


BMJ Open Public satisfaction with the healthcare system in China during 2013–2015: a cross-sectional survey of the associated factors

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ABSTRACT

Objective We explore how public satisfaction with the healthcare system in China varies with social and economic factors, especially regional variations and changes during 2013–2015.

Design Population-based, cross-sectional survey performed between July 2013 and July 2015.

Setting General population of China during 2013–2015.

Participants A total of 15 969 participants (women=49.4%, sample-weighted average age=51.9).

Primary outcome measure Public satisfaction with the healthcare system, defined as ‘being satisfied’ if a respondent’s satisfaction score is ≥ 70 points.

Results The 2-year mean of the satisfaction score of the sample is 68.5 out of 100 points and the score in 2015 is higher than 2013 by 3.5 points. Senior respondents (OR=1.19, $p<0.001$), rural respondents (OR=1.23, $p=0.009$) and those with higher socioeconomic status are more likely to report being satisfied. Internal migrants (OR=0.75, $p<0.001$) and those with a higher level of education are less likely to report being satisfied. Total health expenditure as percentage of gross domestic product and density of hospital beds have a significantly positive association with satisfaction (OR=1.13, $p<0.001$). Meanwhile, the government’s share in total healthcare expenditures has a moderately negative association with satisfaction (OR=0.97, $p<0.001$). In rural areas, the density of hospital beds has a positive association with satisfaction (OR=1.26, $p=0.002$). The Northeast region and Shanghai (OR=0.49, $p<0.001$; OR=0.71, $p=0.034$) are less likely to report being satisfied and this remained unchanged in 2015.

Conclusion There are considerable disparities in public satisfaction with the healthcare system in China, associated with demographic and socioeconomic characteristics, regional locations, urban–rural environment, and regional health resource abundance. Actions are recommended to improve satisfaction with the public healthcare system, especially in the Northeast region of China.

INTRODUCTION

Public satisfaction with healthcare systems measures the general population’s satisfaction. Unlike patient satisfaction, which

Strengths and limitations of this study

- Public satisfaction with healthcare systems has been considered one of the most coherent indicators of the general subjective evaluation of the healthcare system and effectiveness of the reform.
- This study analysed a national representative sample of more than 15 969 respondents from two waves of surveys during the ongoing healthcare reform.
- This study provides empirical evidence about the rural city disparity and the regional variations in healthcare satisfaction in China, which have not yet been well studied.
- The survey data set contains only one global satisfaction score, making it difficult to further attribute the satisfaction or dissatisfaction to specific reform actions or issues of the healthcare system.
- Public satisfaction may be biased by confounding factors such as media reports and political discussion, or citizens’ expectations.

focuses on those who directly use the healthcare services, public satisfaction has been considered one of the most coherent indicators of the general subjective evaluation of the healthcare system, as well as the acceptability and effectiveness of healthcare reform.^{1 2} A public satisfaction indicator has several advantages. First, it gathers information on satisfaction from the whole population, including both direct users and non-users of healthcare services. Second, it represents a mixture of citizens’ personal experiences with the healthcare system, beyond the provision of quality services.² It may also include the broader views of the social affairs in the country, social welfare culture and media portrayals of the healthcare system.^{3 4} Third, it may affect how the general population uses services and their trust in the system.⁵

In short, public satisfaction with a healthcare system has become integral to

cross-country and across-time comparisons of healthcare systems,^{3 4 6} as well as healthcare policy evaluations.^{4 7} During the past decade, studies about public satisfaction have received increasing attention, reflecting the shift towards a people-centred healthcare system and the emphasis on the responsiveness of the system.⁴

For decades the priority of the healthcare system in China has been set to meet basic survival needs, such as reducing mortality.^{8 9} Public satisfaction was not included in any official measurement in China. However, since China has achieved a rapid decline in mortality and an unprecedented increase in life expectancy over the past decade, the issue of public satisfaction in China, among many other aspects of the healthcare system, has received increased attention. The phenomenally intense physician–patient relationship has further fuelled interest in public satisfaction.^{8–10} This has led to the goal of people-centred integrated care as the focus of the transition to Healthy China 2030, the new healthcare reform programme.

Currently, there is only a small body of literature studying the public satisfaction of the healthcare system in China and its related factors.^{11–13} Most are only based on small survey samples at the province level.^{14 15} Some studies focus on public dissatisfaction with the integration reforms of health insurance schemes.¹⁶ To our knowledge, no prior studies have systematically examined the nationwide public satisfaction of the healthcare system on the second phase of the healthcare reform from 2013 to 2015.

Specifically, the objectives of this study are (1) to explore the basic factors (demographic, socioeconomic and public healthcare resources) associated with public satisfaction of the healthcare system in China; (2) to examine how public satisfaction with the healthcare system differs between the urban and rural residents, as well as in the major economic regions of China; and (3) to examine changes in public satisfaction with the healthcare system between 2013 and 2015.

Healthcare system and reform background for China

Institution background

The healthcare system in China is largely a public hospital-based delivery system under the administration of the National Health Commission of the People's Republic of China.¹⁷ In China, public hospitals provide more than 90% of healthcare services.⁹ A national accreditation system classifies hospitals into primary, secondary and tertiary levels according to characteristics such as the number of beds, professional healthcare force, diagnosis and treatment equipment, and operational area sizes.¹⁷ The basic health insurance coverage in China provided by three major national health insurance systems has increased significantly during the past decade and has reached 98% of the whole population in recent years.¹⁸

Existing issues and challenges

There has been a large volume of literature produced about the reform of China's healthcare system in the past decades.^{8 19–24} Due to the privatisation and market-oriented reform of the healthcare system in China during the 1980s and 1990s, by the first decade of the 2000s there were widespread complaints about unaffordable basic healthcare services and difficulties with basic healthcare access.^{24 25} The disparity in healthcare status had gradually increased across the country and has become a major public policy concern.²⁶ Meanwhile, due to the fast growth of the economy and residents' income, together with rapid urbanisation in China, there has been an increasingly unmet demand for healthcare services along with higher expectations for the quality and experience of the healthcare system.²⁷

The major issues with the system late in the first decade of the 2000s can be summarised as follows: (1) First is the rising healthcare costs and a high ratio of out-of-pocket expenditure. In 2013, the reimbursement rates for inpatient care were in the range of 50%–69%, according to a resident's health insurance type, which was based on the permanent residence registration system (rural or urban 'Hukou') and/or employment status.^{13 18} (2) There are large socioeconomic disparities and geographical inequities in healthcare source allocation and utilisation, especially between the urban and rural areas.⁹ (3) The financial incentive in the reimbursement of and fee-for-service payment models led to excessive treatment and overprescription.^{9 28} As a consequence, there has arisen a deep distrust of physicians by the public.^{8 10 27} (4) There are difficulties in healthcare access. Despite the financial incentive of the reimbursement of health insurance, no strict referral or gate-keeping system has been enforced in China yet. Patients are still free to self-refer to preferred hospitals regardless of the severity of their sickness.²⁷ As a result, almost all major hospitals in China are overdemanded and operate over their capacity. While a patients' clinic wait time could be as long as a full day, physicians were overloaded and could only ration a few minutes to meet with a patient for technical diagnosis assistance. This minimal physician–patient interaction was perceived by patients as poor service quality and further deteriorated the patient–physician relationship.⁹ Together with the deep mistrust and frustration on the part of the public, there had been rising numbers of violent incidents against healthcare professionals in the early 2000s.^{29–31}

2009 Healthcare Reform in China

In 2009, the Chinese government launched a new wave of healthcare reform actions as part of 'the 12th Five-Year Plan', aiming to establish a basic universal healthcare system of safe, effective and affordable service by 2020. To achieve this objective, the government set priorities for achievements in five major areas, namely (1) expanding public health insurance, (2) establishment of an Essential Drug System, (3) reforming public hospitals, (4)

providing primary healthcare service and (5) equity of public healthcare services.⁹

The healthcare reform was implemented in two sequential phases: (1) the first phase (2009–2012) aimed to reallocate resources to healthcare development, to expand the coverage of basic health insurance and to set up an Essential Drug System; and (2) the second phase (2013–2015) focused on reforming public hospitals, including the pricing models of healthcare services and prescription drugs.²⁴ To remove the financial incentives of over-prescribing, a zero mark-up drug policy was implemented among provincial public hospitals (the tertiary-level hospitals) during 2013–2015, after pilot tests in county hospitals in 2012.²⁴

The implementation of the healthcare reform has varied across provinces and regions in China.³² First, the governments of provinces and cities had the discretion to tailor the service level according to the availability of local fiscal budgets.⁹ Second, some reform actions were first experimented with as pilot projects in selected cities or provinces. For example, public hospitals in Beijing started diagnosis-related groups payment reform starting in 2011.^{9,33} One hundred pilot cities ran a zero mark-up drug policy from 2012 to 2015.

METHODS

Data source introduction

The Chinese General Social Survey (CGSS) aims to collect dynamic information about Chinese residents' life quality. It first included a single question about public satisfaction with the healthcare system in 2013, and then in 2015 included a set of detailed questions about public satisfaction regarding various aspects of public healthcare provision. The timing of these two surveys matched well with the agenda of the second phase of the 2009 Healthcare Reform, and thus has provided good opportunities to study how public satisfaction has changed after the implementation of the reform. These data are the latest available ones containing public satisfaction with the healthcare system in China. This study adopts the combined data sets from the two waves in 2013 and 2015.

Administered throughout all 31 provinces and municipalities in China, both waves of the CGSS surveys adopted the same multistage stratified sampling design. The primary sampling unit (PSU) is a county-level unit and there are 2762 PSUs in the sampling frame. In each wave, the CGSS sampled about 12000 households, and a Kish grid procedure was used to randomly select one adult respondent (18 years of age or older) from each household for a face-to-face inhome interview. Sampling weights were included to reflect the general population parameters of the survey year.

The final sample contains 15969 observations from the CGSS 2013 and 2015 combined, after deleting observations with important missing variables. There are only 5566 observations from the 2013 wave because the CGSS 2013 was designed to sample only about half of all

respondents to answer the public healthcare satisfaction survey.

Patient and public involvement

We discussed with physicians and government officials of public healthcare administration in China their viewpoint on public satisfaction with the healthcare system. We also discussed with them the results of this study.

No patients were directly involved in this study. No experimental designs were involved.

Dependent variable

Public satisfaction with the healthcare system

The measurement is based on a single question: 'Taking all aspects into consideration, what is your general satisfaction with the healthcare system?' Respondents were asked to assign a score between 0 and 100, with '0' representing totally unsatisfied and '100' for totally satisfied. As reported in [table 1](#), the average satisfaction score of the whole sample is 68.5. It is observed that the satisfaction scores of most responses concentrated on four integrals, such as 50, 60, 70 and 80 points. In Chinese culture, 60 points means 'Passing/neutral', 70 points means 'good, satisfied', and 80 points and above means 'very good, very satisfied'. Of the respondents, 40% reported a satisfaction score higher than 70 points.

For consistency with the literature,^{5,34} a dummy variable of 'being satisfied' was constructed, taking the value of '1' if a respondent's satisfaction score is greater than or equal to 70 points.³⁴

Independent variables

Demographic and socioeconomic characteristics

Control variables included gender (1=female), age group (1=those 60 years or older), minority ethnic group (1=yes), marital status (1=married/living together) and education level (a category variable). General physical health condition was measured by a single item: 'How do you evaluate your health condition overall?' Respondents rated this on a 5-point Likert scale (1=very unhealthy, 2=unhealthy, 3=so-so, 4=healthy and 5=very healthy). Socioeconomic information included living area (urban or rural), internal migrant status (1=yes), employment status (employed=1), primary health insurance status (1=yes) and basic pension status (1=yes). Household socioeconomic status was measured as 'below the average', 'middle class', 'middle-high' and 'high', according to the respondent's answer to a single item: 'How do you assess your relative economic condition in the society?'

Healthcare resources on an aggregated level

Key indicators of the public healthcare resources included total health expenditure as a percentage of gross domestic product (GDP), the government's percentage of total expenditure on healthcare, out-of-pocket percentage of individuals, the densities of the health workforce and hospital beds⁴ (per 1000 population) in rural and urban areas of each province, respectively.

Table 1 Descriptive statistics of the respondents in CGSS 2013–2015

	Total	2013	2015	χ^2
n	15 969*	5566	10 403	–
Satisfaction	68.50	66.21	69.73	–
Being satisfied (%)	60.08	52.91	63.93	–
Age				
Age (average years)	51.9	50.8	52.5	–
Age <60 (%)	63.4	66.4	61.8	32.34
Age ≥60 (%)	36.6	33.6	38.2	
Gender (%)				
Male	50.6	50.8	50.5	0.07
Female	49.4	49.2	49.5	
Ethnic group (%)				
Han	92.8	92.4	93.1	2.30
Ethnic minority	7.2	7.6	7.0	
Marital status (%)				
Single/separated/widow/widower	29.3	28.8	29.6	1.10
Cohabitation and married	70.7	71.2	70.4	
Employment status (%)				
Not working	43.1	39.8	44.9	38.86
Employed/farmer	56.9	60.3	55.1	
Education (%)				
Elementary school or less	37.8	36.2	38.7	10.71
Middle/high school	45.6	47.0	44.9	
College	15.5	15.8	15.3	
Postgraduate	1.1	1.1	1.1	
Self-reported health (%)				
Very bad	3.3	3.4	3.3	49.54
Bad	15.3	14.4	15.8	
Average	21.6	19.8	22.6	
Good	38.0	37.7	38.1	
Very good	21.8	24.7	20.3	
Self-reported household economic status (%)				
Far below average	6.0	5.7	6.2	37.26
Below average	32.2	30.2	33.3	
Average	53.7	57.0	52.0	
Above average	8.1	7.3	8.2	
Insurance status (%)				
Without any health insurance	10.2	11.3	9.6	10.90
With any health insurance	89.8	88.7	90.4	
Residence status (%)				
Urban	60.0	59.7	60.2	0.28
Rural	40.0	40.3	39.8	
Internal migrant (%)				
No	89.0	88.7	89.2	1.09
Yes	11.0	11.3	10.8	

Continued

Table 1 Continued

	Total	2013	2015	χ^2
Regions or municipalities (%)				
East China (without Shanghai)	23.2	23.6	23.1	37.28
Middle China	23.9	22.2	24.8	
West China (without Chongqing)	21.7	21.1	22.0	
Northeast China	14.2	14.9	13.8	
Beijing	5.1	4.7	5.3	
Shanghai	6.2	7.0	5.7	
Tianjin	3.2	3.7	3.0	
Chongqing	2.6	3.0	2.4	

*The total observation number is sample weight-adjusted.
CGSS, Chinese General Social Survey.

Year and region dummy variables

Dummy variables were included to identify the major economic regions in China (East, Central, West and Northeast regions) according to the official classification standard, as well as the municipalities (Beijing, Shanghai, Tianjin and Chongqing), which have relatively abundant healthcare resources and are also the pilot cities of some healthcare reforms. A dummy variable was included to identify the survey wave of year 2015.

Statistical analysis

The baseline model is a multivariate logistic regression model^{4 5 35 36} analysing the major factors associated with China residents' satisfaction with the healthcare system. The dependent variable was the dummy variable 'being satisfied' with the healthcare system. The independent variables included all demographic and socioeconomic characteristics on individual-level and healthcare resources variables aggregated on province level. Year and region dummy variables were included too.

In step 2, interaction terms of rural and healthcare resource variables were constructed to examine the rural disparities. An interaction term for the rural area and a year dummy for 2015 was also constructed to examine how the satisfaction in rural areas changed between the years 2013 and 2015.

In step 3, interaction terms of region dummies and year 2015 were adopted to examine the changes in the geographical variations over time. All regressions were conducted in STATA V.15, weight-adjusted, using the survey weights provided in the original data sets.

RESULTS

Descriptive statistics

Table 1 shows the demographic statistics of the participants, and table 2 shows a summary information of the healthcare resources in various regions of China. The total observation numbers are weight-adjusted, using the survey weights provided in the original data sets.

As reported in table 3, the mean satisfaction score of the sample is 68.5 out of 100 points. The scores in 2013 and 2015 are 66.2 and 69.7, respectively. Table 3B reports the percentage of respondents who scored above 70 points and are classified as 'being satisfied with the healthcare system'. This ratio was 52.9% in 2013, then 63.9% in 2015, suggesting that public satisfaction with the healthcare system in China had made general improvement during the study period.

Baseline analysis

Table 4 reports the logistic regression results of the demographic characteristics of the baseline analysis. Senior respondents (60 years or older) are significantly more likely, by 19 percentage points (OR=1.19, $p<0.001$), to report being satisfied with the healthcare system.

Respondents from rural areas on average are more likely to report being satisfied (OR=1.23, $p=0.009$). Those from ethnic minority groups, with basic health insurance,^{37 38} with better self-reported health or with higher self-rated socioeconomic status are at greater odds of reporting being satisfied. Meanwhile, internal migrants (OR=0.75, $p<0.001$) and those with a higher level of education¹³ are less likely to report being satisfied.

As for the association with province-level health resources and expenditures, higher total health expenditure as a percentage of GDP and density of hospital beds are significantly associated with a higher probability of reporting as being satisfied (OR=1.13, $p<0.001$). Meanwhile, the government's share in total healthcare expenditure has a moderately negative association with satisfaction (OR=0.97, $p<0.001$). Out-of-pocket percentage and the density of the healthcare workforce are insignificant.

Additionally, in year 2015, the respondents were on average more likely than in year 2013, by 51 percentage points, to report being satisfied.

Table 2 Descriptive statistics of the medical resource in CGSS 2013–2015

	Healthcare expenditure per cent in GDP		Government per cent in healthcare expenditure		Out of pocket (%)		Hospital beds/1000 population		Healthcare workforce/1000 population	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Total	5.48	5.47 to 5.49	29.45	29.4 to 29.51	33.12	33.06 to 33.19	6.05	6.01 to 6.08	2.84	2.82 to 2.85
East China (without Shanghai)	4.24	4.23 to 4.26	25.83	25.77 to 25.9	31.89	31.81 to 31.97	5.96	5.9 to 6.03	2.97	2.94 to 3.01
Middle China	5.45	5.44 to 5.46	32.84	32.77 to 32.92	36.87	36.78 to 36.96	5.82	5.75 to 5.89	2.36	2.33 to 2.39
West China (without Chongqing)	6.57	6.55 to 6.59	36.54	36.42 to 36.67	32.13	32.05 to 32.2	5.87	5.79 to 5.96	2.38	2.34 to 2.41
Northeast China	5.53	5.51 to 5.55	24.51	24.46 to 24.56	40.41	40.3 to 40.51	6.44	6.33 to 6.55	2.67	2.63 to 2.7
Beijing	7.21	7.19 to 7.24	25.43	25.35 to 25.51	20.45	20.34 to 20.56	7.48	7.36 to 7.61	5.6	5.53 to 5.66
Shanghai	5.59	5.58 to 5.6	20.79	20.76 to 20.83	20.22	20.17 to 20.27	6.89	6.74 to 7.04	4.27	4.26 to 4.27
Tianjin	3.97	3.95 to 3.99	25.86	25.81 to 25.91	34.2	34.03 to 34.37	5.36	5.23 to 5.48	3.15	3.12 to 3.18
Chongqing	5.64	5.62 to 5.65	31.23	31.2 to 31.26	32.22	31.9 to 32.54	4.26	4.21 to 4.31	1.58	1.55 to 1.6

CGSS, Chinese General Social Survey; GDP, gross domestic product.

Table 3 Descriptive statistics of satisfaction about the healthcare system in China (2013–2015)

(A) Satisfaction score about the healthcare system in China (2013–2015)

	Full sample		Subsample of year 2013		Subsample of year 2015	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Satisfaction	68.5	68.2 to 68.8	66.21	65.73 to 66.68	69.73	69.34 to 70.12
Age						
<60	67.43	67.06 to 67.8	65.4	64.82 to 65.97	68.6	68.11 to 69.08
≥60	70.35	69.83 to 70.88	67.81	66.93 to 68.68	71.56	70.91 to 72.21
Gender						
Male	68.16	67.72 to 68.61	66.07	65.38 to 66.76	69.29	68.72 to 69.86
Female	68.84	68.42 to 69.26	66.35	65.67 to 67.02	70.17	69.64 to 70.71
Ethnic group						
Han	68.28	67.97 to 68.6	65.94	65.44 to 66.44	69.53	69.13 to 69.94
Ethnic minority	71.26	70.19 to 72.34	69.42	67.69 to 71.16	72.35	70.97 to 73.72
Marital status						
Single/separated/widow/widower	68.07	67.4 to 68.74	65.73	64.68 to 66.79	69.3	68.44 to 70.15
Cohabitation/married	68.67	68.34 to 69	66.4	65.87 to 66.92	69.91	69.49 to 70.34
Employment status						
Not working	69.08	68.6 to 69.56	66.38	65.58 to 67.18	70.37	69.77 to 70.97
Employed/farmer	68.06	67.66 to 68.45	66.09	65.49 to 66.69	69.21	68.69 to 69.72
Education						
Elementary school or less	70.76	70.26 to 71.26	68.15	67.36 to 68.94	72.07	71.42 to 72.71
Middle/high school	67.53	67.08 to 67.99	65.5	64.8 to 66.2	68.68	68.09 to 69.27
College	66.36	65.64 to 67.09	64.32	63.12 to 65.52	67.5	66.6 to 68.39
Postgraduate	60.69	57.59 to 63.78	59.17	54.19 to 64.15	61.45	57.55 to 65.35
Self-reported health						
Very bad	66.39	64.15 to 68.63	65.68	62.24 to 69.12	66.79	63.88 to 69.7
Bad	68.28	67.43 to 69.13	65.61	64.23 to 66.99	69.59	68.52 to 70.66
Average	68.18	67.52 to 68.85	65.43	64.35 to 66.5	69.48	68.65 to 70.31
Good	68.62	68.15 to 69.1	66.31	65.58 to 67.05	69.85	69.25 to 70.46
Very good	69.07	68.43 to 69.7	67.09	66.11 to 68.06	70.36	69.53 to 71.19
Self-reported household economic status						
Far below average	65.26	63.57 to 66.95	62.69	59.63 to 65.74	66.51	64.49 to 68.53
Below average	67.16	66.59 to 67.73	65.19	64.26 to 66.12	68.12	67.39 to 68.84
Average	69.37	68.99 to 69.76	66.88	66.3 to 67.46	70.84	70.34 to 71.34
Above average	70.44	69.42 to 71.46	67.87	66.18 to 69.56	71.61	70.35 to 72.87
Insurance status						
Without any health insurance	65.9	64.85 to 66.94	64.36	62.86 to 65.87	66.86	65.45 to 68.27
With any health insurance	68.79	68.48 to 69.11	66.44	65.93 to 66.95	70.04	69.63 to 70.44
Residence status						
Urban	67.48	67.08 to 67.87	67.12	66.52 to 67.72	67.67	67.15 to 68.18
Rural	70.03	69.56 to 70.51	64.85	64.06 to 65.64	72.85	72.26 to 73.43
Internal migrant						
No	68.99	68.67 to 69.31	66.52	66.01 to 67.02	70.31	69.91 to 70.72
Yes	64.5	63.53 to 65.48	63.76	62.26 to 65.27	64.92	63.65 to 66.19
Regions or municipalities						
East China (without Shanghai)	68.32	67.74 to 68.91	67.26	66.29 to 68.23	68.91	68.16 to 69.66

Continued

Table 3 Continued

(A) Satisfaction score about the healthcare system in China (2013–2015)

	Full sample		Subsample of year 2013		Subsample of year 2015	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Middle China	70.53	69.98 to 71.08	66.73	65.84 to 67.62	72.35	71.67 to 73.04
West China (without Chongqing)	70.49	69.86 to 71.13	67.01	65.94 to 68.08	72.29	71.5 to 73.08
Northeast China	63.88	62.94 to 64.82	62.88	61.53 to 64.23	64.46	63.2 to 65.73
Beijing	66.1	64.58 to 67.62	63.75	61.7 to 65.8	67.22	65.23 to 69.21
Shanghai	64.33	62.91 to 65.75	62.61	60.4 to 64.83	65.45	63.63 to 67.27
Tianjin	68.84	67.31 to 70.36	70.6	69.05 to 72.14	67.66	65.36 to 69.97
Chongqing	73.94	72.46 to 75.41	71.67	69.04 to 74.3	75.45	73.73 to 77.17

(B) Being satisfied with the healthcare system in China (%)*

	Full sample		Subsample of year 2013		Subsample of year 2015	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Satisfaction	60.08	59.22 to 60.94	52.91	51.37 to 54.45	63.93	62.9 to 64.95
Age						
<60	57.58	56.53 to 58.63	51.41	49.6 to 53.23	61.13	59.85 to 62.42
≥60	64.41	62.91 to 65.92	55.86	52.99 to 58.74	68.46	66.72 to 70.19
Gender						
Male	59.56	58.3 to 60.81	53.09	50.91 to 55.27	63.04	61.52 to 64.56
Female	60.61	59.41 to 61.82	52.72	50.52 to 54.92	64.83	63.42 to 66.25
Ethnic group						
Han	59.7	58.8 to 60.59	52.37	50.77 to 53.97	63.6	62.53 to 64.68
Ethnic minority	65	61.9 to 68.1	52.37	53.89 to 65.03	68.25	64.6 to 71.91
Marital status						
Single/separated/widow/widower	60.02	58.12 to 61.91	52.19	48.8 to 55.59	64.1	61.86 to 66.35
Cohabitation/married	60.1	59.16 to 61.05	53.2	51.52 to 54.88	63.85	62.72 to 64.99
Employment status						
Not working	61.26	59.91 to 62.61	53.1	50.57 to 55.64	65.14	63.56 to 66.72
Employed/farmer	59.18	58.05 to 60.31	52.78	50.84 to 54.73	62.94	61.56 to 64.32
Education						
Elementary school or less	65.71	64.31 to 67.11	56.77	54.18 to 59.37	70.19	68.56 to 71.82
Middle/high school	57.56	56.28 to 58.84	51.27	49.05 to 53.49	61.1	59.55 to 62.65
College	54.58	52.32 to 56.84	49.45	45.51 to 53.4	57.43	54.69 to 60.16
Postgraduate	47.99	38.91 to 57.06	45.15	29.2 to 61.1	49.41	38.4 to 60.43
Self-reported health						
Very bad	55.1	49.94 to 60.26	50.43	41.14 to 59.72	57.69	51.56 to 63.82
Bad	58.02	55.69 to 60.35	48.76	44.51 to 53.01	62.56	59.82 to 65.31
Average	58.19	56.26 to 60.11	50.13	46.54 to 53.72	61.98	59.73 to 64.24
Good	61.59	60.21 to 62.97	53.78	51.31 to 56.25	65.75	64.1 to 67.39
Very good	61.52	59.7 to 63.33	56.57	53.55 to 59.58	64.75	62.5 to 67
Self-reported household economic status						
Far below average	53.21	49.24 to 57.18	46.27	39.02 to 53.52	56.59	51.89 to 61.29
Below average	56.57	54.99 to 58.14	48.96	46.1 to 51.82	60.26	58.39 to 62.14
Average	61.97	60.81 to 63.12	54.62	52.6 to 56.63	66.3	64.91 to 67.68
Above average	66.66	63.78 to 69.54	61.12	55.79 to 66.46	69.19	65.78 to 72.6

Continued

Table 3 Continued

(B) Being satisfied with the healthcare system in China (%)*

	Full sample		Subsample of year 2013		Subsample of year 2015	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Insurance status						
Without any health insurance	52.9	49.97 to 55.83	46.92	42.05 to 51.79	56.66	53.02 to 60.31
With any health insurance	60.9	59.99 to 61.8	53.67	52.05 to 55.3	64.7	63.63 to 65.78
Residence status						
Urban	57.67	56.55 to 58.79	54.84	52.9 to 56.78	59.18	57.81 to 60.55
Rural	63.69	62.35 to 65.04	50.05	47.54 to 52.55	71.1	69.57 to 72.62
Internal migrant						
No	61.43	60.53 to 62.33	53.6	51.99 to 55.21	65.62	64.54 to 66.69
Yes	49.1	46.22 to 51.98	47.54	42.45 to 52.63	49.98	46.5 to 53.46
Regions or municipalities						
East China (without Shanghai)	58.66	56.89 to 60.44	54.51	51.27 to 57.76	60.94	58.81 to 63.07
Middle China	66.38	64.73 to 68.03	55.28	52.19 to 58.37	71.7	69.78 to 73.61
West China (without Chongqing)	64.2	62.4 to 65.99	53.64	50.4 to 56.88	69.64	67.53 to 71.75
Northeast China	47.22	44.82 to 49.62	43.13	39.01 to 47.24	49.59	46.65 to 52.53
Beijing	53.34	49.38 to 57.29	51.63	45.13 to 58.14	54.15	49.25 to 59.05
Shanghai	52.52	48.53 to 56.52	45.36	38.83 to 51.9	57.2	52.34 to 62.07
Tianjin	65.34	60.7 to 69.97	66.85	60.04 to 73.66	64.33	58.1 to 70.55
Chongqing	74.93	70.11 to 79.74	68.61	59.69 to 77.53	79.12	73.77 to 84.48

*'Being satisfied' is a dummy variable, taking the value of '1' if a respondent's satisfaction score is greater than 70 points.

Rural disparities and changes

As reported in [table 5](#), in the rural area the density of hospital beds is positively associated with higher satisfaction (OR=1.26, p=0.002). The effect is even stronger than the main effect (OR=1.02, p=0.057) in [table 4](#). The density of the healthcare workforce in rural areas or the dummy variable rural area is not significant in this specification.

[Table 6](#) reports the changes in rural China during the period from 2013 to 2015. The coefficients of rural*2015 indicates that rural residents are more likely, by 57 percentage points, in 2015 to report being satisfied (OR=1.57, p<0.001). After including the interaction term of rural area and year 2015, the OR of the rural area is reduced 1.00 and totally insignificant, while year 2015 is still significant, although the absolute value of its coefficient became smaller.

Regional variations

As shown in [table 4](#), with East China as the baseline region, Middle and West China regions (OR=1.36, p=0.001; OR=1.28, p=0.019), together with Tianjin and Chongqing municipalities (OR=1.48, p=0.001; OR=2.03, p<0.001), are on average more likely to report being satisfied. On the other hand, the Northeast region and Shanghai (OR=0.49, p<0.001; OR=0.71, p=0.034) are less likely, by about 51–30 percentage points, respectively. Beijing is not significantly different from the East region.

After the interaction terms of year 2015 and regions are controlled, the results reported in [table 7](#) indicate that the differences in Middle and West China regions are no longer significant, but the differences in Tianjin, Chongqing, Shanghai and the Northeast region of China are robust and consistent.

Changes in 2015

The dummy variable year 2015 captures the average changes in public satisfaction. As reported in [tables 4 and 7](#), the ORs of year 2015 are 1.36 and 1.23, respectively, highly significant in both specifications.

In 2015, after controlling for the average year effect and region effects, respondents from the Middle (OR=1.60, p<0.001) and the West China (OR=1.44, p=0.002) regions are significantly more likely to report being satisfied than those from the base group of East China region. Meanwhile, there was no significant improvement in the Northeast region or Shanghai City, although respondents from these two regions tend to report being less satisfied.

DISCUSSION

Demographic and socioeconomic characteristics

The association relationships between the various demographic characteristics and the public satisfaction with the healthcare system found in this study are all consistent

Table 4 Baseline analysis of public satisfaction with the healthcare system in China (logistic regression)

Variables	OR	P value	95% CI
Demographic			
Age ≥60	1.19	<0.001	1.08 to 1.32
Female	1.03	0.513	0.95 to 1.11
Cohabitation and married	0.93	0.108	0.84 to 1.02
Han (ethnic minority)	1.28	0.001	1.11 to 1.49
Rural	1.23	0.009	1.05 to 1.44
Internal migrant	0.75	<0.001	0.66 to 0.85
Employed/farmer	0.97	0.452	0.89 to 1.06
With any health insurance	1.18	0.011	1.04 to 1.35
Education			
Elementary school or less	Ref		
Middle/high school	0.76	<0.001	0.69 to 0.83
College	0.65	<0.001	0.57 to 0.75
Postgraduate	0.55	0.002	0.37 to 0.8
Self-reported health			
Very bad	Ref		
Bad	1.04	0.721	0.82 to 1.32
Average	1.18	0.163	0.93 to 1.49
Good	1.45	0.002	1.15 to 1.83
Very good	1.61	0	1.27 to 2.04
Self-reported household economic status			
Far below average	Ref		
Below average	1.21	0.037	1.01 to 1.45
Average	1.59	<0.001	1.33 to 1.9
Above average	2.05	<0.001	1.64 to 2.55
Healthcare resource			
Healthcare expenditure per cent in GDP	1.13	<0.001	1.05 to 1.2
Government per cent in healthcare expenditure	0.97	<0.001	0.95 to 0.98
Out of pocket (%)	1	0.57	0.99 to 1.02
Hospital beds/1000 population	1.04	0.057	1.00 to 1.08
Healthcare workforce/1000 population	0.92	0.117	0.83 to 1.02
Region			
East China (without Shanghai)	Ref		
Middle China	1.36	0.001	1.14 to 1.62

Continued

Table 4 Continued

Variables	OR	P value	95% CI
West China (without Chongqing)	1.28	0.019	1.04 to 1.58
Northeast China	0.49	0	0.41 to 0.59
Beijing	0.83	0.342	0.56 to 1.22
Shanghai	0.71	0.034	0.52 to 0.98
Tianjin	1.48	0.001	1.17 to 1.86
Chongqing	2.03	<0.001	1.5 to 2.76
Year			
2013	Ref		
2015	1.51	<0.001	1.36 to 1.66
Constant	0.73	0.437	0.33 to 1.61
Observations	15 969		
R-squared	0.07		

Dependent variable: 'being satisfied'.

'Being satisfied' is a dummy variable, taking the value of '1' if a respondent's satisfaction score is greater than 70 points.

GDP, gross domestic product; ref, reference.

with existing literature. For example, seniors,^{13 39} those with better self-rated health³⁷ and those with higher socio-economic status⁴⁰ are more likely to report being satisfied.^{14 15} Those with a lower level of education¹³ and those in rural areas^{13 35} are more likely to report being satisfied too.¹⁵

This phenomenon may be explained by the role of the respondents' expectations.^{3 5 36} Residents with a lower level of education and in rural areas of China have had a lower level of expectation. In past decades, they only had very limited access to public healthcare resources

Table 5 Association between public satisfaction and the healthcare system and healthcare resources in rural China during 2013–2015 (logistic regression)

Variables	OR	P value	95% CI
Hospital beds/1000 population*rural	1.26	0.002	1.09 to 1.47
Healthcare workforce/1000 population*rural	0.96	0.545	0.84 to 1.09
Rural	1.12	0.243	0.93 to 1.34
Constant	0.24	0.001	0.1 to 0.54
Observations	15 969		

Dependent variable: 'Being Satisfied'.

The regression has controlled all other variables (including demographic, education, self-reported health, self-reported household economic status, healthcare resource, region and year) as listed in [table 4](#).

Table 6 Changes in public satisfaction with the healthcare system in rural China during 2013–2015 (logistic regression)

Variables	OR	P value	95% CI
Rural	1	0.982	0.83 to 1.2
Rural*year 2015	1.57	<0.001	1.3 to 1.9
Year 2015	1.24	0.001	1.09 to 1.41
Constant	0.92	0.845	0.42 to 2.05
Observations	15969		

Dependent variable: 'Being Satisfied'. The regression has controlled all other variables (including demographic, education, self-reported health, self-reported household economic status, healthcare resource, region and year) as listed in [table 4](#).

Table 7 Association between public satisfaction and the healthcare system and regions of China during 2013–2015 (logistic regression)

Variables	OR	P value	95% CI
Year 2015	1.23	0.022	1.03 to 1.46
East China (without Shanghai)	Ref		
Middle China	1	0.989	0.79 to 1.27
West China (without Chongqing)	0.99	0.955	0.76 to 1.29
Northeast China	0.46	<0.001	0.36 to 0.6
Beijing	0.83	0.437	0.52 to 1.32
Shanghai	0.62	0.065	0.38 to 1.03
Tianjin	1.72	0.004	1.2 to 2.49
Chongqing	1.67	0.036	1.03 to 2.69
Year 2015*East China (without Shanghai)	Ref		
Year 2015*Middle China	1.6	<0.001	1.27 to 2.02
Year 2015*West China (without Chongqing)	1.44	0.002	1.14 to 1.82
Year 2015*Northeast China	1.07	0.61	0.82 to 1.4
Year 2015*Beijing	0.93	0.715	0.64 to 1.35
Year 2015*Shanghai	1.18	0.469	0.76 to 1.83
Year 2015*Tianjin	0.77	0.289	0.48 to 1.24
Year 2015*Chongqing	1.3	0.366	0.74 to 2.3
Constant	0.93	0.862	0.42 to 2.06
Observations	15969		

Dependent variable: 'Being Satisfied'. The regression has controlled all other variables (including demographic, education, self-reported health, self-reported household economic status, healthcare resource, region and year) as listed in [table 4](#). ref, reference.

and social welfare. Also, they are usually unaware of their citizenship entitlements or patient rights.^{13 18 41}

Healthcare resources

Generally, a larger healthcare workforce and more resources are associated with a higher level of public satisfaction with the healthcare system.^{42 43} However, this study has mixed findings.

- ▶ There are positive associations between public satisfaction and the expenditure on healthcare as a percentage of GDP as well as the density of hospital beds. These findings are consistent with the general perception in the literature.^{4 34 42 43}
- ▶ A higher level of healthcare professionals in the population usually appears to increase overall patient satisfaction^{34 44 45}; however, the estimates of this factor are not statistically significant in this study. Actually, the higher quality of public hospitals in the developed regions of China has attracted patients from all over the country and is always overcrowded and experiencing overcapacity situations.⁹ Hence, the nominal healthcare professional density in the population may not reflect the actual healthcare resources accessible by the permanent residents in those areas.
- ▶ Generally, a lower out-of-pocket expense is preferred by the population.^{34 44} However, this study found no significant role from the ratio of out-of-pocket expenses. This study has found that there is a moderately negative association with the share of government expenditure on satisfaction with healthcare. This finding is different from those in European countries.^{4 34 45} There could be several potential explanations for this paradox. First, the negative association may reflect the shares of government expenditures in poorer regions, which have increased as a result of the healthcare reform in China. However, it takes a longer time and it is a challenging, systematic task to improve the public satisfaction with the healthcare system in those areas. Second, accessing preferred care is highly important to the satisfaction of some citizens,⁶ but healthcare choices are further limited when the government is taking a greater share of the expenditure. For example, with the implementation of the essential drug lists and zero mark-up drug policy in public hospitals in China, the availability of preferred therapies is limited.^{3 24} Third, there is also the possibility that some government expenditures on healthcare may have not been allocated appropriately or efficiently. For instance, the funding may have been allocated to sophisticated but unnecessary medical equipment. Future research should continue to explore and investigate this phenomenon.

Rural disparities

As reported in [table 5](#), the density of hospital beds in rural areas of China has a strong positive association with the satisfaction of respondents (OR=1.26, p=0.002), whereas the OR is only 1.04 (p=0.057) in the baseline model. This

phenomenon may be explained as follows. First, hospitalisation is often perceived in China as healthcare of better quality and with more experienced physicians. Second, hospitalisation is often preferred by many patients in China because inpatient service has a higher reimbursement ratio than outpatient service.^{18 27} Third, in rural areas of China, hospitalisation can be especially helpful, assuring patients access to quality medical care and alleviating the commuting needs from distantly located home places.⁴¹ Additionally, if admitted to hospitals, most rural residents have a lower opportunity cost in terms of time than urban residents, since they do not have an office-commuting requirement.

While the bed occupancy rate of tertiary hospitals in China could be as high as 107.5% on average due to temporarily added beds, it may be as low as 58.0% in township-level hospitals.⁴⁶ It is often difficult to get admitted to tertiary hospitals, or for shorter lengths of stay.¹⁷ When there is a higher density of hospital beds in rural areas, it may be easier for a patient to get admitted for hospitalisation.^{47–49} Therefore, rural residents with easy hospitalisation admission may perceive good quality healthcare at a low cost. Consequently, they may report high level of satisfaction.

As shown in table 6, the OR of rural*2015 is as large as 1.57 ($p<0.001$). This finding indicates a large and significant improvement in satisfaction with the healthcare system in rural areas. After controlling the changes in 2015, the OR of the rural area becomes insignificant, while the year dummy 2015 is still large and highly significant (OR=1.24, $p<0.001$). Together, these results suggest that the healthcare reform actions of China from 2013 to 2015 have brought significant improvements in healthcare satisfaction in rural areas.

Regional variations and changes in 2015

The regional differences in the healthcare system satisfaction may have reflected the inequality of healthcare resources and quality in China.⁵⁰ Beijing, Shanghai, Tianjin and Chongqing City, the four municipalities, are the most important central cities in China with the most advanced and abundant healthcare resources. Since they have also piloted many healthcare reform plans, it is not unexpected that there are no significant changes in public satisfaction with the healthcare system during the studied period.

The Middle and West regions are more likely to experience a significant and large improvement in healthcare satisfaction during the reform period of 2013–2015 because many of the reform policies were eventually implemented in these regions after piloting in the East region of China.

Shanghai's lower level of satisfaction may be due to the very crowded hospital environment and overstretched resources. As the most modernised city in China, Shanghai has the most skilled professionals and advanced medical equipment. However, due to the lack of a referral system, all tertiary hospitals in Shanghai are always in

high demand and crowded with patients from all over the country.¹⁷ Hence, local Shanghai residents actually do not have a good experience generally. This situation has not improved during this round of healthcare reform.

It is noted that the Northeast region consistently reported lower level of satisfaction and no significant improvements during the studied period. The low satisfaction actually can be attributed to the weak economy concurrently in this region. Known as China's rustbelt, the three northeastern provinces were plagued by widespread lay-offs in the 1990s and were among the regions with the weakest economic growth in 2010s.⁵¹ With a shrinking economy and fiscal deficits, the local governments had very limited resources available for healthcare and many local healthcare professionals migrated to other developed regions in the country.^{9 52} Additionally, poor economic performance may also directly affect the respondents' perception and lead to a lower rating of public policies, including the healthcare system.^{4 5} Additionally, Chen *et al*⁵³ reported that patients in the Northeast consistently had the highest mortalities in terms of overall stroke and each subtype of stroke. The researchers indicate that this may be mainly due to the differences in lifestyle and inconsistent medical development and a lower economic level.

Robustness check

As a robustness check, 'being satisfied' is redefined as scoring equal to or greater than 80 points. About 15% of the sample population scored their satisfaction equal to or greater than 80 points. Logistic regressions of the same model were performed accordingly.

Ordinary least square regressions were also performed, using the original 'satisfaction score' of respondents as the dependent variable.

The results of the robustness checks above are all consistent with our current findings.

Limitations

As a type of subjective evaluation, public satisfaction has several weaknesses when being adopted to measure the healthcare system's performance. First, the data in this study, especially the CGSS 2013, contain only one global satisfaction score. Therefore, it is difficult to attribute the satisfaction or dissatisfaction to specific reform actions or issues of the healthcare system.⁵ With the advancement in research and reform of the healthcare system in China, a data set with more detailed information may be available in more recent or future years. The Grey relational analysis method, as a novel quantitative method, can also be applied to obtain more detailed results to better understand the fuzzy/grey concept of satisfaction with the health system.^{54–56}

Second, while being related to the quality and outcome of healthcare service, public satisfaction may also be influenced by some external factors, such as media and political discussion,^{5 36} or citizens' expectations.^{54–57} Since these confounding factors are not included in the

original survey data and it is almost impossible to identify or recover them from other resources, the possibility of potential bias cannot be completely ruled out. While it will be interesting to study how media reports and portrayals about physicians and hospitals may influence the public's perception or satisfaction with the healthcare system in China, this topic actually is beyond our research scope and expertise. Third, self-reported health status is used as a health measurement in this study. It is generally valid, however not as ideal as clinical health measurements.

CONCLUSION

Using a total sample of 15 969 observations from Chinese national representative surveys, the CGSS 2013 and 2015, this study examined various factors associated with public satisfaction of the healthcare system in China, such as demographic and individual socioeconomic characteristics, rural areas and regions across the country, as well as the changes in public satisfaction in 2015.

While there was a nationwide general improvement in the satisfaction level recorded in year 2015, when the second phase of the 2009 Health Reform was implemented, the low level of satisfaction among internal migrants as well as those of residents in the Northeast region of China remained unchanged. Especially, close attention and further study about the causal reason for the low level of satisfaction in the Northeast region are recommended.

Contributors JHZ, XP and CL designed the study and developed the methods. JHZ, XP and HZ reviewed the literature. JHZ, XP and YC sorted and analysed the data. XP prepared the tables. JHZ and XP drafted the manuscript. CL, HZ and OOI provided critical review of the manuscript. All authors have reviewed and approved the final version of the manuscript for publication.

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Data availability statement Data are available in a public, open access repository. The Chinese General Social Survey (CGSS), a national representative continuous survey project available in China since 2003, is publicly downloadable at <http://www.cnsda.org/index.php>. Data on healthcare resources and expenditure at the provincial level were obtained from the China Public Health Statistical Yearbook 2013 and 2015, accessible through subscription-based databases (<http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2010090866>).

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