

RESEARCH

Open Access



# Utilization of community health care centers and family doctor contracts services among community residents: a community-based analysis in Shenzhen, China

Qingming Zheng<sup>1</sup>, Lu Shi<sup>2\*</sup>, Tiantian Pang<sup>3</sup> and Willie Leung<sup>4</sup>

## Abstract

**Background:** Family doctor contract services (FDCS) began in China in 2016. Shenzhen, one of the most developed cities in China, also implemented a family doctor (FD) policy in 2017. The objectives of this study were to identify the impact of awareness of FDCS and signing service contracts with FDs on utilization of community health care centers (CHCs).

**Methods:** Cross-sectional secondary data based on residents living in Luohu district was used for analysis. Descriptive analysis was conducted to identify utilization of CHCs by awareness of FDCS and signing service contracts with FDs, respectively. Linear probability models (LPM) were used to determine the association of utilization of CHCs with awareness of FDCS and signing service contracts with FDs, respectively.

**Results:** Among 1205 adults included in the analysis, 27% of the participants knew about the FDCS, 5% signed with FD, and 20% had chronic disease. Both awareness of the FDCS and signing service contracts with FDs significantly increased the probability of using CHCs as a first choice.

**Conclusions:** This study provided evidence that both awareness of FDCS and signing service contracts with FDs had a positive impact on utilization of primary health care services at the community level. More interventions to improve awareness of FDCS are needed to increase the utilization of primary health care services.

**Keywords:** Family doctor contract services, Family doctor, Andersen's Behavioral Model, Shenzhen, Awareness, Chronic disease, Community health care center

## Introduction

Even though the primary health care system was introduced to China in the 1980s, little attention was paid to establishing an effective primary health care system, such as training primary health care doctors. Due to the economic reforms in the early 1980s, the Chinese

government reduced public health care expenses and the market-oriented health care reforms caused an increased concentration of health care resources at higher-level health care facilities [1, 2]. The neglect of the primary health care system by the government caused discontent among the public [3]. Thus, in recent years, the Chinese government has been trying to strengthen the ability of the primary health care system to provide health care services [1].

These efforts to strengthen primary care are exemplified by the rise of community health care centers

\*Correspondence: shil@oregonstate.edu

<sup>2</sup> College of Public Health and Human Sciences, School of Social and Behavioral Health Sciences, Oregon State University, 2520 SW Campus Way, Corvallis, OR 97331, USA

Full list of author information is available at the end of the article



© The Author(s) 2021. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

(CHCs), the leading health care providers in the primary health care system in urban China [1]. Primary health care services provided by CHCs include 14 basic public health services, such as chronic disease management and vaccination [1, 4]. Increasing subsidies to primary health care institutions from \$2.8 billion in 2008 to \$20.3 billion in 2015 was one of the most critical health care reform policies related to CHCs [1]. The policy led to an increased number of CHCs from 24,000 in 2008 to 35,000 in 2018 [5].

With the implementation of primary health care, the concept of primary physicians also known as family doctors (FDs) or general practitioners (GPs) was introduced to Chinese society. Primary physicians are the primary health care professionals in CHCs. To strengthen the primary health care system within the community and CHCs, the Chinese government introduced family doctor contract services (FDCS) in 2009 and promoted these services to the general public in 2016 [6]. FDCS are health care services provided by signing service contract with FDs in the CHCs [7]. Signing service contract with FDs to use FDCS is voluntary. FDs working as a primary health care workforce and providing FDCS may be able to increase the utilization of CHCs.

According to previous study in Shanghai, signing service contracts with FDs and awareness of FDCS significantly increased the effectiveness of self-management in health [8]. Recently, more researchers have been interested in exploring factors associated with signing service contracts with FDs and awareness of FDCS [9, 10]. Other research has also suggested that chronic disease patients were more likely to sign service contracts with FDs [11]. Previous studies estimating the association between influencing factors and signing service contract with FDs, the relationship between influencing factors and awareness of FDCS, and satisfaction of FDCS have shown that FDCS played an important role in health care services in communities [9, 12, 13]. However, most of these studies or surveys were conducted in Shanghai [8, 9, 11, 13, 14], Guangzhou [10], and Zhejiang province [12], limited research regarding FDCS has been conducted in Shenzhen.

Shenzhen is a southeastern metropolis located in Guangdong, China, and China's first Special Economic Zone (SEZ), where it attracts millions of migrants to work, live, and study [15]. Luohu, a district in Shenzhen, was the first district in Shenzhen and in China to introduce the concept of health care group to manage the health care institutions [15]. The health care group is operated by one independent legal entity and its subsidiaries share responsibility for providing health care services [15]. Luohu health care group includes 6 district level hospitals, 23 CHCs, and 1 health care research

center [16]. With the introduction of health care group, CHCs in Shenzhen can efficiently aggregate health care resource to support community health [15]. It is important to note that not all health care services can be covered by the city's or province's health care funding. But there will be out-of-pocket expenditures by Chinese citizens utilizing health care services, including CHCs. However, usually, the reimbursement rate of health care is lower comparing to other health care institutions when received health care services at CHCs [17]. Further, regardless of insurance status, Chinese citizens have access to their local CHCs for health care services [17]. According to the Shenzhen Family Doctor Service Administrative Measures, CHCs can promote FDCS with professional FD teams, including GPs, public health physicians, pharmacies, etc. Under the management of health care group, community residents have easy access to professional FDs and can use FDCS from CHCs [15]. Thus, it is profoundly important to study the association of awareness of FDCS and signing service contracts with FDs with utilization of primary health care services in Shenzhen.

Andersen's Behavioral Model of Health Services Use provides a conceptual framework to identify factors associated with health care use [18]. We adapted the model to identify factors that affect CHCs utilization. According to the model, the utilization of CHCs is determined by three types of factors: predisposing, enabling, and needs. Predisposing factors are demographic characteristics, such as age, gender, education, and marital status. Enabling factors can be defined as insurance status, such as the availability of insurance. Need factors are the awareness of FDCS and signing service contracts with FDs.

The purpose of this study is to identify the impact of awareness of FDCS and signing service contracts with FDs on the probability of community residents choosing CHCs as their most frequently visited health care institutions. We hypothesized that community residents would be more likely to choose CHCs as their primary site for health care services if they were aware of FDCS or had signed service contracts with FDs.

## Methods

### Data and study population

Data were collected as part of the China Community Diagnosis Survey. The China Community Diagnosis Survey is a community health diagnosis program operated by the Centers for Disease Control and Prevention (CDC) of Shenzhen to track community health care needs in the Dongmen community within the Luohu district of Shenzhen, China, in 2019. As of 2019, Luohu district included 1.03 million residents [19]. The diversity of the Dongmen community fully represents the

residents of Luohu district, and partially represents the residents of Shenzhen. The objectives of the survey are to identify the community's health care problems, and to improve evidence-based health care promotion. Participants were community residents who lived in the districts for more than 6 months. Multistage cluster sampling was used to identify the sample of 1,205 residents. Seven sub-communities in the Dongmen community, Luohu district were selected. From these seven sub-communities, twenty-five clusters were randomly selected based on the community grid. A total of 925 households were interviewed face-to-face by trained investigators. If the selected household was not available, a nearby neighbor was chosen as a replacement, but the replacement rate was strictly controlled to within 5% of the total sample. A total of 2,086 individuals were interviewed, of which 1,205 residents between 18 and 59 years old were included in the study. All participants provided written informed consent before participated in the survey. This secondary data analysis was approved by the IRB of the corresponding author's institution.

## Variables

To identify the impact of awareness of FDSC and signing service contracts with FDs on utilization of CHCs, all variables utilized in this secondary analysis were from the China Community Diagnosis Survey in Luohu district. The outcome variable of utilization of CHCs as first choice was identified by the question "Which medical institutions do you frequently visit?" The response options included (1) private clinics, (2) CHCs, (3) secondary hospitals, and (4) tertiary hospitals. The response was recoded as binary variable into (1) CHCs and (2) Others. The independent variable of awareness of FDSC was based on the question, "Have you ever heard about FDSC?" The response options included (1) Yes and (2) No. The other independent variable of signing service contracts with FDs was measured by the question, "Did you sign a service contracts with a FD?". The response options included (1) Yes and (2) No.

Socio-demographic information included: *hukou* status (Shenzhen *hukou*, non-Shenzhen *hukou*), age (18–29, 30–39, 40–49, 50–59), gender (male, female), marital status (Yes or No), education (no education or primary school, middle school, high school, or professional college or university), employment status (Yes or No), and insurance status (Yes or No). *Hukou* is a household registration system in China [20]. The *hukou* system identified individuals as rural or urban residents. Chronic disease status was measured with the following questions: "Do you have hypertension?" (Yes or No); "Do you have diabetes?" (Yes or No); "Do you have any following disease? Stroke, chronic bronchitis, chronic hepatitis B,

hyperlipemia, cataract, osteoporosis, benign prostatic hyperplasia, cervical spondylopathy, chronic enteritis, chronic rhinitis, renal calculus, psychosis, benign tumors, malignant tumors, coronary disease, asthma, or other chronic disease?" (Yes or No). Participants' responses were classified as binary variable of having chronic diseases, if they reported yes to any of the above questions and not having any chronic disease if they reported no to all of the above questions.

## Statistical analysis

The relationships between utilization of CHCs as first choice and (1) the awareness of FDSC and (2) likelihood of signing service contracts with a FD were estimated using a chi-squared test and linear probability models (LPM) via ordinary least squares (OLS), respectively. LPM coefficients, reported as percentage change, directly estimated the change in magnitude and direction of probabilities of usage of CHCs. All regression models were adjusted for socio-demographic information, including age, marital status, education, gender, employment status, insurance status, and chronic disease status. Bootstrapped standard error was estimated. Alpha levels were set at 0.05. All analyses were conducted using Stata/SE 16 (StataCorp LP, College Station, TX).

## Results

A total of 1,205 adults were included in the analysis. Table 1 presents the characteristics of the sample by awareness of FDSC and signing service contracts with FDs. Approximately 26.8% of participants were aware of FDSC, but only 5.2% of participants confirmed that they had signed service contracts with FDs. Approximately 55.7% of participants who knew about FDSC selected CHCs as their first-choice health care institutions, compared to those who were not aware of the FDSC ( $p < 0.01$ ). Approximately 61.9% of participants who signed service contracts with FDs chose CHCs as their most frequent visited health care institutions, compared to those who did not sign service contracts with FDs ( $p < 0.01$ ).

The impact of awareness of FDSC on utilization of CHCs was estimated by LPM, as shown in Table 2. Our analysis found that participants who were aware of FDSC were 18.8% points ( $p < 0.001$ ) more likely to choose CHCs as their first choice of health care institutions compared to those who were not aware of FDSC. The analysis found that participants with insurance coverage were 18.4% points ( $p < 0.001$ ) more likely to choose CHCs as their first choice compared to uninsured participants. No statistically significant difference was found in other covariates. The analysis found a decreasing trend of selecting

**Table 1** Characteristics for utilization of CHCs by awareness of the FDCS and signing service contracts with FDs in Dongmen community, Luohu district, Shenzhen, China

| Variable                           | Awareness of FDCS |             | $\chi^2$ P-value | Signing service contracts with FDs |            | $\chi^2$ P-value |
|------------------------------------|-------------------|-------------|------------------|------------------------------------|------------|------------------|
|                                    | No, n (%)         | Yes, n (%)  |                  | No, n (%)                          | Yes, n (%) |                  |
| Total, n                           | 882 (73.20)       | 323 (26.80) |                  | 1142 (94.77)                       | 63 (5.23)  |                  |
| Utilization of CHCs                |                   |             |                  |                                    |            |                  |
| Others                             | 548 (62.13)       | 143 (44.27) | < 0.01           | 667 (58.41)                        | 24 (38.1)  | < 0.01           |
| CHCs                               | 334 (37.87)       | 180 (55.73) |                  | 475 (41.59)                        | 39 (61.9)  |                  |
| Hukou status                       |                   |             |                  |                                    |            |                  |
| Locals (Shenzhen hukou)            | 281 (31.86)       | 172 (53.25) | < 0.01           | 404 (35.38)                        | 49 (77.78) | < 0.01           |
| Migrants (non-Shenzhen hukou)      | 601 (68.14)       | 151 (46.75) |                  | 738 (64.62)                        | 14 (22.22) |                  |
| Age                                |                   |             |                  |                                    |            |                  |
| 18–29                              | 218 (24.72)       | 51 (15.79)  | < 0.01           | 262 (22.94)                        | 7 (11.11)  | < 0.01           |
| 30–39                              | 253 (28.68)       | 121 (37.46) |                  | 356 (31.17)                        | 18 (28.57) |                  |
| 40–49                              | 235 (26.64)       | 85 (26.32)  |                  | 305 (26.71)                        | 15 (23.81) |                  |
| 50–59                              | 176 (19.95)       | 66 (20.43)  |                  | 219 (19.18)                        | 23 (36.51) |                  |
| Gender                             |                   |             |                  |                                    |            |                  |
| Male                               | 414 (46.94)       | 134 (41.49) | 0.09             | 522 (45.71)                        | 26 (41.27) | 0.49             |
| Female                             | 468 (53.06)       | 189 (58.51) |                  | 620 (54.29)                        | 37 (58.73) |                  |
| Marriage                           |                   |             |                  |                                    |            |                  |
| No                                 | 234 (26.53)       | 48 (14.86)  | < 0.01           | 275 (24.08)                        | 7 (11.11)  | 0.02             |
| Yes                                | 648 (73.47)       | 275 (85.14) |                  | 867 (75.92)                        | 56 (88.89) |                  |
| Education                          |                   |             |                  |                                    |            |                  |
| No education or primary school     | 131 (14.85)       | 17 (5.26)   | < 0.01           | 147 (12.87)                        | 1 (1.59)   | < 0.01           |
| Middle school                      | 261 (29.59)       | 64 (19.81)  |                  | 314 (27.50)                        | 11 (17.46) |                  |
| High school                        | 245 (27.78)       | 99 (30.65)  |                  | 321 (28.11)                        | 23 (36.51) |                  |
| Professional college or university | 245 (27.78)       | 143 (44.27) |                  | 360 (31.52)                        | 28 (44.44) |                  |
| Employment status                  |                   |             |                  |                                    |            |                  |
| No                                 | 137 (15.53)       | 65 (20.12)  | 0.06             | 182 (15.94)                        | 20 (31.75) | < 0.01           |
| Yes                                | 745 (84.47)       | 258 (79.88) |                  | 960 (84.06)                        | 43 (68.25) |                  |
| Insurance status                   |                   |             |                  |                                    |            |                  |
| No                                 | 94 (10.66)        | 7 (2.17)    | < 0.01           | 101 (8.84)                         | 0 (0)      | 0.01             |
| Yes                                | 788 (89.34)       | 316 (97.83) |                  | 1041 (91.16)                       | 63 (100)   |                  |
| Chronic disease status             |                   |             |                  |                                    |            |                  |
| No                                 | 729 (82.65)       | 240 (74.30) | < 0.01           | 934 (81.79)                        | 35 (55.56) | < 0.01           |
| Yes                                | 153 (17.35)       | 83 (25.70)  |                  | 208 (18.21)                        | 28 (44.44) |                  |

Note. Data from Community Diagnosis Questionnaire, Luohu, Shenzhen (2019)

FD Family doctor, FDCS family doctor contract services, CHCs community health care centers

CHCs as first choice of health care institutions as education level increased.

The relationship between signing service contracts with FDs and utilization of CHCs was estimated by LPM, as shown in Table 3. The results of LPM showed that participants who signed service contracts with FDs were 22.1% points ( $p < 0.01$ ) more likely to choose CHCs as their first choice of health care institutions compared to those did not sign service contracts with FDs. The analysis found that participants with insurance coverage were 20.3% points ( $p < 0.001$ ) more likely

to choose CHCs as their first choice compared to uninsured participants.

## Discussion

The results of this study indicate a positive impact of the FD policy implementation among the communities in Shenzhen. Individuals were more likely to choose CHCs as their first choice of health care institutions, if they were aware of FDCS or had signed service contracts with FDs. Even though individuals in the communities are free to visit any type of health care institutions, they were

**Table 2** Linear probability models examine association between utilization of CHCs and awareness of the FDCS in Dongmen community, Luohu district, Shenzhen, China

|                                       |      | Utilization of CHCs                        |         |
|---------------------------------------|------|--|---------|
|                                       |      | Percentage point change (bootstrapped SE%) | p-value |
| Awareness of the FDCS                 |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 18.806 (3.273)                             | < 0.001 |
| <i>Hukou</i> status                   |      |  |         |
| Locals (Shenzhen <i>hukou</i> )       | Ref. |  |         |
| Migrants (non-Shenzhen <i>hukou</i> ) |      | 5.164 (3.553)                              | 0.146   |
| Age                                   |      |  |         |
| 18–29                                 | Ref. |  |         |
| 30–39                                 |      | 4.869 (4.661)                              | 0.296   |
| 40–49                                 |      | 7.492 (4.568)                              | 0.101   |
| 50–59                                 |      | 3.906 (5.780)                              | 0.499   |
| Gender                                |      |  |         |
| Male                                  | Ref. |  |         |
| Female                                |      | 1.316 (3.071)                              | 0.668   |
| Marriage                              |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 3.185 (4.100)                              | 0.437   |
| Education                             |      |  |         |
| No education or primary school        | Ref. |  |         |
| Middle school                         |      | 1.773 (5.150)                              | 0.731   |
| High school                           |      | -3.880 (5.559)                             | 0.485   |
| Professional college or university    |      | -10.040 (5.847)                            | 0.086   |
| Employment status                     |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | -1.106 (3.779)                             | 0.770   |
| Insurance status                      |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 18.428 (4.795)                             | < 0.001 |
| Chronic disease status                |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | -4.573 (3.574)                             | 0.201   |

Note. Data from Community Diagnosis Questionnaire, Luohu, Shenzhen (2019)  
 FD Family doctor, FDCS family doctor contract services, CHCs community health care centers

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 3** Linear probability models examine association between utilization of CHCs and signing service contracts with FDs in Dongmen community, Luohu district, Shenzhen, China

|                                       |      | Utilization of CHCs                        |         |
|---------------------------------------|------|--|---------|
|                                       |      | Percentage point change (bootstrapped SE%) | p-value |
| Signing service contracts with FDs    |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 22.128 (6.752)                             | 0.001   |
| <i>Hukou</i> status                   |      |  |         |
| Locals (Shenzhen <i>hukou</i> )       | Ref. |  |         |
| Migrants (non-Shenzhen <i>hukou</i> ) |      | 5.407 (3.718)                              | 0.146   |
| Age                                   |      |  |         |
| 18–29                                 | Ref. |  |         |
| 30–39                                 |      | 5.837 (4.611)                              | 0.206   |
| 40–49                                 |      | 7.679 (4.515)                              | 0.089   |
| 50–59                                 |      | 3.599 (5.723)                              | 0.529   |
| Gender                                |      |  |         |
| Male                                  | Ref. |  |         |
| Female                                |      | 2.194 (3.031)                              | 0.469   |
| Marriage                              |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 4.959 (4.101)                              | 0.227   |
| Education                             |      |  |         |
| No education or primary school        | Ref. |  |         |
| Middle school                         |      | 2.810 (5.143)                              | 0.585   |
| High school                           |      | -1.592 (5.518)                             | 0.773   |
| Professional college or university    |      | -6.571 (5.920)                             | 0.267   |
| Employment status                     |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | -1.031 (3.787)                             | 0.785   |
| Insurance status                      |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | 20.293 (4.876)                             | < 0.001 |
| Chronic disease status                |      |  |         |
| No                                    | Ref. |  |         |
| Yes                                   |      | -4.605 (3.610)                             | 0.202   |

Note. Data from Community Diagnosis Questionnaire, Luohu, Shenzhen (2019)  
 FD Family doctor, FDCS family doctor contract service, CHCs community health care centers

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

more willing to utilize CHCs compared to other health care institutions, which suggests that both awareness of FDCS and signing service contracts with FDs have a positive effect among residents in terms of the communities in utilizing CHCs.

The positive relationships between FDs and community residents showed that individuals living in Shenzhen were able to accept the FDCS, which was consistent with results from previous studies conducted in other cities [9, 10, 12, 14]. On the other hand, this also shows that there is still much room to improve



the awareness rate of FDCS among residents in Shenzhen. The improving awareness rate about FDCS can have positive impact on utilization of CHCs.

With the publication of “Healthy China 2030” in 2016, it was suggested that FDCS should play an important role in achieving the goal of Healthy China 2030, such as improving population health by changing lifestyles [21]. As FDs were designed to serve community residents, FDs should become a supportive mechanism in primary health care. In 2016, the National Healthcare Security Administration released a new guideline to promote community residents’ willingness to visit and sign service contracts with FDs [22]. According to the guideline, in 2017, the service contracts signing rate with FDs should reach 30% for the general population and 60% for the population in special needs, such as elderlies, patients with chronic diseases. The guideline also suggested that by 2020, FDCS coverage should reach 100% of the general population.

Compared to other cities, only 26.8% of participants in Shenzhen were aware of FD services. Additionally, only 5.2% of participants confirmed that they had signed service contracts with FDs in Shenzhen as of 2019. Compared to the contracts rate targets set by the National Healthcare Security Administration, which were 30% by 2017 and 100% by 2020, contracting with FDs in Shenzhen communities was far from meeting the target contracts rate [22]. Compared to Shenzhen, the signing rate was much higher in other comparable cities, such as the nearby cities of Guangzhou and Shanghai, with the contracts rate ranging from 14.4 to 65.3% [8–10, 14, 23]. These differences have a number of possible explanations. First, the lower service contracts signing rate in Shenzhen may be explained by the high migration rate. According to the Shenzhen Statistical Yearbook, in 2019, only 35% of the population in Shenzhen had Shenzhen *hukou* registration status [19]. Most of the population in Shenzhen were not permanent residents of the city, especially migrant workers who often moved to other cities in pursuit of other opportunities. The high migration rate may contribute to the low contracts rate with FDs, because the purpose and objective of FDs are to build up stable and consistent relationships with communities’ residents regarding health-related behaviors. Second, the short implementation time of FD policy may have led to a low service contracts signage rate with FDs. The FD policy was introduced at the end of 2017, in November. Most of the population might not have had a chance to become familiar with or be informed about the new policy of FDCS. Compared to Shanghai, Shenzhen also has a shorter history of FDCS. Shanghai was the first city to pilot FDCS in 2013 [7, 9]. Third, previous studies recruited study populations from CHCs, whereas

our study population were recruited randomly from communities, which may better represent the usage of CHCs among the general population. Last, it is possible that residents in the community might have signed service contracts with FDs by their employers or insurance plans but unable to identify or confirm the exact FDs with whom they have signed.

An interesting finding was the great impact of education on choosing CHCs as first choice. Specifically, the probability of choosing CHCs as first choice decreased with education level. This may be largely explained by the trust of primary health care institutions and social media usage. Individuals with higher education level are more likely to absorb information from different mediums, such as social media [24]. It is possible that residents can receive different perspectives of information from various sources, both in-person or online. One of the perspective could be residents do not trust primary health care providers [1]. Other perspective could be residents with higher education levels have more resources to become aware of the FDCS and FD policy implementation. However, this study cannot determine the reasons and the causations for the decreasing trends of residents with higher education selecting CHCs as their first choice.

Even though the FD policy has only been implemented for a short period in Shenzhen, there is a need to further increase awareness of FDs and likelihood of signing service contracts with FDs. FDs should have the availability and the capacity to serve as health promoters in the communities. To serve as health promoters, FDs should play the following roles: (1) building relationships with local community members, (2) increasing personal medical skills, and (3) increasing the acknowledgement of the health promotion role of CHCs [15, 22]. The key concept is to build trust between FDs and community residents through providing home health care services to the community residents first. FDs cannot simply stay in the CHCs and wait for patients, instead, they should initiate contact with community residents. They can provide drop-in visits for some residents, such as individuals with chronic disease, individuals with disability, and the elderly. Social interaction is important to attract individuals to sign service contracts with FDs. Also, it is important to build up a consistent training environment. The distrust of primary care was mainly caused by the health care quality provided by GPs [1]. FDs should be trained consistently via either self-training or government-provided health care training. The impact of the FDCS will increase with the constant professional development of FDs. To expand the publicity of FD, social media should be used to advertise FDCS, such as using Weibo, Wechat, television, and newspaper. Diverse methods of health

education and advertising should be implemented to promote the efficiency and advantages of FDSCs.

Due to the special health care group operation in Shenzhen, to the authors knowledge, this is one of the few studies identifying the impacts of awareness of FDSC on utilization of CHCs, and signing service contracts with FDs on utilization of CHCs. But this study is not without limitations. First, this study was a cross-sectional study with a focus on one district in Shenzhen. The data was collected through a self-reporting survey, self-reporting, recall, and social bias may exist, such as the variable of chronic disease status. Also, this survey was targeting on the health care needs in the community. It might not be able to capture all perspectives of FDSC and FD in Shenzhen. Lastly, this study only concentrated on Dongmen community, Luohu District, which may limit the generalizability of the study. Even though Dongmen community can represent in Luohu district but it may only partially represent Shenzhen. To fully investigate the contracted rate in Shenzhen, further studies need to be conducted on a larger scale.

## Conclusions

Even though the rates of FDSC awareness and signing service contracts with FDs were relatively low in Luohu, Shenzhen, they both have positive impacts on the utilization of CHCs. The results of this study confirm the positive impact of FDs on utilization of CHCs, aligned with previous studies. With the environment of policy implementation in primary health care, populations are gradually transforming their health care seeking behaviors. Community residents are more willing to utilize primary health care institutions, such as CHCs, as their first choice of health care institutes. Ultimately, it is also important for local government and society to make joint efforts to improve the medical services in the primary health care system, such as expanding public acceptance, improving health care quality for primary health care, and building up trust between community residents and FDs.

## Abbreviations

CHCs: Community health care centers; CDC: Centers for Disease Control and Prevention; FDSCs: Family doctor contract services; FD: Family doctor; GP: General physician; LPM: Linear probability models; OLS: Ordinary least squares; SEZ: Special Economic Zone.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12875-021-01444-6>.

Additional file 1

## Acknowledgements

We are grateful to the Luohu Center for Disease Control and Prevention, Shenzhen, Guangdong, China for providing us the raw data from the Luohu Community Diagnosis Program.

## Authors' contributions

LS conceived the paper. QMZ led the systematic review and data analysis under LS direction. TTP and WL participated in the systematic review and data analysis. LS and QMZ wrote this paper. TTP and WL reviewed the paper. All authors read and approved the final manuscript.

## Funding

There was no funding utilized for this research.

## Availability of data and materials

The datasets generated during the current study are not publicly available due to the ownership belong of this dataset belong to Luohu Center for Disease Control and Prevention, Shenzhen, Guangdong, China. The datasets used and/or analyzed during the current study available from the Luohu Center for Disease Control and Prevention, Shenzhen, Guangdong, China on reasonable request.

## Declarations

### Ethics approval and consent to participate

All participants provided a written informed consent before participated in the survey collected by the Luohu Center for Disease Control and Prevention. All methods associated with the survey and data analyses in this study were in accordance with the relevant guidelines and regulations. This secondary data analysis was reviewed by the Oregon State University's IRB and determined the study did not involve human subjects under the regulations set forth by the Department of Health and Human Services 45 CFR 46.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no conflict of interest.

### Author details

<sup>1</sup>Luohu Center for Disease Control and Prevention, Shenzhen, Guangdong, China. <sup>2</sup>College of Public Health and Human Sciences, School of Social and Behavioral Health Sciences, Oregon State University, 2520 SW Campus Way, Corvallis, OR 97331, USA. <sup>3</sup>College of Public Health, University of South Florida, Tampa, FL, USA. <sup>4</sup>College of Public Health and Human Sciences, School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR, USA.

Received: 29 November 2020 Accepted: 23 April 2021

Published online: 24 May 2021

## References

- Li X, Lu J, Hu S, Cheng K, De Maeseneer J, Meng Q, et al. The primary health-care system in China. *The Lancet*. 2017;390(10112):2584–94.
- Zhao Y, Lin J, Qiu Y, Yang Q, Wang X, Shang X, et al. Demand and signing of general practitioner contract service among the urban elderly: a population-based analysis in Zhejiang Province, China. *International Journal of Environmental Research and Public Health*. 2017;14(4):356.
- Wu D, Lam TP. At a crossroads: Family medicine education in China. *Acad Med*. 2017;92(2):185–91.
- China NHCoTPsRo. Circular on the work of the national basic public health service project in 2019 2019 [Available from: <http://www.nhc.gov.cn/jws/s7881/201909/83012210b4564f26a163408599072379.shtml>].
- National Bureau of Statistics. China Statistical Yearbook 2019 2019 [Available from: <http://www.stats.gov.cn/tjsj/ndsj/2019/indexch.htm>].
- National Health Commission of the People's Republic of China. Guidance on promoting general practitioners' contract service 2016 [Available

- from: <http://www.nhc.gov.cn/cms-search/xxgk/getManuscriptXxgk.htm?id=e3e7d2670a8b4163b1fe8e409c7887af>.
7. Shenzhen Government. Shenzhen Family Doctor Service Management Methods 2017 [Available from: [http://www.sz.gov.cn/zfgb/2017/gb1029/content/post\\_4945557.html](http://www.sz.gov.cn/zfgb/2017/gb1029/content/post_4945557.html)].
  8. Huang J, Zhang T, Wang L, Guo D, Liu S, Lu W, et al. The effect of family doctor–contracted services on noncommunicable disease self-management in Shanghai, China. *Int J Health Plan Manag*. 2019;34(3):935–46.
  9. Huang J, Liu S, He R, Fang S, Lu W, Wu J, et al. Factors associated with residents' contract behavior with family doctors in community health service centers: A longitudinal survey from China. *PLoS One*. 2018;13(11):e0208200.
  10. Liu Z, Tan Y, Liang H, Gu Y, Wang X, Hao Y, et al. Factors influencing residents' willingness to contract with general practitioners in Guangzhou, China, during the GP policy trial phase: A cross-sectional study based on Andersen's behavioral model of health services use. *Inquiry*. 2019;56:0046958019845484.
  11. Huang J, Lu W, Wang L, Zhang T, Liu C, Liu S, et al. A preliminary effect analysis of family doctor and medical insurance payment coordination reform in Changning District of Shanghai, China. *BMC Fam Pract*. 2019;20(1):60.
  12. Shang X, Huang Y, Li Be, Yang Q, Zhao Y, Wang W, et al. Residents' Awareness of Family Doctor Contract Services, Status of Contract with a Family Doctor, and Contract Service Needs in Zhejiang Province, China: A Cross-Sectional Study. *Int J Environ Res Publ Health*. 2019;16(18):3312.
  13. Xie C-y, Hu S-l, He J-j. Thoughts and Suggestions of Family Doctor Services Based on Field Observation. *Chin Gen Pract*. 2012;2012(31):11.
  14. Yuan L, Zhou C, Jiang P, Xu L, Zhang Q, Xu B. Community residents' demand for family physician service in Changning District, Shanghai (Chinese). *Chin Gen Pract*. 2014;17(32):3860–4.
  15. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseeneer J, Meng Q, et al. Quality of primary health care in China: challenges and recommendations. *The Lancet*. 2020;395(10239):1802–12.
  16. Shenzhen Luohu Service. Health Care Reform in Luohu District 2021 [Available from: [http://www.szlh.gov.cn/ggfw/mssstz/lhylzt/shglyyzzhgg/yglc/content/post\\_8549675.html](http://www.szlh.gov.cn/ggfw/mssstz/lhylzt/shglyyzzhgg/yglc/content/post_8549675.html)].
  17. General Office of the People's Government of Shenzhen Municipality. The Measures on Medical Insurance of Employees of Shenzhen 2013 [Available from: [http://www.sz.gov.cn/zfgb/2013/gb857/content/post\\_4948076.html](http://www.sz.gov.cn/zfgb/2013/gb857/content/post_4948076.html)].
  18. Andersen RM. National health surveys and the behavioral model of health services use. *Medical care*. 2008;647 – 53.
  19. Municipality SBoS. Shenzhen Statistical Yearbook 2019 [Available from: <http://tjj.sz.gov.cn/attachment/0/695/695422/7971762.pdf>].
  20. Song Y. What should economists know about the current Chinese hukou system? *China Economic Review*. 2014;29:200–12.
  21. the State Council of the People's Republic of China. Healthy China 2030 2016 [Available from: [http://www.gov.cn/zhengce/2016-10/25/content\\_5124174.htm](http://www.gov.cn/zhengce/2016-10/25/content_5124174.htm)].
  22. National Healthcare Security Administration. Notice on Promoting Guidance for Family Doctor Contracted Services 2016 [Available from: [http://www.mohrss.gov.cn/SYrlzyshbzb/shehuibaozhang/zcwj/yiliao/201606/t20160615\\_241854.html](http://www.mohrss.gov.cn/SYrlzyshbzb/shehuibaozhang/zcwj/yiliao/201606/t20160615_241854.html)].
  23. Huang J, Liang H, Zhang W, Zhang J, Wang c, Chen X, et al. Influencing factor analysis of signing a contract with a family doctor among residents in Hongkou district (Chinese). *Chin Gen Pract*. 2019;22(6):687–91.
  24. Perrin A. Social media usage. *Pew research center*. 2015:52–68.

### Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more [biomedcentral.com/submissions](https://biomedcentral.com/submissions)

