



## RESEARCH ARTICLE

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# Assessing perceived quality of primary care under hospital-township health centre integration: A cross-sectional study in China

Shasha Yuan<sup>1</sup> | Fang Wang<sup>1</sup> | Yan Zhao<sup>2</sup> | Yun Liu<sup>3</sup>

<sup>1</sup>Institute of Medical Information and Library, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

<sup>2</sup>Zhijiang Health and Family Planning Bureau, Yichang, Hubei, China

<sup>3</sup>Erasmus School of Health Policy and Management, Erasmus University Rotterdam, Rotterdam, the Netherlands

## Correspondence

Shasha Yuan, Institute of Medical Information and Library, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China.  
Email: yuanshasha417@163.com

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## Summary

Since the new round of health care reform in 2009, the vertical integration of hospitals and primary health institutions has become widely implemented in China as an efficient method for improving quality of primary care. This study aimed to answer the following questions: (a) What is the perceived quality of township health centres (THCs) under integration? (B) What differences could be observed among the three typical integration models, namely, private hospital-THC integration, public hospital-THC integration, and loose collaboration? Two rounds of cross-sectional surveys were conducted from November 2016 to June 2018. The Chinese version of the Primary Care Assessment Tool was used to evaluate perceived quality of sample THCs, and 1118 adult patients were interviewed in total. Multiple linear regressions were employed to compare the quality scores between two survey rounds and among different integration models after controlling for potential confounders. The results revealed that the quality of care significantly improved under private hospital-THC integration as observed by comparing two survey rounds, while no change or slight changes were observed in the other two models. The difference observed among the three models was that the perceived quality of THCs integrated with private hospitals was worse than that of THCs integrated with public hospitals and THCs under loose collaboration, while

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no significant difference was observed between public hospital-THC integration and loose collaboration. Increased attention should be given to highlighting the tight integration between hospitals and THCs and the different roles played by private and public hospitals in the current reform.

#### KEYWORDS

health system reform, integration, primary health care, quality assessment, township health centres

## 1 | INTRODUCTION

The Alma Ata Declaration of 1978 emphasized the important role of primary care, which is characterized by first contact, continuous care, comprehensive care, and coordination of care.<sup>1</sup> A positive association between high-quality primary care and improvement in health outcomes has been observed in many countries.<sup>2-4</sup> Thus, the high dependence on primary care is regarded as one of the fundamental features of a health system with good performance.<sup>5</sup> In recent years, the focus of health systems worldwide has been to deliver integrated people-centred health services. In China, primary care has mainly been provided by township health centres (THCs) and village clinics in rural areas.<sup>6</sup> It was believed that primary health institutions in China did not function well, especially in the gate-keeping role (ie, first contact with primary care), which was mainly a result of a hospital-centred fragmented health care delivery system.<sup>7</sup> Therefore, a new round of health care reform was initiated in China in 2009. These reforms greatly emphasized strengthening the competency and quality of primary health institutions to establish an organized health system with the primary care physician as a patient's first point of contact, while realizing the continuity, comprehensiveness, and coordination of care.<sup>8</sup> The vertical integration of hospitals and THCs was regarded as one of the most efficient pathways to achieving this goal.

In practice, to achieve hospital-THC integration, secondary or tertiary hospitals were appointed by local health bureaus to take charge of all operating issues of selected primary health institutions.<sup>9</sup> One of the most important strategies was to designate one deputy hospital director or a director from key clinical departments working in the hospitals the head of the THC to quickly establish a close relationship between the two organizations. Other key integration strategies included regular face-to-face technical training, the establishment of departments with high demands in primary health institutions, and referral channels free of obstacles ("green channels").<sup>9</sup> Notably, under such tight integration, the THCs were still separate legal entities with independent financial, personal, and payment systems, while the designated head was still paid by the hospital rather than the THCs at which they worked in some cases. In comparison, under loose collaboration, there was no close relationship between hospitals and participating primary health institutions because possible contact between the two institutions normally only existed at a technical communication level, and no other material integration strategies existed; therefore, this model was considered the control group in this study. Recently, the bundled payment of health insurance has sometimes been involved during tight integration to stimulate the leading hospital, which was mostly determined by local governments.<sup>10</sup> The different models of integration of hospitals and primary health institutions were intended to improve the competency of primary health professionals and the quality of primary care to retain patients with common diseases in primary health institutions or refer patients to hospitals in a timely manner as needed. Therefore, it is vital to determine the quality of primary health institutions under integration from the demand side and discuss the differences among the various models.

To the best of our knowledge, research related to this topic has mainly focused on the collaborative mechanism in different integration models, especially on the analysis of dual referral between hospitals and primary health facilities.<sup>11-13</sup> Some studies have examined the impact of integrated intervention on access and care coordination at the

patient level in Henan Province and at the system level in Qinghai Province.<sup>7,8,14</sup> We also found studies targeting chronic diseases, including mental diseases, hypertension, diabetes, and stroke, that explored whether the integration intervention was successful in different local contexts.<sup>8,15-17</sup> To date, very few studies have focused on assessing the perceived quality of primary care in tight integration and loose collaboration to provide evidence for the ongoing reform. Furthermore, regarding tight integration, evidence regarding the different roles played by private and public hospitals in the quality of primary care is lacking, especially considering their large difference in goal setting. Therefore, it is meaningful to assess and compare the perceived quality of primary care under integration to provide policy implications for future integration reform.

Moreover, it is very challenging to measure the quality of primary care considering its complex and abundant contents. Researchers have previously conducted rich studies investigating quality assessment and developed standard quality assessment tools to make measurement more feasible, providing a good basis for this study. Based on a systematic review,<sup>18</sup> studies concerning primary care quality have focused on the evaluation of the core characteristics of primary care (ie, the realization of first contact, continuity, comprehensiveness, and coordination), specific service content (such as immunization, hypertension management, and health education), and Donabedian's structure-process-outcome quality indicators. In particular, the Chinese version of the Adult Primary Care Assessment Tool (PCAT) evaluates the quality of primary care from the perspective of its four core characteristics in several domains, namely, first contact, continuity, comprehensiveness, and coordination of care, which are highly consistent with the goal of integration reform in China. Therefore, this measure was adopted as the quality assessment tool in this study. The validity and reliability of this questionnaire have been assessed in previous studies.<sup>19-21</sup>

In this study, we aimed to assess and compare patients' perceived quality of THCs under different integration models based on the PCAT. We aimed to answer the following two research questions: (a) What was the perceived quality of THCs under each integration model during the ongoing reform? (b) What differences could be observed among the three typical integration models, including private hospital-THC integration, public hospital-THC integration, and loose collaboration?

## 2 | METHODS

### 2.1 | Ethical approval

This study was approved by the Institute of Medical Information and Library Human Research Ethics Committee (HREC) (Ref. No. IMICAMS/01/19/HREC).

### 2.2 | Study design and participants

Two rounds of cross-sectional surveys were designed for the three typical integration models. The private hospital-THC integration (model 1) in Daxing District of Beijing was initiated in 2014 by the local health bureau to increase the competency of the THC in a suburban area that included a secondary comprehensive private hospital and one public THC. The integration mainly occurred in the aspects of management, personnel, and clinical services. Particularly, regarding the two key strategies of the management aspect, the deputy director of the private hospital was designated the head of the THC to take charge of all operating issues for 5 years, and the THC became a branch of the private hospital. Regarding the personnel and clinical services aspect, clinical experts in diabetes, orthopaedics, and paediatrics and the laboratory in the hospital regularly worked in the THC every week for 2 or 3 days to help improve the specialized skills of the health professionals in the THC. It was also common for the physicians and nurses working in the THC to be trained at the hospital for several months. Importantly, the private hospital did not obtain any profit directly from the THC that was integrated because the health staff from the hospital were still paid by the hospital. The sustainability of such integration was uncertain. The integrated THC was selected to conduct a patient survey.

The public hospital-THC integration (model 2) in the city of Zhijiang of Hubei Province started in 2012. This model included one secondary comprehensive public hospital and four public THCs, while the other three public THCs in Zhijiang had a loose collaboration with the other public comprehensive hospital. The key integrative strategies were similar to those in model 1, including the hospital staff responsible for the operating issues of the THCs as a branch of the public hospital, the establishment of a rehabilitation department, and the frequent and regular personnel communication between the leading hospital and the four THCs. Additionally, a mechanism of interest allocation was gradually established during the reform under this model. For example, the head of the integrated THCs, who originally worked at the hospital, substantially participated in the performance of the payment of the THCs. More importantly, the local government initiated bundled payment reform of health insurance in 2017. Instead of separate payment by the health insurance bureau to the hospital and the THCs, the leading hospital is responsible for the allocation and payment of health insurance funds for both the hospital and integrated THCs. Therefore, the balance can be reserved for other possible uses, encouraging the leading hospital to retain or refer patients to the THCs by improving the quality of primary care to save funds. Two THCs were randomly selected to conduct a patient survey.

Regarding loose collaboration (model 3), the THCs were usually associated with one or several collaborative hospitals with staff trained in clinical skills, and patients could be referred upward as necessary. No material management or personnel integration existed, which differed from the tight integration collaboration (models 1 and 2). In this study, one of the three other THCs in Zhijiang and one THC in Xinjin County of Sichuan Province involved in a loose collaboration were randomly selected as the control group. Table 1 provides a brief summary of the three integration models.

### 2.3 | Perceived quality assessment tool

The PCAT was adopted as the perceived quality assessment tool in this study and was organized based on the core characteristics of primary care. In detail, the PCAT domains include an assessment of first contact utilization and accessibility (first contact domain), the continuity of care domain, coordination of services and information system (coordination domain), and comprehensiveness of service availability and provision (comprehensiveness domain).<sup>20-22</sup> First contact-utilization measures the extent to which the primary care provider performs a gatekeeper function, whereas first contact-accessibility refers to whether patients are able to receive primary care whenever needed within a reasonable time; continuity of care refers to the longitudinal use of a regular source of primary care over time; coordination refers to the interpersonal linkage of care among different levels of providers (coordination of services) or informational linkage of care through the use of an electronic information system (coordination of information); and comprehensive care refers to the ability to perform a wide range of services in primary care (comprehensiveness of service availability) and the appropriate provision of services during consultations by a primary care provider (comprehensiveness of service provided).<sup>20-22</sup>

Each PCAT domain consists of several items. A Likert-type self-report scale was applied for each item (1 = definitely do not agree; 2 = probably do not agree; 3 = probably agree; 4 = definitely agree; and 9 = not sure). Options 1 to 4 directly represented the score for most items, while reverse coding was adopted for certain items, but the items were not scored if a code of 9 was entered for  $\geq 50\%$  of the questions in the domain. The total score was calculated by summing the scores of all domains to represent the overall quality of primary care.<sup>22</sup> Thus, a higher PCAT score indicated better quality of care from the viewpoints of the patients.

### 2.4 | Data collection

We conducted two rounds of cross-sectional surveys in all three sample THCs from November 2016 to June 2018. To achieve 90% study power at a 5% level of significance, a sample size of 113 patients was needed for each integration model in each survey round for a total of 678 patients. An exit survey was implemented in the sample THCs for

**TABLE 1** Brief information regarding the three typical integration models examined in this study

Integration Models	Participants	Location	Key Integrative Strategies
Model 1: Private hospital-THC integration	Leading hospital: private secondary hospital THCs covered: 1	Eastern area: Daxing District, Beijing	<p>Management:</p> <ul style="list-style-type: none"> <li>• Designating the head of the THC from the hospital</li> <li>• Designated a branch of the private hospital</li> <li>• Independent financial and human resources for the two organizations</li> </ul> <p>Personnel and clinical services:</p> <ul style="list-style-type: none"> <li>• Help establish clinical departments with high demand</li> <li>• Improve the skills of clinical laboratory staff</li> <li>• Regular training for health professionals in the THC</li> </ul> <p>Profit obtained: None</p>
Model 2: Public hospital-THC integration	Leading hospital: public secondary hospital THCs covered: 4 (7 THCs in total in Zhijiang)	Middle area: Zhijiang, Hubei	<p>Management:</p> <ul style="list-style-type: none"> <li>• Designating the heads of the THCs from hospitals</li> <li>• Designated a branch of the public hospital</li> <li>• Independent financial and human resources for the two organizations</li> </ul> <p>Personnel and clinical services:</p> <ul style="list-style-type: none"> <li>• Help establish departments specialized in rehabilitation</li> <li>• Regular training for health professionals in the THC</li> </ul> <p>Profit obtained:</p> <ul style="list-style-type: none"> <li>• The head of the THC from the hospital participated in the performance of payment in the THC</li> <li>• Bundled payment of health insurance initiated in 2017</li> </ul>
Model 3: Loose collaboration	Collaborative hospital: public secondary hospital THCs covered: 3  Collaborative hospital: public secondary hospital THCs covered: 10	Middle area: Zhijiang, Hubei  Western area: Xinjin County, Sichuang	<p>Personnel and clinical services:</p> <ul style="list-style-type: none"> <li>• Training for health professionals in the THCs (relatively informal)</li> <li>• Hospital expert visits in the THCs (relatively informal)</li> </ul>

patients older than 18 years and was required by the PCAT after patients sought primary care during the study period. All participants signed informed consent forms before the survey commenced. The same group of researchers and master's students from the Institute of Medical Information, who received training for collecting data and interviewing the respondents, were recruited for both rounds of surveys.

In addition to the PCAT data, basic sociodemographic information, including sex, age, education, occupation, monthly household income, the number of family members living together (family size), household registration (local or migrants), health insurance (having at least one type of insurance for more than 6 months), self-reported health status, and the presence of chronic disease, was collected to be controlled. The number of health professionals in each sample THC was also collected as a proxy for service competency. The data were inputted and double checked by professionals using EpiData to ensure accuracy.

## 2.5 | Statistical analysis

We employed chi-square tests to compare the sociodemographic characteristics of the respondents. An analysis of variance (ANOVA) was used to compare the scores of the domains and total scores measured by the PCAT between the two survey rounds and among the three integration models, while multiple linear regression models were employed after controlling for potential cofounders, such as the respondents' sociodemographic characteristics and THC service competency, to compare the PCAT scores among the three integration models and the two survey rounds. All analyses were processed by using Stata/SE 15.0 (StataCorp LLC, Texas 77845).

## 3 | RESULTS

### 3.1 | Sociodemographic characteristics of the participants

The total sample size from the two survey rounds was 1118 participants; specifically, there were 377 participants for private hospital-THC integration, 253 participants for public hospital-THC integration, and 488 participants for loose collaboration. Table 2 presents the sociodemographic characteristics of the participants. In addition to the presence of chronic diseases, the participants significantly differed among the three integration models. In total, most respondents were females, older than 45 years, educated at the middle school level or lower and local residents. Regarding health insurance, most respondents were covered by Urban and Rural Resident Medical Insurance and Urban Employee Medical Insurance, while only a few participants had commercial health insurance.

### 3.2 | Primary care quality scores of the three integration models in the two survey rounds

When comparing the quality scores of each integration model between the two survey rounds, the total quality score in the second survey round was significantly higher than that in the first survey round (a score of 24.1 compared with a score of 22.7) after controlling for potential confounders. Specifically, quality improvement was observed in the comprehensiveness-services provided domain. Under public hospital-led integration, no significant quality changes were found in any domains after controlling for potential confounders. In contrast, the perceived quality changes reported under loose collaboration were mixed such that both positive and negative effects were observed. The detailed results of the comparisons of the three integration models between the two survey rounds are shown in Table 3.

### 3.3 | Primary care quality scores among the three integration models

After controlling for potential confounders, the respondents in the THC under private hospital-led integration reported a lower quality than those in the THCs under public hospital-led integration ( $\beta = -1.08$ , 95% CI,  $-1.86$  to  $-0.30$ ) as measured by the four domains, particularly the comprehensiveness-services provided domain ( $\beta = -0.34$ , 95% CI,  $-0.48$  to  $-0.19$ ). The perceived quality of the THCs integrated with private hospitals was significantly lower than that of the THCs under loose collaboration ( $\beta = -1.30$ , 95% CI,  $-1.90$  to  $-0.70$ ). The three largest differences

**TABLE 2** Sociodemographic characteristics of the participants under the three integration models<sup>a</sup>

Characteristics	Private Hospital-THC Integration (n = 377), N (%)	Public Hospital-THC Integration (n = 253), N (%)	Loose Collaboration (n = 488), N (%)
Survey round***			
Round 1	180 (47.8)	120 (47.4)	213 (43.7)
Round 2	197 (52.3)	133 (52.6)	275 (56.4)
Sex**			
Female	216 (57.5)	154 (60.9)	328 (67.2)
Male	160 (42.6)	99 (39.1)	160 (32.8)
Age***			
18-44	97 (25.7)	41 (16.2)	63 (12.9)
45-59	139 (36.9)	86 (34.0)	161 (33.0)
≥60	141 (37.4)	126 (49.8)	264 (54.1)
Education***			
Middle school or below	261 (69.6)	193 (76.3)	435 (89.1)
High school or equivalent	61 (16.3)	54 (21.3)	43 (8.8)
College or above	53 (14.1)	6 (2.4)	10 (2.1)
Occupation***			
Farmer	144 (38.4)	138 (55.2)	285 (60.8)
Nonfarmer	143 (38.1)	53 (21.2)	80 (17.1)
Retired	43 (11.5)	24 (9.6)	49 (10.5)
No job	45 (12.0)	35 (14.0)	55 (11.7)
Monthly household income***			
<3000 RMB	94 (25.4)	137 (54.4)	273 (56.2)
3000-5000 RMB	109 (29.5)	47 (18.7)	101 (20.8)
5001-10 000 RMB	107 (28.9)	50 (19.8)	86 (17.7)
>10000 RMB	60 (16.2)	18 (7.1)	26 (5.4)
Family size***			
<3 persons	177 (49.2)	158 (62.7)	262 (53.8)
4-5 persons	120 (33.3)	70 (27.8)	183 (37.6)
≥6 persons	63 (17.5)	24 (9.5)	42 (8.6)
Household registration***			
Locals	338 (89.7)	243 (96.1)	469 (96.1)
Migrants	39 (10.3)	10 (4.0)	19 (3.9)
Health insurance***			
Yes	347 (92.0)	246 (97.2)	476 (97.5)
No	30 (8.0)	7 (2.8)	12 (2.5)
Self-reported health status***			
Good or above	202 (53.9)	129 (51.0)	236 (48.5)
Fair	148 (39.5)	73 (28.9)	187 (38.4)

(Continues)

**TABLE 2** (Continued)

Characteristics	Private Hospital-THC Integration (n = 377), N (%)	Public Hospital-THC Integration (n = 253), N (%)	Loose Collaboration (n = 488), N (%)
Poor or below	25 (6.7)	51 (20.2)	64 (13.1)
Presence of chronic diseases			
Yes	187 (49.6)	124 (49.0)	219 (44.9)
No	190 (50.4)	129 (51.0)	269 (55.1)

<sup>a</sup> $\chi^2$  test was used to compare the differences among the participants under the three different integration models.

\* $P < .05$ .

\*\* $P < .01$ .

\*\*\* $P < .001$ .

between the two types were observed in the domain of comprehensiveness-services provided, first contact accessibility, and continuity of care. In contrast, there was no significant difference in the total quality score between public hospital-led integration and loose collaboration. Mixed influences were found when comparing the two models; in particular, positive improvements were reported in coordination of information in the public hospital-led integration model, while negative effects were found on first contact (utilization and accessibility) and continuity of care. The multiple linear regression results obtained after controlling for potential cofounders are displayed on the right side of Table 4.

## 4 | DISCUSSION

The issue of vertical integration is a priority for local governments as illustrated by the official release of a national policy at the end of 2016 to improve the competency of primary health facilities and establish an organized hierarchical health system. Some places have already piloted different models at a much earlier time. However, accompanied by intensive policies issued, our knowledge of the quality of and differences in primary care under the different integration models is limited, which was the main objective of this study. Three typical integration models were examined in the eastern, middle, and western areas of China, and quality differences indeed exist in the sampled THCs from the demand side as revealed in this study. Among these differences, three key findings are worthy of an in-depth discussion.

First, one notable finding of this study was that the perceived quality of the THCs under the integration led by a public hospital was better than the quality of THCs integrated with private hospitals in the study areas. The possible explanations are related to key specific integration moves. The interest allocation mechanism between public hospitals and THCs in Zhijiang was gradually established with two important reforms. One reform is that the director appointed from the public hospital was also paid based on performance by the entrusted THC in addition to the regular payment received from the hospital. More importantly, bundled payment of health insurance was implemented in early 2017. The public hospital was responsible for the allocation of health insurance funds prepaid by the health insurance bureau between the hospitals and THCs, and the balance could be used as personal incentives. Both of these economic strategies greatly encouraged the public hospitals to improve the quality of the THCs to retain patients, which did not occur in the integration led by private hospitals. The positive role of health insurance in the quality improvement of primary health institutions was also supported by Lin's study conducted in the city of Tianchang in Anhui Province in 2017.<sup>23</sup> However, its sustainability and appropriate balance allocation are still uncertain in practice.<sup>24</sup> In addition, the different goals and methods of operating between public hospitals and private hospitals contributed to this result. Public hospitals in China are public welfare-oriented and regulated by the



**TABLE 3** Primary care quality scores of the three integration models in each round of surveys

Attributes	Private Hospital-THC Integration			Public Hospital-THC Integration			Loose Collaboration		
	Round 1	Round 2	$\beta$ (95% CI) <sup>b</sup>	Round 1	Round 2	$\beta$ (95% CI) <sup>b</sup>	Round 1	Round 2	$\beta$ (95% CI) <sup>b</sup>
	Mean (SD) <sup>a</sup>	Mean (SD) <sup>a</sup>		Mean (SD) <sup>a</sup>	Mean (SD) <sup>a</sup>		Mean (SD) <sup>a</sup>	Mean (SD) <sup>a</sup>	
First contact-utilization	3.6 (0.71)	3.5 (0.71)	-0.02 (-0.19 to 0.14)	3.5 (0.70)	3.4 (0.70)	0.00 (-0.19 to 0.19)	3.7 (0.53)	3.8 (0.39) <sup>*</sup>	0.10 (0.01 to 0.18) <sup>*</sup>
First contact-accessibility	2.9 (0.45)	3.0 (0.52)	0.09 (-0.03 to 0.22)	3.3 (0.48)	3.2 (0.48)	0.00 (-0.19 to 0.19)	3.4 (0.46)	3.2 (0.39) <sup>***</sup>	-0.15 (-0.23 to -0.07) <sup>***</sup>
Continuity of care	3.3 (0.46)	3.3 (0.38)	0.08 (-0.02 to 0.18)	3.5 (0.30)	3.5 (0.37)	0.06 (-0.04 to 0.15)	3.5 (0.36)	3.7 (0.26) <sup>***</sup>	0.17 (0.12 to 0.23) <sup>***</sup>
Coordination of services	2.9 (0.71)	3.1 (0.58) <sup>*</sup>	0.19 (-0.02 to 0.40)	3 (0.65)	2.9 (0.65)	-0.17 (-0.46 to 0.12)	3.1 (0.60)	2.8 (0.80) <sup>*</sup>	-0.2 (-0.50 to -0.04) <sup>*</sup>
Coordination of information	3.2 (0.91)	3.4 (0.67) <sup>**</sup>	0.19 (-0.01 to 0.39)	3.5 (0.67)	3.3 (0.62) <sup>*</sup>	-0.17 (-0.35 to 0.01)	3.1 (0.67)	3.2 (0.44) <sup>*</sup>	0.14 (0.03 to 0.25) <sup>**</sup>
Comprehensiveness-service availability	3.3 (0.36)	3.3 (0.37)	-0.02 (-0.11 to 0.07)	3.4 (0.32)	3.5 (0.29) <sup>**</sup>	0.16 (0.07 to 0.25)	3.5 (0.32)	3.5 (0.37)	0.07 (0.00 to 0.14) <sup>*</sup>
Comprehensiveness-services provided	2.7 (0.85)	2.9 (0.79)	0.21 (0.01 to 0.40) <sup>*</sup>	3.1 (0.64)	3.2 (0.85)	0.09 (-0.13 to 0.30)	3.1 (0.60)	3.3 (0.76) <sup>**</sup>	0.17 (0.05 to 0.30) <sup>**</sup>
Total score	22.7 (5.10)	24.1 (4.60) <sup>**</sup>	1.26 (0.16 to 2.36) <sup>**</sup>	25.0 (3.38)	24.3 (4.18)	-0.23 (-1.30 to 0.84)	24.3 (4.04)	25.2 (3.05) <sup>*</sup>	0.70 (0.07 to 1.33) <sup>*</sup>

Abbreviations: CI, confidence interval; SD, standard deviation.

<sup>a</sup>Analysis of variance of the two survey rounds.

<sup>b</sup>Multiple linear regression models were used to examine the differences in the quality scores between rounds 1 and 2 after adjusting for potential cofounders; round 1 was used as the reference group.

\* $P < .05$ .

\*\* $P < .01$ .

\*\*\* $P < .001$ .

**TABLE 4** Primary care quality scores of the three integration models as reported by the patients

Attributes	Mean (SD) <sup>a</sup>		$\beta$ (95% CI)			
	Private Hospital-THC Integration	Public Hospital-THC Integration	Loose Collaboration	Private vs Public Hospital-THC Integration <sup>b</sup>	Private Hospital-THC Integration vs Loose Collaboration <sup>c</sup>	Public Hospital-THC Integration vs Loose Collaboration <sup>c</sup>
First contact-utilization	3.5 (0.71)	3.5 (0.70)	3.8 (0.46) <sup>***</sup>	0.12 (0.00 to 0.24)	-0.16 (-0.25 to -0.07) <sup>***</sup>	-0.26 (-0.36 to -0.17) <sup>***</sup>
First contact-accessibility	2.9 (0.49)	3.2 (0.49)	3.3 (0.42) <sup>***</sup>	-0.28 (-0.37 to -0.19)	-0.37 (-0.44 to -0.30) <sup>***</sup>	-0.08 (-0.15 to -0.01) <sup>*</sup>
Continuity of care	3.3 (0.42)	3.5 (0.34)	3.6 (0.32) <sup>***</sup>	-0.21 (-0.28 to -0.14) <sup>***</sup>	-0.33 (-0.38 to -0.28) <sup>***</sup>	-0.11 (-0.17 to -0.06) <sup>***</sup>
Coordination of services	3.0 (0.65)	3.0 (0.65)	2.9 (0.74)	0.02 (-0.15 to 0.19) <sup>***</sup>	0.09 (-0.06 to 0.25)	0.10 (-0.07 to 0.26)
Coordination of information	3.3 (0.80)	3.4 (0.65)	3.2 (0.56) <sup>***</sup>	-0.11 (-0.25 to 0.03)	0.10 (0.00 to 0.21)	0.18 (0.07 to 0.29) <sup>***</sup>
Comprehensiveness-service availability	3.3(0.36)	3.5 (0.31)	3.5 (0.35) <sup>***</sup>	-0.18 (-0.24 to -0.12)	-0.18 (-0.24 to -0.13) <sup>***</sup>	-0.01 (-0.07 to 0.04)
Comprehensiveness-services provided	2.8 (0.82)	3.2 (0.76)	3.2 (0.70) <sup>***</sup>	-0.34 (-0.48 to -0.19) <sup>***</sup>	-0.43 (-0.54 to -0.32) <sup>***</sup>	-0.10 (-0.22 to 0.02)
Total score	23.4 (4.89)	24.6 (3.87)	24.8 (3.54) <sup>***</sup>	-1.08 (-1.86 to -0.30) <sup>***</sup>	-1.30 (-1.90 to -0.70) <sup>***</sup>	-0.30 (-0.92 to 0.31)

Abbreviations: CI, confidence interval; SD, standard deviation.

<sup>a</sup>Analysis of variance of the three integration models.

<sup>b</sup>Multiple linear regression models were used to examine the differences in the quality scores between private hospital-THC integration and public hospital-THC integration after adjusting for potential cofounders, and the latter was used as a reference group.

<sup>c</sup>Multiple linear regression models were used to examine the differences in the quality scores among the three integration models after adjusting for potential cofounders, and loose collaboration was used as a reference group.

\* $P < .05$ .

\*\* $P < .01$ .

\*\*\* $P < .001$ .

government with certain subsidies, while private hospitals are regarded as profit maximizing and under relatively loose control by the government.<sup>25</sup> The THC<sub>s</sub> included in this study were all public; as a result, the integration of health institutions with the same public property facilitated cooperation regarding resource sharing, personnel communication, and mutual recognition of test results. Additionally, when integration occurred, the THC normally had a second identity as a hospital branch, which was an advertisement of quality assurance to patients seeking care in primary health institutions and could influence their impressions and evaluations of the quality of the THC<sub>s</sub>. Considering the preference of Chinese patients for public hospitals,<sup>26</sup> it is understandable why the quality of the public hospital branch was regarded as better than that of the private hospital branch, even if they had the same technical quality from the perspective of the patients. Furthermore, the quality scores of the comprehensiveness-services provided domain under both the integration with a public hospital and loose collaboration model were found to be significantly better than those for the private hospital. This result was closely related to the basic functions of THC<sub>s</sub> in China, which cover basic clinical and public health services, which were also evaluated in the comprehensiveness domain. It is not mandatory for private hospitals to provide or guide public health services; therefore, this function of the THC was neglected, which was also a point of debate during integration.<sup>27</sup> In contrast, relatively more effort was devoted to public health services by public hospitals, which are normally monitored and supervised by local governments. Regarding loose collaboration, there were no material interventions from certain hospitals, and the THC<sub>s</sub> were not interrupted and could develop public health services as usual. These reasons could possibly explain the better performance in the comprehensiveness of services provided domain in the THC<sub>s</sub> under the public hospitals and loose collaboration.

Another interesting finding revealed in this study is that the perceived quality of the THC<sub>s</sub> under loose collaboration did not significantly differ from that under the integration led by the public hospital and was better than that of the THC<sub>s</sub> integrated with the private hospital. The results indicated that the THC<sub>s</sub> had the ability to improve quality under a loose relationship with hospitals at an advanced level. Specifically in our cases, the original state of the THC included in the loose collaboration was worse than that of the other THC<sub>s</sub>, as it had 58 health professionals less than the THC entrusted to the private hospital (141) and public hospital (62), and its total visits in 2017 were almost half of those of the THC<sub>s</sub> entrusted to the private hospital, both of which exhibited lower competency. In contrast, one study conducted in the city of Zhenjiang in Jiangsu Province suggested that community health centres in loose collaboration behaved worse than those under tight integration,<sup>10</sup> which conflicts with our findings. To the best of our knowledge, no other studies in China have found this result. Both studies indicated that tight integration may not play the same role in the quality of primary health institutions and that more attention should be paid to integration. However, tight integration was represented as being a part of the hospitals, and bundled insurance payment has been highly advocated by local governments in many places in China. Further studies are urgently needed to examine and compare the influence of integration on the quality of primary health institutions instead of discussing such influences only in theory.

Finally, notably, the respondents reported significant quality improvement in the THC under the private hospital-led integration when comparing the two rounds of survey results from 2016 to 2018. The detailed suggestions by the interviewees included assigning technical personnel to THC<sub>s</sub> to treat patients, setting an appropriate clinical environment and regularly supervising clinical quality data, which contributed to the positive quality changes perceived by the patients. However, the influence on the patients was not distinct or only occurred during the initial stage due to the longer time required to combine two institutions with completely different properties, and this exceeded the effects resulting from the other two integration types under which the quality improvement occurred earlier, and the institutions were in a stable self-operating period. To the best of our knowledge, similar studies providing comprehensive comparisons have not been conducted.

The two main strengths of this study deserve to be highlighted. This study is the first to assess and compare the perceived quality of THC<sub>s</sub> under three typical integration models in China. The findings contribute to an understanding of the implementation of current integration practices and provide a useful reference for the development of related policies in the future. This study also provides a direction for future studies to enrich the empirical evidence

in this area. In addition, we provided the latest evidence regarding the current quality situation of THCs under the typical integrations implemented from 2016 to 2018 along with the official release of the national integration policy based on patients who should be directly involved in integrated health systems. Additionally, the results revealed in this study were partially inconsistent with the theoretical expectations, shedding new light on ongoing integration reform, particularly for the considerations of tight versus loose integration led by public versus private hospitals for local policy makers.

However, this study is not without limitations. First, the findings should be considered in light of methodological limitations. The standardized impact evaluation method was not applicable in this study because different integration strategies were implemented by local governments at various time points in China, even before the official policy release in 2016. Therefore, it was not possible to collect data from the viewpoint of the patients in advance and establish an ideal control group for comparison, which was one of the main obstacles confronted by the policy impact evaluation.<sup>8</sup> Two solutions were applied in this study to avoid bias as much as possible. The THCs under loose collaboration were used as a control group, which was reasonable as these THCs were regarded as a natural contrast under the context of wide existence without virtual integration. Furthermore, two rounds of cross-sectional surveys were designed and conducted to obtain more comprehensive results of the quality of primary care in the same sample of THCs for a longer period to minimize the bias created by the lack of data before integration. Second, this research included three typical cases in the eastern, middle, and western areas of China with the purpose of being nationally representative, which simultaneously weakened the comparability of the sample THCs due to different contexts as described in the study setting. The demographic information of the patients and number of health professionals in the sample THCs were collected and adjusted by multiple linear regressions as potential confounders to minimize bias as much as possible. Furthermore, we selected THCs under the three models in rural areas without consideration of community health centres in urban areas to maximize the comparability of the sample THCs. Due to limited medical resources, THCs in China need to receive more attention during integration, as their competency and quality have been regarded as lower.

## 5 | CONCLUSIONS

This study provides important suggestive evidence regarding the quality of THCs under private hospital-led integration, public hospital-led integration, and loose collaboration from the perspective of patients via the use of the PCAT-Chinese version with two rounds of cross-sectional surveys conducted in the eastern, middle, and western areas of China. Overall, the quality improvement in the THC integrated with the private hospital was significantly distinct when comparing the results of the two survey rounds. Notably, no significant difference was found in the quality of the THCs integrated with public hospitals and those under loose collaboration. However, the perceived quality of the THCs under private hospital-led integration was significantly worse than that of the THCs under public hospital-led integration and loose collaboration, particularly in the domain of comprehensiveness-services provided. This study suggests that the government should pay more attention to the tight integration method by entrusting primary health institutions to hospitals, and attention should be focused on the role played by private and public hospitals. Given the above-mentioned limitations, the results of this study should be interpreted cautiously.

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## CONFLICTS OF INTEREST

None of the authors have competing interests to declare.

## ORCID

Shasha Yuan  <https://orcid.org/0000-0002-5091-6688>

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