



Current situation of family doctor contracting program: A survey of the perspective of general practitioners[☆]



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ABSTRACT

Background: Research on family doctor contract services has predominantly focused on residents, with limited attention to the general practitioners (GPs) regarding the current situation of family doctor team contracting.

Objective: This study aims to assess the current status of family doctor contract services in primary health care facilities in Guangdong Province from the GPs' perspective and to identify factors influencing the number of people contracting with family doctor teams.

Methods: A multi-stage stratified cluster sampling method was used to select GPs from primary health care facilities in Guangdong Province from July 5 to July 31, 2021. A self-developed survey questionnaire was used to collect data. The number of people contracted with family doctor teams under different characteristics of GPs and their teams was compared, and a two-level Logistic regression model was developed using R 4.2.2 software to determine the factors that influence whether enrollment numbers in family doctor teams exceed 2,000.

Results: A total of 3,252 valid responses were collected from family doctor teams with a contracting count above 100. In 2020, the median number of contracts per family doctor team, as reported by GPs, was 1,400 (IQR = 2,499). Comparisons of the number of people contracted with family doctor teams among GPs of different genders, ages, educational levels, managerial positions, employment forms, years of professional experience, working facilities, practicing regions, training received, and annual income showed statistically significant differences ($P < 0.05$). Variables including the number of team members, the population under jurisdiction, the intention for specialist doctors within the health group to join the team, the availability of hospital beds, and guidance from higher-level hospitals also exhibited significant variations ($P < 0.05$). Zero model fitting results highlighted that the distribution of contracted individuals was regionally clustered among the practicing regions of GPs ($P < 0.05$). The comprehensive analysis using a two-level Logistic regression model revealed several key findings: GPs holding a college diploma [OR (95 %CI) = 2.79 (1.84, 3.74)] or a vocational school/high school certificate [OR (95 %CI) = 2.83 (1.80, 3.86)] were more likely to manage teams with over 2,000 contracted individuals, compared to those with a master's degree or higher. GPs in managerial positions were less likely [OR (95 %CI) = 0.66 (0.33, 0.99)] to oversee teams exceeding 2,000 contracted individuals, in contrast to those without any managerial role. Formal employment status was associated with a higher likelihood [OR (95 %CI) = 2.02 (1.53, 2.51)] of managing larger numbers of contracted individuals compared to temporary employment. Team size showed a positive correlation with contracting capacity; teams with 4–6 members [OR (95 %CI) = 1.31 (1.05, 1.57)], 7–10 members [OR (95 %CI) = 2.06 (1.75, 2.37)], 11–19 members [OR (95 %CI) = 3.67 (3.31, 4.03)], and ≥ 20 members [OR (95 %CI) = 3.46 (2.74, 4.18)] were increasingly likely to surpass 2,000 contracted individuals. Teams managing larger populations—2,001–9,999 [OR (95 %CI) = 2.37 (2.12, 2.62)], 10,000–29,999 [OR (95 %CI) = 2.92 (2.65, 3.19)], and $\geq 30,000$ [OR (95 %CI) = 2.86 (2.55, 3.17)]—were more likely to exceed 2,000 contracts compared to those managing $\leq 2,000$ people. The absence of hospital bed resources within a team was positively associated [OR (95 %CI) = 1.38 (1.14, 1.62)] with surpassing the 2,000 contracted individuals threshold.

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Conclusion: The study findings suggest that a larger family doctor team size and larger population size of jurisdiction positively impact the capacity for contracting with family doctor teams. GPs with higher educational levels, managerial roles, and access to hospital bed resources possess a more profound understanding and control over family doctor contract service policies, leading to optimized management of contracted individuals. Compared to their temporarily employed counterparts, formally employed GPs within family doctor teams are more likely to engage in contracting activities.

Introduction

In China, general practitioners (GPs), commonly referred to as family doctors, primarily provide comprehensive, continuous, effective, timely, and personalized primary care.¹ The presence of an adequate number of family doctors is essential for the successful implementation of family doctor contract services. To expand the resource of potential family doctor teams, the "Guidance on Promoting the High-Quality Development of Family Doctor Contract Services" (issued by department of primary health care, national health commission in 2022) states that GPs, other types of clinical physicians (including traditional Chinese medicine) practicing in medical institutions, rural doctors, and retired clinical physicians to serve as family doctors. Practices in family doctor services show that the family doctor system is beneficial for guiding residents to choose primary health care facilities for initial visit, optimizing the using of medical resources, and improving the health of residents.² In China, family doctors have the flexibility to be the contracting party independently or to offer contracted services by forming teams. While there are multiple researches on the implementation of family doctor contract services from the residents' perspective, studies focusing on the current state of family doctor team contracting based on GPs' viewpoint are limited. This study aims to examine the status of family doctor team contracting in Guangdong Province, identify the factors influencing the number of individuals contracting with family doctor teams, and improve the service capacity of these teams, all from the GP's perspective.

Methods

Data source

The dataset for this study originates from the Job Satisfaction Survey of General Practitioners in Primary Health Care Institutions across Guangdong Province. The data were collected by the research team from July 5 to 31, 2021, through a multi-stage stratified cluster sampling method, selecting GPs in primary health care facilities in Guangdong Province as the subject.³ The survey was conducted using a self-developed questionnaire. For the purposes of this study, 3252 valid participants were identified, all of which included family doctor team contracting numbers exceeding 100.

Selection of dependent and independent variables

The policy indicates that for family doctor teams providing services in a team format, each team's contracting number of people should not exceed 2000 individuals.⁴ The dependent variable in this study is whether the family doctor team's contracted individual count exceeds 2000. Based on the results of previous research,³ the potential independent variables were determined. The potential factors influencing whether the number of individuals contracted to the family doctor team exceed 2000 involve natural characteristics (gender, age, working facility, facility characteristics, team size, and population under the team's jurisdiction), socio-economic factors (including education level, professional title, managerial position, form of employment, years of professional experience, practicing region, and annual income), and policy implementation (the GP's training status, job satisfaction, the reasonableness of team staffing, clarity of team members' work respon-

sibilities, the GP's role within the team, teamwork and coordination, presence of higher-level hospital staffs in the team, desire for specialists within the health group to join the team, provision of personalized contract services, specialist appointment availability, hospital bed availability, development of home-based care services, referral services for contracted patients, long-term prescription services, and guidance from higher-level hospitals).

Statistical methods

Statistical analysis was performed using SPSS software (version 24.0, IBM Corp., Armonk, NY, USA). For data not following a normal distribution, the median and interquartile range [M (QR)] were used for description. The Mann-Whitney U test was used for comparisons between two groups, the Kruskal-Wallis H test for comparisons among multiple groups, and the Nemenyi test for pairwise comparisons between groups. Due to the use of multi-stage stratified cluster sampling method to select subjects for this survey, there might be regional clustering in the number of individuals contracted with family doctor teams. Consequently, R statistical software version 4.2.2 was used to establish a two-level Logistic regression model, with GPs as Level 1 and the GPs practicing region (whether it was in the Pearl River Delta) as Level 2, to analyze the factors influencing whether the number of individuals contracted with the family doctor team exceed 2000. A zero model was initially employed to test the random effects of the intercept, verifying the suitability of a multi-level model for data analysis.⁵⁻⁶ A p-value of <0.05 was considered statistically significant.

Results

Basic information of the subjects

Among the 3252 GPs surveyed, 2173 were male (66.82%), 1828 (56.21%) worked in community health centers, 1891 (58.15%) practiced in the Pearl River Delta. Additionally, 25.58% (598/2338) had completed standardized training, which includes either the "5+3" standardized residency training for GPs or the "3+2" standardized training for assistant GPs. Furthermore, 53.52% (1739/3249) reported an annual income of less than 100,000 Yuan. Detailed demographics of the GPs are presented in Table 1. In 2020, the median number of individuals contracted to the family doctor teams where these GPs were employed was 1400 (median number of contracts = 2499). Among these teams, 64.76% (2106/3252) had ≤2000 contracted individuals, 19.74% (642/3252) had between 2001 and 5000 contracted individuals, and 15.50% (504/3252) had more than 5000 contracted individuals. General information regarding the family doctor teams is displayed in Table 2.

Analysis of the Differences in the Number of People Contracted with Family Doctor Teams Based on the Characteristics of Different GPs and Their Teams

The analysis revealed statistically significant differences in the number of people contracted with family doctor teams across various GPs and team's characteristics ($P < 0.05$). Female GPs' teams had fewer contracted individuals compared to their male counterparts ($P < 0.001$). In terms of age groups, compared to the 26–34 age group, the 35–44 and 45–54 age groups had more individuals contracted with their family doctor teams ($P < 0.001$). GPs with a bachelor's degree educa-

Table 1
Analysis of differences in the contracted number of the team by different GP characteristics.

Item	Number	Number of family doctor team contractors	Z(H) value	P value
Gender			-4.970	<0.001
Male	2 173	1 500.0(2 762.0)		
Female	1 079	1 100.0(2 040.0)		
Age (years)			28.257 ^a	<0.001
≤25 [ⓐ]	23	800.0(1 052.0)		
26–34 [ⓑ]	639	1 053.0(2 037.0)		
35–44 [ⓒ]	1 611	1 500.0(2 543.0) ^d		
45–54 [ⓓ]	898	1 500.0(2 619.0) ^d		
≥55 [ⓔ]	81	1 360.0(2 713.0)		
Educational level			14.209 ^a	0.003
Master's degree and above [ⓐ]	83	1 000.0(1 650.0)		
Undergraduate [ⓑ]	2 062	1 356.0(2 470.0) ^c		
College [ⓒ]	907	1 500.0(3 188.0) ^c		
High school or vocational certificate [ⓓ]	200	1 345.0(3 959.0) ^c		
Title			3.794 ^a	0.435
Senior	19	1 000.0(3 666.0)		
Associate senior	444	1 452.5(2 400.0)		
Intermediate	1 492	1 341.0(2 184.0)		
Junior and below	1 274	1 500.0(3 500.0)		
No title	23	1 390.0(3 927.0)		
Position			38.732 ^a	<0.001
No position [ⓐ]	2 205	1 200.0(2 430.0)		
Department manager [ⓑ]	667	1 836.0(3 166.0) ^c		
Institution manager [ⓒ]	380	1 630.0(2 968.0) ^c		
Employment form			71.637 ^a	<0.001
Temporary [ⓐ]	215	1 013.0(1 455.0)		
Contractual [ⓑ]	650	1 007.5(1 350.0)		
Regular [ⓒ]	2 357	1 596.0(3 298.0) ^{c,d}		
Retirement and rehiring [ⓓ]	10	1 001.0(2 484.0)		
Other [ⓔ]	20	1 048.0(1 285.0)		
Years of professional experience ^b			29.343 ^a	<0.001
≤10 [ⓐ]	763	1 050.0(2 084.0)		
11–20 [ⓑ]	1 445	1 500.0(2 474.0) ^c		
21–30 [ⓒ]	929	1 600.0(3 036.0) ^c		
≥31 [ⓓ]	111	1 102.0(2 490.0)		
Institution			-6.638	<0.001
Township hospital	1 424	1 800.0(4 030.0)		
Community health center	1 828	1 200.0(1 769.0)		
Institution nature			-1.892	0.058
Government-run	3 141	1 419.0(2 496.0)		
Non-government-run	111	1 200.0(1 508.0)		
Practicing region			-10.438	<0.001
Non-Pearl River Delta	1 361	2 000.0(4 402.0)		
Pearl River Delta	1 891	1 112.0(1 598.0)		
Training received			-3.415	0.001
Received standardized training ^b	598	1 102.0(1 753.0)		
Received other training ^c	1 740	1 500.0(2 462.0)		
Job satisfaction			2.323 ^a	0.313
Low	1	200.0(0)		
Medium	1 272	1 439.5(2 490.0)		
High	1 979	1 369.0(2 500.0)		
Annual income (10,000 Yuan) ^b			-4.474	0.001
<10	1 739	1 500.0(3 500.0)		
≥10	1 510	1 249.5(1 885.0)		

Note:

- ^a Indicates H-value;
- ^b Indicates missing data;
- ^c Indicates P<0.05 compared with [ⓐ];
- ^d Indicates P < 0.05 compared with [ⓑ];
- ^e indicates "5+3" standardized training for general practice residents or "3+2" standardized training for assistant general practitioners.

tion(P = 0.026), college diploma(P = 0.003), and high school or vocational certificate (P = 0.017) had higher numbers of contracted individuals than those with a master's degree or higher. Compared to those without any managerial position, GPs who were managers had more contracted individuals (P < 0.001). Formally employed GPs reported more contracted individuals than their temporarily or contractually employed counterparts (P < 0.001). GPs with 11–20 and 21–30 years of professional experience had more contracted individuals than those with≤10 years of professional experience (P < 0.001). Township health center (rural) GPs managed more contracted individuals com-

pared to those in urban community health centers (P < 0.001). GPs practicing outside the Pearl River Delta had higher numbers of contracted individuals than those within the region (P < 0.001). GPs who received standardized training reported fewer contracted individuals than those who underwent other types of training (P = 0.001). GPs with an annual income of < 100,000 Yuan had more contracted individuals than those with an annual income of ≥100,000 RMB (P = 0.001), as shown in Table 1.

The comparison of the number of people contracted with family doctor teams based on team size, jurisdiction population, desire for spe-

Table 2
Analysis of the differences in the contracted number of family physician teams by different team traits.

Item	Number	Number of family doctor team contractors	Z(H) value	P value
Number of team members ^b			212.835 ^a	<0.001
≤3 [ⓐ]	776	1 000.0(1 594.0)		
4–6 [ⓑ]	1 423	1 258.0(2 100.0) ^c		
7–10 [ⓒ]	599	2 000.0(3 858.0) ^{c,d}		
11–19 [ⓓ]	360	3 000.0(6 487.0) ^{c,d,e}		
≥20 [ⓔ]	66	3 000.0(9 147.0) ^{c,d}		
Jurisdiction population ^b			243.927 ^a	<0.001
≤2 000	1 487	1 000.0(1 600.0)		
2 001–9 999	795	1 850.0(2 393.0)		
10 000–29 999	568	2 000.0(4 222.0)		
≥30 000	370	2 195.0(9 569.0)		
Reasonability of team staffing			-1.408	0.159
Yes	2 217	1 475.0(2 474.0)		
No	1 035	1 300.0(2 500.0)		
Clarity of team members' job responsibilities			2.320 ^a	0.313
Everyone has clear job responsibilities	2 457	1 487.0(2 480.0)		
Everyone is not clear about their job responsibilities	81	1 268.0(2 550.0)		
Some members have clear job responsibilities, some do not	714	1 236.5(2 500.0)		
Status of GPs in the team			-1.696	0.090
Non-core status	2 127	1 450.0(2 970.0)		
Core status	1 125	1 328.0(2 068.0)		
Coordination between team members			0.441 ^a	0.802
Better	2 612	1 411.0(2 486.0)		
Average	579	1 338.0(2 500.0)		
Poor	61	1 268.0(2 130.0)		
Presence of health technicians from higher-level hospitals in the team			-0.152	0.879
Yes	1 079	1 436.0(2 472.0)		
No	2 173	1 390.0(2 500.0)		
Desire specialists from health group to join the team			-2.663	0.008
Yes	2 623	1 500.0(2 517.0)		
No	629	1 200.0(2 114.0)		
Provision of personalized contracted services by the team			-0.557	0.577
Provided	2 412	1 394.5(2 470.0)		
Not provided	840	1 400.5(2 800.0)		
Specialist appointment availability in the team ^f			-1.654	0.098
Yes	952	1 300.0(2 500.0)		
No	2 300	1 458.5(2 582.0)		
Availability of hospital beds in the team ^g			-2.170	0.030
Yes	779	1 249.0(2 500.0)		
No	2 473	1 475.0(2 574.0)		
Item	Number	Number of family doctor team contractors	Z(H) value	P value
Implementation of the home hospital bed service			-0.924	0.355
Yes	1 252	1 366.5(2 401.0)		
No	2 000	1 411.0(2 700.0)		
Provision of referrals for contracted patients			-1.404	0.160
Yes	2 104	1 358.0(1 928.0)		
No	1 148	1 500.0(3 503.0)		
Provision of long-term prescription services ^h			-1.792	0.073
Yes	2 513	1 354.0(2 489.0)		
No	739	1 510.0(3 300.0)		
Guidance from higher-level authorities ⁱ			-3.234	0.001
Yes	2 049	1 500.0(2 460.0)		
No	1 203	1 240.0(2 500.0)		

Note:

^a Indicates H-value;

^b Indicates missing data;

^c Indicates $P < 0.05$ when compared with ①;

^d Indicates $P < 0.05$ when compared with ②;

^e indicates $P < 0.05$ when compared with ③;

^f Indicates the availability of specialists of second-level and above medical institutions;

^g Indicates the availability of hospital beds of second-level and above medical institutions for the team;

^h Indicates whether the team provides long prescription services for patients with chronic diseases;

ⁱ indicates whether the administrative departments of health at all levels have organized experts to provide on-site guidance to the institution in family doctor contracting services.

cialist doctors within the health group to join the team, availability of hospital bed, and guidance from higher-level hospitals showed statistically significant differences ($P < 0.05$). The difference in the number of contracted individuals between teams with 7–10 members ($P = 0.150$) and 11–19 members ($P = 1.000$) and those with ≥ 20 members was not statistically significant. Similarly, there was no significant differ-

ence in the number of contracted individuals between teams managing a population of $\geq 30,000$ and those managing 10,000–29,999 individuals ($P = 0.999$). Family doctor teams desiring specialist doctors within the health group to join had a higher number of contracted individuals than those not desiring such additions ($P = 0.008$). Teams with hospital bed resources had fewer contracted individuals than those without such

Table 3

Results of the Zero model test analysis of factors influencing the contracted number of family physician teams ≥ 2000 .

Variable	Estimated value	SE	t value	P value
Constant	0.217 1	0.465 9		
Inter-area variance	0.369 7	0.076 1	4.857	0.040
Inter-individual variance	1.000 0	0.000 0		

resources ($P = 0.030$). Teams with guidance from higher level hospitals had more contracted individuals than those without such guidance ($P = 0.001$), as shown in [Table 2](#).

Zero model test categorizing GPs as level 1 and their practicing region (whether in the Pearl River Delta or not) as level 2

The results indicated a statistically significant difference at level 2 ($P < 0.05$), indicating that the number of individuals contracted with family doctor teams shows regional clustering among GP practicing regions. Hence, a two-level logistic regression model is appropriate for this analysis, as detailed in [Table 3](#). Using the number of individuals contracted with the family doctor teams of GPs as the dependent variable (coded as: No = 0, Yes = 1), and the variables with statistically significant differences in [Tables 1 and 2](#) as independent variables, and GPs as level 1 and their practicing region (whether in the Pearl River Delta or not) as level 2, a two-level Logistic regression model was fitted.

The results showed that the educational level, managerial position, form of employment, as well as team size, jurisdiction population, and availability of bed resources were factors influencing whether the number of individuals contracted with the family doctor teams exceed 2000 ($P < 0.05$). GPs with a college diploma [OR (95 %CI) = 2.79 (1.84, 3.74)] and those with a high school or vocational certificate [OR (95 %CI) = 2.83 (1.80, 3.86)] were more likely to have teams with over 2000 contracted individuals compared to those with a master's degree or higher. Compared to those without any managerial position, GPs who were managers had a lower likelihood [OR (95 %CI) = 0.66 (0.33, 0.99)] of having teams with more than 2000 contracted individuals. Formally employed GPs had a higher likelihood [OR (95 %CI) = 2.02 (1.53, 2.51)] of having teams with over 2000 contracted individuals compared to temporary workers. Teams with 4–6 members [OR (95 %CI) = 1.31 (1.05, 1.57)], 7–10 members [OR (95 %CI) = 2.06 (1.75, 2.37)], 11–19 members [OR (95 %CI) = 3.67 (3.31, 4.03)], and ≥ 20 members [OR (95 %CI) = 3.46 (2.74, 4.18)] were more likely to surpass 2000 contracted individuals compared to teams with ≤ 3 members. Teams managing 2001–9999 [OR (95 %CI) = 2.37 (2.12, 2.62)], 10,000–29,999 [OR (95 %CI) = 2.92 (2.65, 3.19)], and $\geq 30,000$ [OR (95 %CI) = 2.86 (2.55, 3.17)] individuals were more likely to have more than 2000 contracted individuals. Teams without hospital bed resources were more likely [OR (95 %CI) = 1.38 (1.14, 1.62)] to have more than 2000 contracted individuals compared to those with such resources ($P < 0.05$), as detailed in [Table 4](#).

Discussion

The release of the "Guidance on Promoting Family Doctor Contract Services" by the state council office of health reform in 2016 marked the beginning of the implementation of family doctor contract services in China.⁷ However, primary health care facilities are still adjusting to this new operational model, and it's common to see family doctor teams with less than 10 contracted individuals. This reality informed our decision to include GPs with more than 100 people contracted to their family doctor teams in our study. The emergence of family doctor teams with more than 10 members can be attributed to the early stages of implementing family doctor contract services, against a backdrop of a GP shortage.

Our findings indicate that 53.82 % of family doctor teams manage a population exceeding 2000 individuals, with 29.13 % of these teams

overseeing more than ten thousand individuals. Despite the increase in GP numbers in recent years, the issue of overly large family doctor teams persists. A possible explanation is that primary health care facilities consider family doctor contract services as part of essential public health service, coordinated by the public health department, with GPs playing only a supporting role within the family doctor teams. In some instances, the general practice department is even subordinated to the public health department in township hospitals. The contracts drafted by the public health department cover only complimentary basic public health services, with the primary objective being to conduct health check-up activities in rural areas. These health check-ups serve as an opportunity to establish contracts with residents, who sign up for free health check-ups often without full comprehension of the arrangement. This approach results in task-oriented contracting that lacks meaningful content in the agreements. Consequently, the trend of "large teams, extensive coverage areas" has become standard practice. This approach results in task-oriented contracting that lacks meaningful content in the agreements.

Family doctor teams lacking access to beds of secondary or higher-level hospitals are more likely to have contracts with over 2000 individuals compared to those with such resources. This counterintuitive phenomenon is still tied to the approach of coordinating family doctor service contracts through the public health department. GPs within family doctor teams serve as "facade" and only play an important role when primary health care facilities undergo evaluations by higher authorities. If GPs or other types of clinical doctors are not included in family doctor teams or do not actively engage in family doctor contract services, their ability to offer long-term prescriptions/referral services, access specialists, or utilize hospital beds in higher-level hospitals remains insufficient. As a result, residents may not receive proactive, continuous, and comprehensive health management services. This phenomenon also indicates that the efforts towards implementing and executing family doctor contract services have not been thoroughly effective.

Compared to family doctor teams with GPs with a master's degree or higher, those with high school or vocational certificate are more likely to have more than 2000 individuals contracted. Currently, most GPs receive their training through speed-up educational program or on-the-job training programs. Despite their designation as GPs, many have not transitioned from a service model focused on "clinic-based practice" or a service principle centered around "disease treatment." There remains a significant gap in understanding how to implement and carry out the new concepts and models of family doctor contract services, including the historical mission they are expected to fulfill. This situation indirectly highlights the persistent shortage of GPs in primary care facilities who have completed "5+3" standardized residency training for GPs or "3+2" standardized training for assistant GPs.

Compared to those without any position, the likelihood of GPs who are managers having family doctor teams with more than 2000 contracted individuals is smaller. Research results showed that individuals with positions, as managers, are more likely to adopt new technologies.⁸ Peretz and Andrew found that engaging in management work could actually help improve individual output,⁹ which may be related to being assigned a directive role.¹⁰ In this study, the reason why managers, compared to those without any positions, are less likely to have family doctor teams with more than 2000 contracted individuals might be that managers have more opportunities to leave for learning and participating in training, leading to a better grasp of family doctor contract service policies than those without positions.

Compared to temporary staff, family doctor teams with formally employed GPs are more likely to have over 2000 contracted individuals. Under the current system, temporary staff are paid relatively fixed salaries that do not adhere to the principle of "more work, more pay" and are often lower than those of their formally employed counterparts for the same or similar roles. Additionally, they encounter varying degrees of discrimination regarding personal development, career advancement, and education and training,¹¹ lacking professional identity and sense of

Table 4
Results of two-level logistic regression analysis of factors influencing the contracted number of family physician teams ≥ 2000 .

Variable	β	SE	Z value	OR(95 %CI)	P value
Gender (male as a reference)					
Female	-0.036	0.112	-0.319	0.96(0.74, 1.18)	0.750
Age(≤ 25 as a reference)					
26–34	0.746	0.716	1.042	2.11(0.68, 3.54)	0.297
35–44	0.862	0.729	1.183	2.37(0.91, 3.83)	0.237
45–54	0.805	0.741	1.086	2.24(0.76, 3.72)	0.278
≥ 55	0.977	0.846	1.154	2.66(0.97, 4.35)	0.248
Educational level(Master's degree and above as a reference)					
Undergraduate	0.881	0.459	1.918	2.41(1.49, 3.33) ^a	0.055
College	1.027	0.473	2.173	2.79(1.84, 3.74)	0.030
High school or vocational certificate	1.041	0.513	2.028	2.83(1.80, 3.86)	0.043
Position (no position as a reference)					
Department manager	-0.023	0.125	-0.186	0.98(0.73, 1.23)	0.852
Institution manager	-0.411	0.163	-2.525	0.66(0.33, 0.99)	<0.001
Employment form(temporary as a reference)					
Contractual	0.255	0.258	0.991	1.29(0.77, 1.81)	0.322
Regular	0.703	0.244	2.886	2.02(1.53, 2.51)	0.004
Retirement and rehiring	1.193	0.895	1.333	3.30(1.51, 5.09) ^a	0.183
Other	-1.604	1.098	-1.460	0.20(-2.00, 2.40)	0.144
Years of professional experience(≤ 10 as a reference)					
11–20	0.182	0.189	0.963	1.20(0.82, 1.58)	0.335
21–30	0.253	0.228	1.110	1.29(0.83, 1.75)	0.267
≥ 31	-0.168	0.414	-0.406	0.85(0.02, 1.68)	0.685
Institution(Township hospital as a reference)					
Community health center	0.139	0.139	1.002	1.15(0.87, 1.43)	0.316
Training received(Received standardized training as a reference)					
Received other training	0.144	0.116	1.247	1.16(0.93, 1.39)	0.213
Annual income(10,000 Yuan, <10 as a reference)					
≥ 10	0.063	0.125	0.503	1.06(0.81, 1.31)	0.615
Number of team members(≤ 3 as a reference)					
4–6	0.269	0.131	2.057	1.31(1.05, 1.57)	0.040
7–10	0.721	0.155	4.638	2.06(1.75, 2.37)	<0.001
11–19	1.299	0.180	7.212	3.67(3.31, 4.03)	<0.001
≥ 20	1.240	0.358	3.466	3.46(2.74, 4.18)	<0.001
Jurisdiction population(≤ 2000 as a reference)					
2001–9999	0.864	0.125	6.922	2.37(2.12, 2.62)	<0.001
10000–29999	1.073	0.135	7.962	2.92(2.65, 3.19)	<0.001
≥ 30000	1.051	0.156	6.723	2.86(2.55, 3.17)	<0.001
Desire specialists from health group to join the team(Yes as a reference)					
No	-0.035	0.124	-0.278	0.97(0.72, 1.22)	0.781
Availability of hospital beds in the team(Yes as a reference)					
No	0.321	0.120	2.673	1.38(1.14, 1.62)	0.008
Guidance from higher level authorities(Yes as a reference)					
No	-0.035	0.103	-0.343	0.97(0.76, 1.18)	0.732

Note: ^a indicates that the 95 % CI for the OR does not contain 1.00 may be associated with a heavily skewed front in the frequency distribution.

belonging. This may adversely impact their motivation to fulfill contract work.

However, the "Guidance on Promoting the High-Quality Development of Family Doctor Contract Services" specifies that "From 2022, based on the current service level, the coverage rate of contracted services for the whole population and key groups will increase by 1–3 percentage points annually, aiming for over 75 % by 2035." To achieve these annual contract targets, formally employed personnel are taking on more contract work, making it more likely for their family doctor teams to have more than 2000 contracted individuals. This exceeds the stipulation of "no more than 2000 people per team when services are provided by teams" as outlined in the "Notification on Issuing the Service Capacity Standards of Township Hospitals (2022 Edition) and Other 3 Service Capacity Standards" (National Health Commission Primary Health Letter [2022] No. 117).

The implementation of family doctor contract services is based on the formation of GP teams.¹² The analysis above highlights that the development of family doctor teams in Guangdong Province requires further strengthening. Outdated practices such as "large teams, broad coverage, and extensive contracts without substantive content" should be eliminated. Primary health care facilities must move beyond merely focusing on the number of contracts. If the number of individuals contracted ex-

ceeds the service capacity of family doctor teams, simply contracting without fulfilling commitments can erode residents' trust in these services and hinder the implementation of the tiered diagnosis and treatment system.

Policy documents like the "Guidance from the State Council on Establishing a General Practitioner System," "Guidance on Standardizing Family Doctor Contract Service Management," and "Service Capacity Standards of Township Hospitals (2022 Edition)" recommend keeping the number of contracted individuals per GP team around 2000 and specify team composition. Primary health care facilities should adjust according to national guidelines, understand the significance of family doctor contract services fully, and abandon the incorrect notion that "family doctor contract services are essential public health services provided by the public health department." As the number of GPs gradually increases, it is appropriate to reorganize and optimize family doctor teams, moving away from the extensive practices of "large teams, broad coverage, extensive contracts." GPs should be empowered, taking a central role within family doctor teams, guiding and overseeing the implementation of family doctor contract services by primary health care facilities. Efforts should be intensified in training and assessment to help primary health care facilities gradually establish and refine various systems, standardizing the execution of family doctor contract services, and ensuring

primary health care physicians recognize that the family doctor contract service model will be the primary service model for primary health care facilities in the future. Implementing family doctor contract services is crucial for deepening healthcare reform and serves as the foundation for a tiered diagnosis and treatment system. Primary health care workers, who serve as the foundation for a tiered diagnosis and treatment system, should engage actively in practice and research. In the process of team restructuring, successful models such as Shanghai's "1+1+1" family doctor contract service model, Xiamen's "co-management of three disciplines" model, and Sanming's "integration of medical treatment, medical insurance and medicines supply" model¹³ should be fully leveraged to create a family doctor contract service model with Guangdong characteristics and implement family doctor contract services unique to Guangdong Province.

ZHAO *et al.*¹⁴ noted that one of the factors contributing to the promotion of active contracting by residents is the ability of GPs to effectively mobilize medical resources. The results of this study indicate that a large number of family doctor teams still lack access to specialist appointments, have not implemented home-based care services, are unable to provide long-term prescription services, or offer referral services for contracted patients. This suggests that the GPs participating in this survey and their family doctor teams, as well as primary health care facilities, have not fully understood the essence and content of family doctor contract services. They have not realized that gaining residents' trust through providing comprehensive referral services, long-term prescription services, home-based care services, and access to specialists is crucial for attracting residents to sign contracts. Only then can a solid foundation be laid for the advancement of family health management work and the construction of a community health management system.¹⁵

Despite strong government support for the development of the general practice system, a societal recognition of GPs has not yet fully emerged.¹⁶ This survey reveals that 53.52 % of GPs have an annual income of less than 100,000 Yuan. According to data from the Organization for Economic Co-operation and Development in 2019, the salaries of GPs in the United States, United Kingdom, and Australia are 3.5, 3.1, and 1.9 times the average social income, respectively.¹⁷ The annual income of GPs is not a factor affecting whether the number of individuals contracted with family doctor teams is ≥ 2000 , indicating a weak link between the number of contracts of family doctor teams and GPs' annual income. This suggests that the policy dictating "no less than 70 % of contract service fees should be allocated to the salaries of those participating in family doctor contract services" may not have been effectively implemented, failing to fully mobilize GP enthusiasm. The "Opinions of the General Office of the State Council on Reforming and Improving the Training and Incentive Mechanisms for General Practitioners" aimed to increase the salaries of GPs as a key strategy, introducing measures to protect GPs' rights and enhance their professional attractiveness. These measures include equating the salary levels of GPs with those of clinical doctors under similar conditions in local county (district) general hospitals, establishing a GP allowance during internal performance salary distributions in primary health care facilities, treating GPs who have completed standardized residency training equally with clinical masters graduates and favoring GPs in title promotion policies. At this stage, Guangdong Province should intensify reforms of the salary system in primary health care facilities. Human resources and social security departments should promptly issue policy documents to exclude the income from family doctor contract service fees from the total performance salary, motivating primary health care physicians to diversify their income sources by actively undertaking family doctor contract services. Meanwhile, the pricing for family doctor contract service components such as home-based care should be rapidly and reasonably established, including family doctor contract service fees within the scope of medical insurance payments to broaden funding sources. Regions outside the Pearl River Delta should enhance fiscal support for GPs to ensure their average salary level is not lower than that of medical personnel in comparable positions in general hospitals.

This study has its limitations: First, the survey participants were registered GPs at township hospitals and community health centers. The insights into the contract status of their family doctor teams were obtained from these GPs, who were also asked to evaluate aspects such as "the reasonableness of team staffing, the clarity of team members' work responsibilities, and the coordination among team members during work." Whether these evaluation results fully represent the views of all team members needs further verification. Second, some GPs participating in the survey were not completely certain about the exact number of individuals contracted with their family doctor teams, providing estimates instead. This may impact the accuracy of the study's findings.

Conclusion

The family doctor contracting program in China has developed for nearly a decade. The report of the 20th National Congress of the Communist Party of China and the Central Economic Work Conference clearly stated that high-quality development is the primary task of comprehensively building a modern socialist country. As high-quality development becomes the mandatory requirement of the new era, family doctor contract services have also transitioned into a phase of high-quality growth. At this stage, it is crucial to address issues impeding the implementation of high-quality development policies, such as team formation, standardizing the number of individuals contracted per team, facilitating the multi-location practice of health group/medical consortiums members within family doctor teams, developing mechanisms for the distribution of benefits, equating the salary levels of GPs with those of clinical doctors under comparable conditions in local county (district) general hospitals, and ensuring that 70 % of contract service fees are directed towards the salaries of those involved in family doctor contract services. By eliminating systemic and procedural bottlenecks and challenges, we can advance the high-quality development of family doctor contract services, thereby solidifying the foundation of primary care facilities and bolstering the stability of their growth.

Declarations

Not applicable.

Authors' contributions

Conceptualization, H.A. and C.L.; Methodology, H.A. and C.L.; Data curation, L.G. and X.Y.; Formal analysis, L.G. and X.Y.; Funding acquisition, not applicable; Project administration, not applicable; Resources, not applicable; Supervision, H.A. and C.L.; Validation, H.A. and C.L.; Writing—original draft, H.A. and C.L.; Writing—review and editing, H.A. and C.L. All authors have read and agreed to the published version of the manuscript.

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Competing interests

The authors declare that they have no competing interests.

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