings are consistent with similar U.S. and Korean studies [12, 13, 24]. For each domain, the family centeredness domain score had the highest Odds Ratio. This means family centeredness played the most important role in improving health outcome in Tibetan area. Family centeredness refers to recognition of family factors related to genesis and management of illness. The policy implication is that family characteristic should be more considered in primary care policy making. This finding is consistent with a currently ongoing national pilot program, which requires all family physicians at primary care practices should establish a service contract with families and residents in their service community [26]. For other factors, patients with higher education level had higher probability to report healthy, which is consistent with Shi’s study [13]. Patients living in rural area reported better health status than those living in urban area, this could be explained by the fact that people living in rural areas have been keeping some good traditional habits, such as religious activities, and had a more harmonious community culture, which led to positive self-reported health status.

Among life style behaviors, drinking has a significant effect on self-rated health. Our study revealed the same results as previous studies that found that heavier
drinkers reported lower health status [27–30]. In Tibet, drinking beer is very popular, and many people engage in prolonged periods of beer drinking. Lack of rest and heavy alcohol use helps explain lower self-reported health status.

Our study has several limitations. Both a unique advantage and a limitation, a self-reported health survey was used to measure primary care quality. Some aspects of technical quality cannot be assessed from patients’ perceptions, because of their limited clinical knowledge. Recall bias may also intervene. Despite these issues, patients’ self-reports are widely accepted as an important method of measuring health care quality and health care performance especially when alternative health care performance measures are not available [31]. Second, there were variables, such as health history, social capital, income inequality, where no data were available, but which might have influenced self-rated health status. These types of data might merit future study. Third, due to the cross-sectional nature of this study, our study only explored the association between primary care quality and self-rated health, and it is difficult to identify a causal relationship between primary care quality and self-rated health.

Conclusion

In Tibet, where little empirical evidence exists to measure the impact of primary care on health performance, SRH survey data provide an alternative measure of health outcomes. Our study shows that primary care total score as well as specific domain score, is positively associated with better self-rated health outcomes. This study suggests that further primary care capacity building should pay more attention to the field of family centeredness area in Tibet.

Competing interests

The author(s) declare that they have no competing interests.

Authors’ contributions

XYL, LYS, ATY and WHW participated in the data collection and data analysis. XYL, WHW, ZFM, EM and SN drafted the manuscript and were responsible for data interpretation. All authors read and approved the final manuscript.

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