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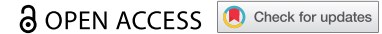


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RESEARCH ARTICLE



## Patient Choice of Health Care Providers in China: Primary Care Facilities versus Hospitals

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### ABSTRACT

As China's health system is faced with challenges of overcrowded hospitals, there is a great need to better understand the recent patterns and determinants of people's choice between primary care facilities and hospitals for outpatient care. Based on recent individual-level data from the China Health and Retirement Longitudinal Survey (CHARLS) and official province-level data from China health statistical yearbooks, we examine the patterns of outpatient visits to primary care facilities versus hospitals among middle-aged and older individuals and explore both supply- and demand-side correlates that explain these patterns. We find that 53% of outpatient visits were paid to primary care facilities as opposed to hospitals in 2015, compared to 60% in 2011. Both supply and demand factors were associated with this decline. On the supply side, we find that the density of primary care facilities did not account for this decline, but higher densities of hospitals and licensed doctors were associated with lower use of primary care facilities. On the demand side, we find that individuals with higher socioeconomic status and greater health care needs were less likely to use primary health care facilities. Our findings suggest that a high concentration of health care professionals in hospitals diverts patients away from primary care facilities. Staffing the primary care facilities with a well-trained health care workforce is the key to a well-functioning primary care system. The findings also suggest a need to address demand-side inequality issues.

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Aging; health policy; health services; primary care



## Introduction

China's health care system does not feature a gate-keeping general practitioner system.<sup>1</sup> Patients can seek primary care from primary care facilities or from outpatient departments in hospitals. Given that individuals can select from a variety of providers, understanding both the supply- and demand-side factors that shape people's health care provider choices is at the core of health policy making.


China's primary care system has undergone fundamental changes in the past decades, and though some of them have been success stories, some have resulted in failure. Between 1949 and the 1970s, the Chinese primary health care system relied on "barefoot doctors" to provide readily accessible but rudimentary primary care, setting a famous global example of primary care, especially for low-resource settings.<sup>2-4</sup> The Chinese

economic reforms of 1978 resulted in the collapse of this system, inter alia, resulting in a fiscal crisis. Government revenue as a percentage of gross domestic product fell from 30% to 10% between 1978 and 1993. Consequently, the subsidies for public health care facilities fell from 50% to 60% to merely 10% of the facilities' total revenues by the early 1990s. Public health care providers had to rely on charging patients directly to earn revenue.<sup>3</sup> Meanwhile, agricultural reforms also dismantled the commune-based health care safety net for rural residents. As a result, 900 million peasants became uninsured and had to pay for health care directly out of pocket.<sup>3</sup>

These changes in the health system resulted in financial barriers that limited access to primary health care services for patients, especially for the poor. In response, China instituted numerous health

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care reforms starting in 2009, of which one major pillar was the expansion of primary health care facilities. Among others, policy measures included increased government subsidy for primary care institutions and additional funds to develop infrastructure and human resources for the primary care system.<sup>5-7</sup> Government subsidy increased from RMB19 billion (2.8 billion USD) in 2008 to RMB140 billion (20.3 billion USD) in 2015.<sup>8,9</sup>

Yet, progress has been limited. Between 2006 and 2016, the number of primary care facilities has increased by merely 4.7%, whereas the number of hospitals has increased by 51.4%.<sup>8,9</sup> Moreover, the ratio of visits to primary health care institutions out of the total number of visits to any health care facility has decreased. The trend of primary care utilization within the four years before and after the 2009 reform went against the policy goal.<sup>10</sup> Further, a large rural-urban disparity persists. Rural residents are less likely to visit hospitals than their urban counterparts.<sup>11</sup> In 2016, village clinics and township hospitals provided 37% (2.9 billion visits) of outpatient care, whereas community health centers and stations provided only 9% (0.7 billion visits).<sup>9</sup>

There remain numerous barriers to primary health care that may contribute to higher hospital utilization over primary care facilities. From a supply-side perspective, primary care facilities offer lower quality of care due to a tiered system that prioritizes hospitals. The tiers are linked with government subsidies, infrastructure, and human resources. Further, higher tier health care providers are disproportionately concentrated in affluent urban areas. Village clinics and community health centers find themselves with far less educated and knowledgeable staff, in part due to the retention of barefoot doctors who lack updated skills and knowledge.<sup>12</sup> There is a substantial gap between the proportion of trained staff within the hospital setting compared to those in primary care, which has only increased over the years. Recruiting more qualified staff for primary health care would be difficult in the current environment, because few doctors are satisfied with their jobs in these settings and nearly half of primary care doctors expressed their intentions to resign.<sup>12,13</sup> As a result of not having properly qualified clinicians, there is a lack of trust in primary care institutions

among patients on the demand side, which in turn leads to lower utilization of these institutions.<sup>4,14,15</sup>

China is now faced with a rapidly aging population and an increasing prevalence of noncommunicable diseases, solutions to which require a strong primary care system. Against this background, this study provides new evidence for understanding recent developments in the primary care system in China. We make the following contributions to the literature. First, this study examines the patterns of outpatient utilization of primary care facilities vis-à-vis hospitals based on recent national-scale data of middle-aged and older individuals. These groups are heavy users of the health care system; thus, understanding their health provider choices is of key policy importance. Second, we link official data on the supply side of the health care system to the China Health and Retirement Longitudinal Survey (CHARLS), enabling us to explore both supply and demand factors that shape individuals' health care provider choices. Third, by employing an estimation method that takes into account county fixed effects, we are able to isolate demand-side factors from supply-side factors at the county level to understand what drives the differences in health care provider choices along the dimensions of socioeconomic status and health care needs.

## Methods

### *Data Source and Study Sample*

We draw our sample from CHARLS, which collects data from a nationally representative sample of residents aged 45 and over in China. Ethics approval is not applicable for our study because we use anonymized secondary data. The CHARLS baseline survey in 2011 covers 17,708 respondents living in 10,253 households in 450 communities/villages of 28 Chinese provinces. Two follow-up surveys in 2013 and 2015 track previous respondents and include a small share of new respondents to compensate for sample attrition. Details of the sampling design and the cohort profile can be found elsewhere.<sup>16</sup>

We focus on patients' choice of health care provider between hospitals and primary care facilities for an outpatient consultation. We include in

our sample only those who have paid an outpatient visit to a health care provider in the last month. We combine all such individuals in waves 2011, 2013, and 2015, treating this sample as repeated cross-sectional data, which leaves us with 10,596 observations. These 10,596 observations are based on data from 8,085 individuals. Overall, 73.5% of the observations are from individuals who were observed once across the three waves, 22.0% are from those who were observed twice, and 4.5% are from those who were observed in every wave.

Our secondary source of data is the China health statistical yearbooks, from which we draw data on supply-side health system characteristics for the years 2011, 2013, and 2015.<sup>9,17,18</sup> The supply-side information we make use of includes density of hospitals, density of primary care facilities, and density of health care professionals at the province level.

### **Variable Definitions**

The outcome we focus on is patient choice between hospitals and primary care facilities. In CHARLS, the respondents are asked, “Which health care provider did you visit most recently during the past month?,” with responses including general hospital, specialized hospital, Chinese medicine hospital, community health care center, township hospital, community health care station, and village or private clinic. Based on this information, our key variable is the utilization of primary health care centers, defined as a binary variable, with 1 indicating that the outpatient visit occurred at a primary health care center (community health care center, community health care station, township hospital, or village or private clinic) and 0 indicates that the visit occurred at a hospital. In the Chinese context, the primary function of township hospitals is primary care and outpatient services, though they provide both primary and secondary care.<sup>15</sup>

Geographical locations are categorized into urban and rural areas, according to the definition by the National Bureau of Statistics of China.<sup>19</sup> In later regression analyses, we run estimations separately on the urban subsample (including peri-urban) and rural subsample to examine rural–urban disparities.

On the supply side, the explanatory variables include the number of hospitals per 10,000 population, the number of primary care facilities per 10,000 population, the number of licensed doctors in hospitals per 1,000 population, the number of licensed doctors in primary care facilities per 1,000 population, and the number of village doctors in rural areas per 1,000 population.

On the demand side, we take into account the individual’s gender, education level (below primary school, middle school, high school and above), log per capita household expenditure (excluding health care expenditure), age (45–54, 55–64, 65 and over), any chronic condition (out of 14 listed conditions: hypertension, dyslipidemia, diabetes or high blood sugar, cancer or malignant tumor, chronic lung disease, liver disease, heart condition, stroke, kidney disease, stomach or other digestive disease, psychiatric condition, memory-related disease, arthritis or rheumatism, and asthma), and health insurance status (New Cooperative Medical Scheme [NCMS], Urban Employee Basic Medical Insurance [UEBMI], Urban Resident Basic Medical Insurance [URBMI], other insurance, and no insurance).

### **Statistical Analysis**

We start by describing the patterns of outpatient visits, by presenting the percentage distributions of outpatient destinations categorized as hospitals and primary care institutions for the years 2011, 2013, and 2015. We examine how these patterns change across three waves as well as by urban and rural areas. Next we run logistic regressions to explore the factors associated with utilization of primary care facilities. For supply-side factors, we first examine the associations with densities of hospitals and primary care facilities and then explore the associations with density of health care professionals. For demand-side factors, we specify a regression that includes socioeconomic variables, health care needs indicators, and county fixed effects on the right-hand side. The inclusion of county fixed effects controls for all of the fixed factors at the county level (county-level administrative divisions include counties in rural areas and subcity districts in urban areas), such as health care system characteristics at the local government level and insurance program benefits. In this

specification, we compare individuals who have the same health system at the county level and thus we are able to determine whether and which demand factors still matter when time-invariant supply-side factors at the county level are controlled for. Though the aforementioned supply-side factors do vary within the same region across the three years, little variation is left once county fixed effects are controlled for. For this reason, we omit them from the county fixed effects models (see Supplemental Material for further details).

Year dummies are also included in all regressions to account for national time trends. Survey-provided sampling weights are applied throughout the analyses. All analyses were performed in Stata version 14.2.

## Results

We follow the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational studies in reporting the results. [Table 1](#) captures the descriptive statistics for our sample drawn from CHARLS. In providing descriptive statistics, we summarize the variables for the total sample first and then for urban and rural areas separately. In the full sample, 57% of outpatients sought outpatient care in primary care facilities, and the remaining 43% sought outpatient care in a hospital setting. A higher share of rural dwellers used outpatient services in primary care facilities (69%) compared to urban residents (45%).

On average there are 0.17 hospitals and 6.74 primary care facilities per 10,000 population. In terms of licensed doctors (excluding assistant doctors), 1.00 doctors per 1,000 population work in hospitals and 0.61 work in primary care facilities. In rural areas, every 1,000 population has access to 0.88 village doctors.

Females comprise 57% of the sample. In terms of education level, 42% of respondents have below primary education as their highest educational attainment, 20% have primary education, 19% have a middle school education, and 15% have a high school or higher, and the remaining 4% are missing data on education. In terms of age groups, 32% are aged 45 to 54, 34% are aged 55 to 64, and the remaining 34% are aged 65 or

**Table 1.** Summary Statistics

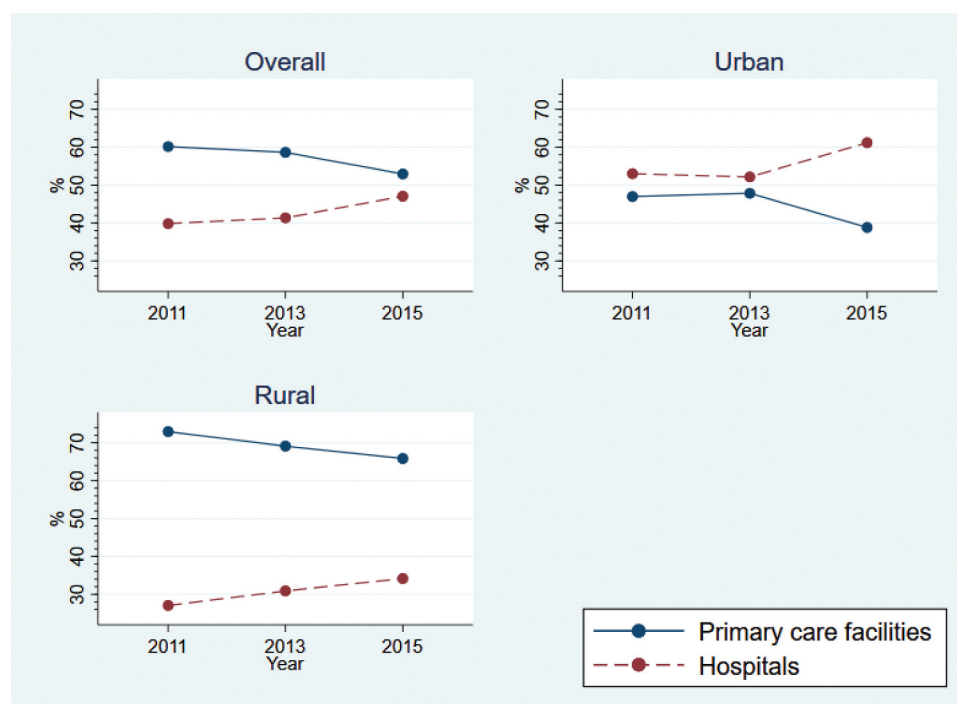
	Overall	Urban	Rural
Visit primary care facility	0.57 (0.49)	0.45 (0.50)	0.69 (0.46)
Number of hospitals per 10,000 population	0.17 (0.05)		
Number of primary care facilities per 10,000 population	6.74 (2.28)		
Number of licensed doctors in hospitals per 1,000 population	1.00 (0.25)		
Number of doctors in primary health care facilities per 1000 population	0.61 (0.18)		
Number of village doctors in primary care institutions per 1,000 population			0.88 (0.69)
Female	0.57 (0.50)	0.56 (0.50)	0.58 (0.49)
Education below primary	0.42 (0.49)	0.27 (0.44)	0.56 (0.50)
Education primary	0.20 (0.40)	0.20 (0.40)	0.21 (0.40)
Education middle school	0.19 (0.39)	0.23 (0.42)	0.15 (0.36)
Education high school and above	0.15 (0.36)	0.25 (0.43)	0.05 (0.23)
Education missing	0.04 (0.19)	0.05 (0.22)	0.03 (0.17)
Log per capita household expenditure	7.57 (3.32)	7.66 (3.59)	7.49 (3.04)
Expenditure missing	0.15 (0.36)	0.17 (0.38)	0.13 (0.34)
Age 55–64	0.34 (0.47)	0.34 (0.47)	0.35 (0.48)
Age ≥65	0.34 (0.47)	0.34 (0.47)	0.34 (0.47)
Chronic conditions	0.78 (0.42)	0.78 (0.42)	0.77 (0.42)
NCMS	0.66 (0.47)	0.40 (0.49)	0.90 (0.30)
UEBMI	0.18 (0.39)	0.34 (0.48)	0.03 (0.17)
URBMI	0.07 (0.25)	0.13 (0.33)	0.01 (0.10)
Other insurances	0.05 (0.21)	0.07 (0.26)	0.02 (0.14)
No insurance	0.05 (0.21)	0.05 (0.22)	0.04 (0.21)
Year 2011	0.32 (0.46)	0.32 (0.47)	0.31 (0.46)
Year 2013	0.37 (0.48)	0.37 (0.48)	0.36 (0.48)
Year 2015	0.32 (0.47)	0.31 (0.46)	0.32 (0.47)
N	10,596	4,063	6,533

Sample means are reported in cells. Sampling weights are applied. Standard deviations are in parentheses.

above. In terms of health status, 78% have at least one chronic illness. Finally, in terms of health insurance, 66% are covered by NCMS, 18% are covered by UEBMI, 7% by URBMI, and 5% by other insurances, and the remaining 5% have no insurance coverage.

More details of the patterns of health care provider choices are provided in [Figure 1](#). Since 2011, the use of primary care facilities dropped from 60% to 59% in 2013 and to 53% in 2015. In rural areas, this proportion dropped steadily from 73% to 69% and then to 66%. In urban areas, this proportion increased slightly from 47% to 48% and then dropped to 39%. Overall this graphical evidence shows a clear trend of middle-aged and





**Figure 1.** Outpatient Visits to Primary Care Facilities and Hospitals, 2011, 2013, and 2015

Sampling weights were applied. Primary care facilities = community health stations, community health centers, township hospitals, and village/private clinics; hospitals = general hospitals, specialized hospitals, Chinese medicine hospitals. Source: Authors' calculations based on CHARLS 2011, 2013, and 2015.

older individuals increasingly choosing hospitals over primary care facilities for outpatient care over this period.

Table 2 presents logistic model results for the associations between the use of primary care facilities and supply-side factors. Odds ratios (ORs) are

reported. Column 1 shows that in urban areas, having access to more hospitals is negatively associated with using primary care facilities (OR = 0.08,  $P = 0.01$ ), though having access to more primary care facilities is not statistically associated with using primary care facilities (OR = 0.99,  $P = 0.78$ ).

**Table 2.** Logistic Model Regression Results for the Associations between Supply-Side Factors and Use of Primary Care Facilities

	Dependent Variable = Visiting Primary Care Facilities			
	Urban	Rural	Urban	Rural
Number of hospitals per 10,000 population	0.08*	0.05***		
	[0.01, 0.58]	[0.01, 0.19]		
Number of primary care institutions per 10,000 population	0.99	0.97*		
	[0.95, 1.04]	[0.94, 1.00]		
Number of doctors in hospitals per 1,000 population			0.23***	0.14***
			[0.15, 0.37]	[0.09, 0.23]
Number of doctors in primary health care facilities per 1,000 population			3.22**	0.80
			[1.37, 7.56]	[0.42, 1.53]
Number of village doctors in primary care institutions per 1,000 population				1.00
				[0.86, 1.16]
Year 2011 (reference)	–	–	–	–
Year 2013	1.03	0.82**	0.90	1.13
	[0.76, 1.39]	[0.71, 0.95]	[0.63, 1.28]	[0.91, 1.39]
Year 2015	0.78	0.79**	0.97	1.15
	[0.58, 1.03]	[0.68, 0.93]	[0.72, 1.32]	[0.88, 1.49]
<i>N</i>	4,063	6,533	4,063	6,533

Odds ratios are reported in cells; 95% confidence intervals are reported in square brackets. Sampling weights and robust standard errors were applied in all estimations.

\* $P < 0.05$ . \*\* $P < 0.01$ . \*\*\* $P < 0.001$ .

In Column 2 for the rural sample, more hospitals is also negatively associated with use of primary care facilities (OR = 0.05,  $P < 0.001$ ), and more primary care facilities is, in terms of magnitude, weakly associated with lower use of primary care facilities (OR = 0.97,  $P = 0.04$ ). Columns 3 and 4 examine the associations with densities of health care professionals. In urban areas, the density of licensed doctors working in hospitals is negatively associated with the use of primary care facilities (OR = 0.23,  $P < 0.001$ ), whereas the density of licensed doctors working in primary care facilities is positively associated with the use of primary care facilities (OR = 3.22,  $P = 0.01$ ). In rural areas, the density of licensed doctors working in hospitals is negatively associated with the use of primary care facilities (OR = 0.14,  $P < 0.001$ ), whereas the density of licensed doctors (OR = 0.80,  $P = 0.50$ ) and village doctors (OR = 1.00,  $P = 0.97$ ) are not statistically associated with the use of primary care facilities.

Finally, Table 3 reports the results from the logistic model regression on determinants of the use of primary health care facilities. Column 1 presents the results for urban areas. The most robust evidence is that better household economic situation, with log household expenditure as a proxy (see Supplemental Material for further details), is strongly associated with lower use of primary care facilities (OR = 0.65,  $P < 0.001$ ). In addition, there is evidence indicating that higher education and better insurance coverage are associated with lower use of primary care facilities. Compared to individuals with education below primary school, those educated at the primary school level are less likely to use primary care facilities (OR = 0.72,  $P < 0.05$ ). Compared to individuals covered under NCMS, those with UEBMI (OR = 0.55,  $P = 0.01$ ), URBMI (OR = 0.57,  $P = 0.02$ ), and other insurances (OR = 0.58,  $P = 0.02$ ) are less likely to use primary care facilities.

Column 2 presents the results for rural areas. Similar to urban areas, household economic situation is strongly associated with lower use of primary care facilities (OR = 0.79,  $P < 0.001$ ). Older age, chronic conditions, higher education, and better insurance coverage are associated with lower use of primary care facilities. Compared to individuals aged between 45 and 55, older people

**Table 3.** Logistic Model Results for the Associations between Demand-Side Factors and Use of Primary Care Facilities

	Dependent Variable = Visiting Primary Care Facilities	
	Urban	Rural
Female	1.17 [0.91, 1.50]	1.10 [0.96, 1.26]
Education below primary school (reference)	–	–
Education primary school	0.72* [0.53, 0.99]	0.90 [0.75, 1.07]
Education middle school	0.72 [0.50, 1.04]	0.74** [0.61, 0.91]
Education high school and above	0.70 [0.47, 1.03]	0.80 [0.60, 1.07]
Education missing	0.55* [0.33, 0.90]	0.77 [0.53, 1.10]
Log per capita household expenditure	0.64*** [0.55, 0.75]	0.79*** [0.73, 0.85]
Expenditure missing	0.02*** [0.01, 0.10]	0.12*** [0.06, 0.26]
Age 45–55 (reference)	–	–
Age 55–64	0.94 [0.71, 1.26]	0.97 [0.82, 1.13]
Age ≥65	0.95 [0.64, 1.40]	1.40*** [1.18, 1.67]
Chronic conditions	0.82 [0.62, 1.09]	0.81* [0.69, 0.96]
NCMS (reference)	–	–
UEBMI	0.55** [0.37, 0.84]	0.46*** [0.31, 0.68]
URBMI	0.57* [0.35, 0.92]	0.62 [0.33, 1.17]
Other insurances	0.58* [0.37, 0.92]	0.67* [0.45, 0.98]
No insurance	0.59 [0.32, 1.08]	0.79 [0.57, 1.07]
Year 2011 (reference)	–	–
Year 2013	1.25 [0.91, 1.73]	0.82* [0.70, 0.96]
Year 2015	0.83 [0.62, 1.10]	0.71*** [0.60, 0.84]
<i>N</i>	4,036	6,528
County fixed effects	Yes	Yes

Odds ratios are reported in cells; 95% confidence intervals are reported in square brackets. Sampling weights and robust standard errors were applied in all estimations. Twenty-seven observations from the urban sample and five from the county sample were dropped due to perfect prediction of county fixed effects.

\* $P < 0.05$ . \*\* $P < 0.01$ . \*\*\* $P < 0.001$ .

(aged 65 or above) are more likely to use primary care facilities (OR = 1.40,  $P < 0.001$ ). Those with chronic conditions are less likely to use primary care facilities (OR = 0.81,  $P = 0.01$ ). Compared to individuals covered under NCMS, those with UEBMI (OR = 0.46,  $P < 0.001$ ) and other insurances (OR = 0.67,  $P = 0.04$ ) are less likely to use primary care facilities.

## Discussion

### Interpretations

Relying on data from the latest CHARLS survey, the objective of this article was to analyze the main supply and demand side correlates associated with primary health care utilization among middle-aged and older Chinese patients. Building on the existing evidence from the field that suggests the existence of a rural–urban divide in the utilization of primary health care, the analysis was conducted on two separate subsamples: urban and rural populations.

There are a few important findings that stem from our analysis. First, the use of primary care facilities decreased in the period of our study between 2011 and 2015. This forms an interesting contrast with increased access and utilization of health care services along with the process of health insurance expansion.<sup>20</sup> On one hand, this is consistent with reduced health care costs for hospital visits because of health insurance expansion. In particular, expanded outpatient coverage in the benefit design plays a critical role.<sup>20–22</sup> On the other hand, this is also consistent with low patient trust in and low perceived quality of care in primary care institutions.<sup>15,23</sup> Improving quality of care and patient trust is a major challenge facing China's primary health care system. Fundamentally, these are issues that stem from uneven distribution of health care resources.

Second, we find that the density of primary care facilities did not account for this decline, but the increase in density of hospitals was associated with lower use of primary care facilities. From another perspective, higher density of licensed doctors working in hospitals was associated with lower use of primary care facilities. In urban areas, higher density of licensed doctors working in primary care facilities accounts for higher use of primary care facilities. In rural areas, we did not find that a higher density of licensed doctors or village doctors increased the use of primary care facilities.

Our findings on the supply-side factors are consistent with the hospital-centered system in China. Hospitals command more resources and attract better talents, whereas the rural health system features lower pay and less room for career development and is thus unable to attract and retain well-trained health care

professionals. Though primary health care facilities in China comprise 96% of all health care facilities, most health workers are allocated to hospitals.<sup>24</sup> For example, only 38% of licensed doctors and 21% of registered nurses work in primary care.<sup>9</sup> In particular, many village clinics are staffed with village doctors who do not have professional medical training. This is linked to a lack of patient trust in the primary care system. Health care staff working in primary health care are viewed as being poorly medically educated and therefore as providing inferior quality of care.<sup>25</sup> The interplay of the concentration of well-trained health care professional in hospital settings and the lack of trust from patients under a free-choice system where patients can bypass primary care facilities leads to underutilization of primary care facilities and overcrowded hospitals. Moreover, circumventing primary health care centers to seek outpatient care at hospitals perpetuates the vicious cycle of primary health care centers. To break this cycle, gaining and maintaining patient trust could be achieved by providing financial and career progression incentives for highly professionalized and well-trained medical staff to choose to practice in primary health care centers and be willing to stay in these centers in the long term.

In remote rural areas, the incentives may not be strong enough to attract and retain a well-trained health care workforce, and technology can provide a less costly and more sustainable solution. With recent rapid growth in telehealth and mobile health initiatives, such technology holds a promising future in China.<sup>26,27</sup> However, in its current form, such technology is still skewed toward use in urban areas. There is great potential for expanding these technologies to rural areas and reducing rural–urban disparities.

Third, we find evidence that demand-side factors also matter, in the sense that there are considerable differences along the lines of socioeconomic status and health care needs factors. In general, higher socioeconomic status and higher health care needs are associated with lower use of primary care facilities. This highlights the challenge of reducing socioeconomic disparities in health care. More resources inevitably mean higher costs for health care in hospital settings than in primary care settings. This results in heterogeneity in the use of primary care facilities from the demand side.<sup>21,28</sup> Individuals with



higher socioeconomic status and higher health care needs are more likely to seek care in hospital settings. This is the case even for outpatients who have chronic conditions (particularly in an urban context), a target group for primary care facilities. This finding is in line with a nascent strand of literature exploring the link between socioeconomic status and utilization of health care services in China. Studies using regional-level data show significant pro-rich inequity in health care utilization, with rich users more likely than poorer users to seek care at hospitals than clinics or health centers based on province-scale data.<sup>29</sup> This pro-rich inequity is at least in part attributed to differences in reimbursement rates for inpatient and outpatient services.<sup>29,30</sup> Along these lines, we also find that individuals covered by the more generous UEBMI are more likely to visit hospitals than those covered by the less generous and less extensive NCMS. Although reimbursement rates may be higher for primary care facilities than for hospitals,<sup>20</sup> stronger incentives are needed for outpatients, particularly in urban areas, to choose primary health care facilities over hospitals.

### Limitations

There are several limitations associated with our findings. First, given the nature of the data and our modeling techniques, we only establish an association between seeking outpatient care in primary health care centers and the determinants of utilization. Though this issue may be less severe for our demand-side analysis owing to the inclusion of county fixed effects, caveats are in order on the interpretation of results on the supply side. In particular, reverse causality between outpatient visits and health care resources is a concern. It is plausible that health planning policies direct resources toward areas where health needs and demand are high. However, at the provincial level, our data suggest that variations in health care resources are small across the three years that we examine; at the national level, resource distribution remains uneven.<sup>23</sup> For these reasons, we believe that reverse causality is unlikely a major driver of our results.

Second, due to data limitations, although we link external supply-side data to CHARLS, these supply-side characteristics do not capture the full picture of all supply-side features. For instance,

quality of care is not measured in our data. Further, the densities of health care resources are measured at the province level, with noise and potential bias. On the demand side, patient trust and satisfaction are not featured in our data set. Previous evidence suggests that these are important factors that determine utilization of health care services. Though we are unable to quantify how these omissions would bias the results, we can gauge the direction of bias based on theoretical arguments. On the supply side, it is reasonable to expect that quality of care tends to be higher in areas where resources are richer. Evidence suggests that quality of primary care is generally low in rural China.<sup>31</sup> On the demand side, patients trust hospitals more than primary care clinics; moreover, distrust in primary care clinics is stronger among patients with higher education.<sup>15</sup> These directions of correlation suggest that our results could pick up some effects driven by quality of care and patient trust in health care providers.

Third, we are unable to distinguish the differences in disease severity between outpatient visits to primary care institutions and hospitals. Because a large proportion of inpatient admissions are channeled through outpatient departments, these patients are likely in poorer health than those who choose to visit primary care institutions. But this alone is unlikely to explain the declining trends of visits to primary care institutions, unless the health of the population as a whole is deteriorating. Inefficient resource allocation remains a plausible explanation, such as specialists in large hospitals dealing with simple diseases.<sup>23</sup> Nevertheless, future research can benefit from more extensive and detailed data to further understand the driving forces behind the declining trends of visits to primary care institutions.

### Conclusions

Limitations notwithstanding, our findings point to valuable policy implications. First, simply building more primary care facilities is not the answer to a healthy and trusted primary care system. Staffing these facilities with well-trained health care professionals is the key. Providing the right incentives for young graduates to choose primary care as their specialization in primary care centers or strengthening the gatekeeping role of general practitioners could spur

increased utilization of primary health care. Technology such as telehealth and mobile health can provide a less costly and more sustainable alternative solution in remote areas where incentives may not be strong enough to attract and retain a well-trained health care workforce. Second, further understanding of the socioeconomic disparities in the use of hospitals versus primary care could provide a basis for incentivizing the wealthier classes to shift their health care utilization from hospitals to primary health care facilities. Third, strengthening service quality of rural primary care facilities is likely to benefit the less well-off in rural areas and contribute to improvements in health equity.

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## Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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## References

- Fang H. The Chinese health care system. In: Mossialos E, Djordjevic A, Osborn R, Sarnak D editors. *International profiles of health care systems: Australia, Canada, China, Denmark, England, France, Germany, India, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Singapore, Sweden, Switzerland, Taiwan, and the United States*. The Common Wealth Fund; 2017. p. 31–38. New York, NY.
- Zhang D, Unschuld PU. China's barefoot doctor: past, present, and future. *The Lancet*. 2008;372(9653):1865–67. doi:10.1016/S0140-6736(08)61355-0.
- Yip W, Hsiao WC. What drove the cycles of Chinese health system reforms? *Health Syst Reform*. 2015;1(1):52–61. doi:10.4161/23288604.2014.995005.
- Lawn JE, Rohde J, Rifkin S, Were M, Paul VK, Chopra M. Alma-Ata 30 years on: revolutionary, relevant, and time to revitalise. *Lancet*. 2008;372(9642):917–27. doi:10.1016/S0140-6736(08)61402-6.
- Rohde J, Cousens S, Chopra M, Tangcharoensathien V, Black R, Bhutta ZA, Lawn JE. 30 years after Alma-Ata: has primary health care worked in countries? *The Lancet*. 2008;372(9642):950–61. doi:10.1016/S0140-6736(08)61405-1.
- Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H, et al. The primary health-care system in China. *Lancet*. 2017;390(10112):2584–94. doi:10.1016/S0140-6736(17)33109-4.
- Liu Q, Wang B, Kong Y, Cheng KK. China's primary health-care reform. *The Lancet*. 2011;377(9783):2064–66. doi:10.1016/S0140-6736(11)60167-0.
- Ministry of Health of China. *China health statistical yearbook 2009*. Peking Union Medical College Publishing House; 2010. Beijing, China.
- National Health and Family Planning Commission of China. *China health and family planning statistical yearbook 2016*. Peking Union Medical College Publishing House; 2017. Beijing, China.
- Wu D, Lam TP. Underuse of primary care in China: the scale, causes, and solutions. *J Am Board Fam Med*. 2016;29(2):240–47. doi:10.3122/jabfm.2016.02.150159.
- Liu M, Zhang Q, Lu M, Kwon C-S, Quan H. Rural and urban disparity in health services utilization in China. *Med Care*. 2007;45(8):767–74. doi:10.1097/MLR.0b013e3180618b9a.
- Zhang X, Fang P. Job satisfaction of village doctors during the new healthcare reforms in China. *Aust Health Rev*. 2016;40(2):225–33. doi:10.1071/AH15205.
- Wen T, Zhang Y, Wang X, Tang G. Factors influencing turnover intention among primary care doctors: a cross-sectional study in Chongqing, China. *Hum Resour Health*. 2018;16(1):10. doi:10.1186/s12960-018-0274-z.
- Zhang P, Zhao L, Liang J, Qiao Y, He Q, Zhang L, Wang F, Liang Y. Societal determination of usefulness and utilization wishes of community health services: a population-based survey in Wuhan city, China. *Health Policy Plan*. 2015;30(10):1243–50. doi:10.1093/heapol/czw128.
- Duckett J, Hunt K, Munro N, Sutton M. Does distrust in providers affect health-care utilization in China? *Health Policy Plan*. 2016;31(8):1001–09. doi:10.1093/heapol/czw024.
- Zhao Y, Hu Y, Smith JP, Strauss J, Yang G. Cohort profile: the China health and retirement longitudinal study (CHARLS). *Int J Epidemiol*. 2014;43(1):61–68. doi:10.1093/ije/dys203.
- National Health and Family Planning Committee. *China health and family planning statistical yearbook 2012*. Peking Union Medical College Publishing House; 2012. Beijing, China.
- National Health and Family Planning Committee. *China health and family planning statistical yearbook 2014*. Peking Union Medical College Publishing House; 2014. Beijing, China.
- National Bureau of Statistics of China. *Guanyu tongji shang huafen chengxiang de guiding* [Definitions of urban and rural areas for statistics purposes]; National Bureau of Statistics of China. Published

- online 2006.[http://www.stats.gov.cn/statsinfo/auto2073/201310/t20131031\\_450613.html](http://www.stats.gov.cn/statsinfo/auto2073/201310/t20131031_450613.html)
20. Zhang A, Nikoloski Z, Mossialos E. Does health insurance reduce out-of-pocket expenditure? Heterogeneity among China's middle-aged and elderly. *Soc Sci Med*. 2017;190:11–19. doi:10.1016/j.socscimed.2017.08.005.
  21. Wang H, Liu Y, Zhu Y, Xue L, Dale M, Sipsma H, Bradley E. Health insurance benefit design and health-care utilization in Northern rural China. *PLoS One*. 2012;7(11):e50395. doi:10.1371/journal.pone.0050395.
  22. 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;16:176. doi:10.1186/s12939-017-0672-1
  23. Li H, Liu K, Gu J, Zhang Y, Qiao Y, Sun X. The development and impact of primary health care in China from 1949 to 2015: A focused review. *Int J Health Plann Manage*. 2017;32(3):339–50. doi:10.1002/hpm.2435.
  24. Zhang T, Xu Y, Ren J, Sun L, Liu C. Inequality in the distribution of health resources and health services in China: hospitals versus primary care institutions. *Int J Equity Health*. 2017;2017:16. doi:10.1186/s12939-017-0543-9
  25. Pan X, Dib HH, Wang X, Zhang H. Service utilization in community health centers in China: a comparison analysis with local hospitals. *BMC Health Serv Res*. 2006;6(1):93. doi:10.1186/1472-6963-6-93.
  26. Chen P, Xiao L, Gou Z, Xiang L, Zhang X, Feng P. Telehealth attitudes and use among medical professionals, medical students and patients in China: A cross-sectional survey. *Int J Med Inform*. 2017;108:13–21. doi:10.1016/j.ijmedinf.2017.09.009.
  27. Yang X, Kovarik CL. A systematic review of mobile health interventions in China: identifying gaps in care. *J Telemed Telecare*. Published online 2019 Jul 18;0(0). doi:10.1177/1357633X19856746.
  28. Dong X, Liu L, Cao S, Yang H, Song F, Yang C, Gong Y, Wang Y, Yin X, Xu X, et al. Focus on vulnerable populations and promoting equity in health service utilization—an analysis of visitor characteristics and service utilization of the Chinese community health service. *BMC Public Health*. 2014;14(1):503. doi:10.1186/1471-2458-14-503.
  29. Xu H, Short SE. Health insurance coverage rates in 9 provinces in China doubled from 1997 to 2006, with a dramatic rural upswing. *Health Aff*. 2011;30(12):2419–26. doi:10.1377/hlthaff.2010.1291.
  30. Flatø H, Zhang H. Inequity in level of healthcare utilization before and after universal health coverage reforms in China: evidence from household surveys in Sichuan Province. *Int J Equity Health*. 2016;2016:15. doi:10.1186/s12939-016-0385-x
  31. Shi Y, Yi H, Zhou H, Xue H, Rozelle S, Medina A, Sylvia S. The quality of primary care and correlates among grassroots providers in rural China: a cross-sectional standardised patient study. *The Lancet*. 2017;390:S16. doi:10.1016/S0140-6736(17)33154-9
  32. StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.
  33. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453–7. doi:10.1016/S0140-6736(07)61602-X.