Research Square

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How medical disputes drive village doctors' turnover intention in rural China: a propensity score matched analysis

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Abstract

Background

Village doctors are the backbone of rural primary care in China, yet their turnover intention is rising. Medical disputes have become a frequent and stressful occupational hazard, but their causal impact on village doctors' turnover intention remains unclear. This study quantifies whether experiencing medical disputes increases turnover intention among village doctors across rural China.

Methods

A cross-sectional study was conducted from May to June 2023 with 1977 village doctors recruited through multi-stage stratified sampling across seven provinces in China. To mitigate selection bias, propensity score matching was applied to balance the observed covariates of village doctors who had and had not experienced medical disputes. Univariate and multivariate logistic regression was then used on the matched sample to evaluate the impact of medical disputes on turnover intention.

Results

Of the 1977 village doctors surveyed, 208 (10.5%) had encountered at least one medical dispute in the preceding year. Propensity score matching yielded a balanced analytic sample of 402 doctors (201 exposed, 201 unexposed) with no residual differences in observed covariates (all $p > 0.05$). Multiple logistic regression revealed that medical disputes were the risk factor for village doctors' turnover intention (OR = 2.181, 95%CI: 1,389, 3.424). In addition, occupational dissatisfaction (OR = 3.638, 95%CI: 1.617, 8.182), work environment dissatisfaction (OR = 4.074, 95%CI: 1.769, 9.386), and male gender (OR = 2.058, 95%CI: 1.213, 3.491) were further significant risk factors.

Conclusion

Experiencing medical disputes almost doubled village doctors' intention to leave rural practice even after accounting for demographic and job-related confounders. Policy makers should introduce targeted mediation, legal-protection schemes and rapid-dispute-resolution mechanisms to retain the rural primary-care workforce.

Introduction

In China, village doctors are the primary providers of rural primary healthcare services, their performance and service capacity directly affects the quantity, quality, and stability of medical services in rural areas[1, 2]. However, the *China Statistical Yearbook 2024* showed that the number of village doctors in China plummeted from 1.12 million in 2011 to 0.62 million in 2023[3], a nearly 50% reduction, indicating a dramatic loss of personnel. More alarmingly, a systematic assessment covering village doctors in almost all provinces of China found that between 2011 and 2022[4], the rate of turnover intention among village doctors reached as high as 44.1%, almost two to three times that of many high-income countries[5–7], reflecting that the stability of

China's village doctor workforce was facing a grave challenge. As the primary point of contact for the health of 490 million rural residents in China, village doctors deliver over 60% of outpatient services in rural towns[3], serving as a linchpin for building a robust rural medical system[8, 9]. Faced with the dual predicaments of a sharply shrinking workforce and a relatively high turnover intention rate, the supply capacity of rural primary healthcare has already shown obvious shortcomings. This not only exacerbates the strain on an already tight rural medical resource pool, but also poses a severe challenge to the core goal of "universal coverage of basic public health services" under the "*Healthy China 2030"* strategy[10, 11], triggering a widespread concern.

To address this crisis, a deeper understanding of its drivers is essential. Turnover intention, defined as the psychological tendency to leave one's job voluntarily, serves as a key precursor[12]. According to the theory of planned behavior[13], intention is the most immediate antecedent of behavior, thus turnover intention can be considered as the most direct and reliable predictor of turnover behavior. Multiple researches have also shown a strong correlation between turnover intention and turnover behavior[14–16], turnover intention has a strong explanatory power for the actual turnover rate. For village doctors, the emergence of turnover intention can trigger a series of negative chain reactions, such as burnout and absenteeism[4, 17], which will hinder the healthy development of rural healthcare services. In view of this, identifying factors that may affect the turnover intention of village doctors, taking effective measures to reduce talent loss, ensuring the stability of the village doctor team have become important issues that urgently need to be addressed.

Existing researches have extensively explored the factors influencing turnover intention, with individual characteristics, occupational burnout, and occupational satisfaction typically considered the common influencing factors[14, 15, 18, 19]. However, it is worth noting that, medical disputes as an increasingly prominent and severe phenomenon in the environment of healthcare[20, 21], are quietly affecting the behavioral decisions of medical personnels[22, 23]. Medical disputes often stem from a cognitive mismatch between patients and doctors regarding treatment outcomes[24]. Since 2016[25], the number of medical disputes in China has been increasing year by year, with an annual increase of nearly 100000 cases. A nationwide survey in 2021 showed that 33.48% of doctors had experienced medical disputes in the past year[26]. And researches indicated that regardless of the outcome of medical disputes, their occurrence bring enormous psychological and professional pressure to medical personnels[27, 28].

The Job Demands-Resources (JD-R) model provides a theoretical framework for understanding this relationship[29]. The model categorizes job characteristics into two dimensions: job demands, defined as the physical, emotional, or cognitive efforts required by work, and job resources, which are structural or psychological supports that help individuals cope with these demands and achieve work-related goals. When job demands exceed personal resources, a health impairment process is activated, leading to stress experiences and negative work outcomes[29, 30]. The unique "one-person-one-station" isolated practice model of village doctors amplifies the resource scarcity dilemma in the context of medical disputes[31]. When village doctors encounter disputes, they lack buffering job resources such as professional support from legal affairs departments and are forced to independently bear multiple pressures including responsibility clarification, emotional reassurance, and risk response[32–34]. This sustained psychological burden and emotional exhaustion directly triggers the "health impairment process" in the JD-R model[29], pushing village doctors into a state of emotional exhaustion like diminished work enthusiasm and intensified psychological fatigue[35, 36]. As a common occupational stressor in the medical environment, medical disputes may be underestimated in

terms of their high frequency and severe negative impacts among village doctors. This overlooked cumulative stress effect compels us to consider its potential association with village doctors' turnover intention.

This study investigated village doctors in seven provinces of China and analyzed the correlation between medical disputes and their turnover intention. We aim to provide new directions for policy makers, reduce the turnover of village doctors, and promote the healthy development of basic healthcare in rural areas of China.

Methods

Participants and procedures

This cross-sectional survey was conducted from May to June 2023 and recruited participants using a multiple stage stratified sampling method. Firstly, we selected rural areas in seven provinces in China, namely Jiangsu, Shandong, Shanxi, Henan, Shaanxi, Inner Mongolia, and Gansu. Secondly, we randomly selected four counties within each province, excluding those located in the central city of the provincial capital (usually with higher levels of urbanization). Thirdly, we randomly selected three townships within each sampled county, excluding townships with county governments (usually with higher levels of urbanization). Finally, all village doctors with over 5 years of work experience in the sample township areas were selected as participants. A total of 2233 village doctors participated in this study, of which 220 participants were excluded from the analysis population because they worked at township health centers and only provided temporary assistance to village clinics. Additionally, 36 village doctors who lacked one or more missing values were excluded from the analysis. The final analysis sample includes 1977 village doctors (Fig. 1). This study followed the principles of the Helsinki Declaration and was approved by the Ethics Committee of Xuzhou Medical University. All participants provided written informed consent before the survey.

Measures

Turnover intention

Turnover intention was assessed with a single item developed for the present study: "How likely is it that you will resign from your current position as a village doctor or change occupation within the next 12 months?" Five ordered response options were provided: (1) "extremely unlikely", (2) "unlikely", (3) "neutral", (4) "likely", and (5) "extremely likely". Consistent with conventional cut-offs used in rural health-workforce research, responses 1–3 were collapsed to indicate "no turnover intention", and responses 4–5 were collapsed to indicate "presence of turnover intention", yielding a binary indicator for subsequent analyses.

Medical disputes

Medical dispute exposure was ascertained with the item: "During the past 12 months, have you personally been involved in any conflict with a patient or family member related to diagnosis, treatment, or service in your village clinic (e.g., verbal complaint, threat, physical altercation, or lawsuit)?" Response options were "yes" or "no".

Covariates

Covariates comprised sociodemographic characteristics (gender, age, education level, professional title, residence, civil servant status, work year, self-rated health, occupational satisfaction and work environment satisfaction) and post competency. The latter was captured with the 35-item Competency Scale for Village doctors (four domains, 5-point Likert; Cronbach's α = 0.987)[37], with higher scores denoting greater post competency.

Statistical analyses

Categorical variables were presented as frequencies and percentage (%), continuous variables were expressed as mean ± standard deviation (SD). For categorical variables, chi square test or analysis of variance (ANOVA) were used to compare inter group differences, and for continuous variables, independent sample t-test was applied. Propensity score matching (PSM**)** was used to mitigate the confounding bias of medical disputes on turnover intention[38]. In this study, matching factors included gender, age, education level, professional title, residence, civil servant status, and self-rated health. Select the Logit function for the matching model, with a caliper value of 0.02 of the propensity score Logit standard deviation[39], and use a 1:1 nearest neighbor matching method. Using standardized mean difference (SMD) to evaluate the balance of demographic characteristics after matching[38, 40], to achieve a satisfactory matching balance, the absolute value of the SMD was set to be less than 0.1[39–41], and nuclear density plot was used to display the distribution of propensity scores before and after matching.

In the matched cohort, hierarchical regression model was used to determine factors that affect turnover intention. Model 1 only included medical disputes, Model 2 included some covariates important in univariate analysis, and Model 3 included all meaningful covariates in univariate analysis. Statistical analyses were conducted using SPSS 26.0, and PSM part was implemented by the R4.3.2 software packages MatchIt, tableone, and cobalt, with a significance level of $P < 0.05$ (two sided) considered statistically significant.

Results

Participant Characteristics before and after propensity score matching

Table 1 provides the participant characteristics before and after propensity score matching. Before matching, 1977 village doctors were included in the criteria, including 208 (10.5%) in the medical disputes group and 1769 (89.5%) in the no medical disputes group. There were significant differences between two groups in gender and self-rated health ($P < 0.05$), while there were no significant differences in age, education level, professional title, residence, and civil servant status ($P > 0.05$). After matching, there were 201 village doctors with and without medical disputes, and all characteristics were well-balanced with no significant differences ($P > 0.05$). The balance between the two groups was demonstrated by the distribution of propensity scores before and after matching (Fig. 2).

Table 1
Baseline characteristics of village doctors grouped by whether experienced medical disputes or not (N = 1977)

Variables	Before matching				After matching			
	No MD (N = 1769)	MD (N = 208)	*p*	SMD	No MD (N = 201)	MD (N = 201)	*p*	SMD
Gender (n,%)			0.004	0.227			1.000	0.012
Male	1162(65.7)	158(76.0)			152(75.6)	153(76.1)		
Female	607(34.3)	50(24.0)			49(24.4)	48(23.9)		
Age (n,%)			0.618	0.112			0.943	0.088
≤ 30	12(0.7)	3(1.4)			3(1.5)	2(1.0)		
31–40	152(8.6)	14(6.7)			12(6.0)	14(7.0)		
41–50	811(45.8)	101(48.6)			101(50.2)	97(48.3)		
51–60	703(39.7)	79(38.0)			72(35.8)	77(38.3)		
≥ 61	91(5.1)	11(5.3)			13(6.5)	11(5.5)		
Education level (n,%)			0.271	0.148			0.977	0.045
Junior school or below	74(4.2)	5(2.4)			3(1.5)	4(2.0)		
High or vocational school	1196(67.6)	133(63.9)			134(66.7)	132(65.7)		
College degree	415(23.5)	57(27.4)			55(26.4)	53(26.4)		
Bachelor's degree or above	84(4.7)	13(6.2)			11(5.5)	12(6.0)		
Professional title (n,%)			0.051	0.181			0.905	0.045
Primary title	949(53.6)	130(62.5)			122(60.7)	125(62.2)		
Intermediate title or above	272(15.4)	27(13.0)			29(14.4)	26(12.9)		
No title	548(31.0)	51(24.5)			50(24.9)	50(24.9)		
Residence (n,%)			0.413	0.073			1.000	< 0.001

Note: MD=medical disputes, SMD=standardized mean difference

Variables	Before matching				After matching			
	No MD (N = 1769)	MD (N = 208)	*p*	SMD	No MD (N = 201)	MD (N = 201)	*p*	SMD
Rural	1625(91.9)	195(93.8)			190(94.5)	190(94.5)		
Urban	144(8.1)	13(6.2)			11(5.5)	11(5.5)		
Civil servant status (n,%)			0.187	0.105			1.000	0.012
Yes	507(28.7)	50(24.0)			49(24.4)	48(23.9)		
No	1262(71.3)	158(76.0)			152(75.6)	153(76.1)		
Self-rated health (n,%)			0.019	0.198			0.907	0.044
Good	1177(66.5)	120(57.7)			118(58.7)	118(58.7)		
General	505(28.5)	71(34.1)			72(35.8)	70(34.8)		
Poor	87(4.9)	17(8.2)			11(5.5)	13(6.5)		
Note: MD=medical disputes, SMD=standardized mean difference								

Univariate analysis of the turnover intention of village doctors

Table 2 shows the univariate analysis of village doctors' turnover intention after PSM. This table revealed that several factors, including gender (χ^2 = 14.641, p < 0.001), civil servant status (χ^2 = 7.060, p = 0.008), self-rate health (χ^2 = 11.755, p = 0.003), medical disputes (χ^2 = 18.515, p < 0.001), occupational satisfaction (χ^2 = 48.251, p < 0.001), work environment satisfaction (χ^2 = 40.882, p < 0.001), post competency (t = 4.117, p < 0.001), exhibited significant differences (P < 0.05) between the village doctors who had turnover intention and who had not.

Table 2
Univariate analysis of turnover intention of village doctors after PSM (N = 402)

Variables	Total (N = 402)	Turnover intention		χ^2/t	*P*
		No (N = 185)	Yes (N = 217)		
Gender (n,%)				14.641	< 0.001
Male	305(75.9)	124(67.0)	181(83.4)		
Female	97(24.1)	61(33.0)	36(16.6)		
Age (n,%)				2.667	0.615
≤ 30	5(1.2)	3(1.6)	2(0.9)		
31–40	26(6.5)	11(5.9)	15(6.9)		
41–50	198(49.2)	98(53.0)	100(46.1)		
51–60	149(37.1)	62(33.5)	87(40.1)		
≥ 61	24(6.0)	11(6.0)	13(6.0)		
Education level (n,%)				2.996	0.392
Junior school or below	7(1.7)	5(2.7)	2(0.9)		
High or vocational school	266(66.2)	126(68.1)	140(64.5)		
College degree	106(26.4)	45(24.3)	61(28.1)		
Bachelor's degree or above	23(5.7)	9(4.9)	14(6.5)		
Professional title (n,%)				2.172	0.338
Primary title	247(61.4)	108(58.4)	139(64.1)		
Intermediate title or above	55(13.7)	30(16.2)	25(11.5)		
No title	100(24.9)	47(25.4)	53(24.4)		
Residence (n,%)				0.003	0.956
Rural	380(94.5)	175(94.6)	205(94.5)		
Urban	22(5.5)	10(5.4)	12(5.5)		
Civil servant status (n,%)				7.060	0.008
Yes	97(24.1)	56(30.3)	41(18.9)		
No	305(75.9)	129(69.7)	176(81.1)		
Self-rated health (n,%)				11.755	0.003
Good	236(58.7)	121(65.4)	115(53.0)		
General	142(35.3)	60(32.4)	82(37.8)		

Variables	Total	Turnover intention		χ^2/t	*P*
	(N = 402)	No (N = 185)	Yes (N = 217)		
Poor	24(6.0)	4(2.2)	20(9.2)		
Work years (n,%)				5.442	0.245
1–5	5(1.2)	4(2.2)	1(0.5)		
6–10	13(3.2)	9(4.8)	4(1.8)		
11–20	68(16.9)	31(16.8)	37(17.1)		
21–30	197(49.0)	87(47.0)	110(50.7)		
≥ 31	119(29.6)	54(29.2)	65(30.0)		
Medical disputes (n,%)				18.515	< 0.001
No	201(50.0)	114(61.6)	87(40.1)		
Yes	201(50.0)	71(38.4)	130(59.9)		
Occupational satisfaction (n,%)				48.251	< 0.001
Satisfaction	105(26.1)	69(37.3)	36(16.6)		
Neutral	207(51.5)	101(54.6)	106(48.8)		
Dissatisfaction	90(22.4)	15(8.1)	75(34.6)		
Work environment satisfaction (n,%)				40.882	< 0.001
Satisfaction	120(29.8)	78(42.2)	42(19.4)		
Neutral	209(52.0)	94(50.8)	115(53.0)		
Dissatisfaction	73(18.2)	13(7.0)	60(27.6)		
Post competency (mean ± SD)	40.05 ± 7.30	41.65 ± 6.89	38.70 ± 7.38	4.117	< 0.001

Multivariate analysis of the turnover intention of village doctors

Table 3 shows the hierarchical regression analysis of village doctors' turnover intention after PSM. In Model 1, we only included medical disputes in the regression analysis, and the results showed that medical disputes (OR = 2.399, 95%CI: 1,605, 3.586) were the risk factor for village doctors' turnover intention. In Model 2, we added some important related covariates. The results showed that, in addition to medical disputes (OR = 2.070, 95%CI: 1.334, 3.212), occupational dissatisfaction (OR = 4.762, 95%CI: 2.176, 10.421) and work environment dissatisfaction (OR = 3.906, 95%CI: 1.727, 8.833) increased the village doctors' turnover intention. In Model 3, we merged all control covariates. The results showed that, except medical disputes (OR = 2.181, 95%CI: 1.389, 3.424), occupational dissatisfaction (OR = 3.638, 95%CI: 1.617, 8.182), and work environment dissatisfaction (OR = 4.074, 95%CI: 1.769, 9.386), male gender (OR = 2.058, 95%CI: 1.213, 3.491) also increased the village doctors' turnover intention.

Table 3
Multivariate hierarchical regression analysis of the turnover intention of village doctors after PSM

Variables	Model 1	Model 2	Model 3
Medical disputes			
No (ref)			
Yes	2.399(1,605, 3.586)***	2.070(1.334, 3.212)**	2.181(1.389, 3.424)**
Post competency		0.994(0.961,1.028)	0.996(0.962,1.033)
Occupational satisfaction			
Satisfaction (ref)			
Neutral		1.742(1.014, 2.995)*	1.521(0.865, 2.675)
Dissatisfaction		4.762(2.176, 10.421)***	3.638(1.617, 8.182)**
Work environment satisfaction			
Satisfaction (ref)			
Neutral		1.527(0.905, 2.576)	1.540(0.902, 2.631)
Dissatisfaction		3.906(1.727, 8.833)**	4.074(1.769, 9.386)**
Gender			
Female (ref)			
Male			2.058(1.213, 3.491)**
Civil servant status			
Yes (ref)			
No			1.476(0.877, 2.484)
Health status			
Good (ref)			
General			0.962(0.588, 1.575)
Poor			3.295(0.966, 11.242)
Note: *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$			

Discussion

To the best of our knowledge, this is the first study to explore the effects of medical disputes on turnover intention among village doctors. After propensity score matching that balanced seven observed covariates, village doctors who had encountered medical disputes in the previous 12 months were more likely to report turnover intention than their non-exposed counterparts. The association remained stable across three nested models, indicating that the effect was not confounded by demographic characteristics, post competency, or job attitudes. The findings provide empirical evidence to address the talent drain dilemma in rural primary healthcare and offer actionable insights for stabilizing the village doctor workforce.

Our study found that medical disputes were the risk factor for village doctors' turnover intention, village doctors who have experienced medical disputes had a stronger turnover intention. This finding was similar to previous research on urban medical personnels[42–46], confirming the universal negative impact of medical disputes on medical personnels' career choices. However, previous research on medical disputes and turnover intention have predominantly focused on tertiary hospital staff in urban areas[42, 46–48], with insufficient attention given to grassroots practitioners, particularly village doctors. As the cornerstone of rural primary healthcare, the stability of village doctor teams directly affects the functioning of rural medical service systems[2, 49, 50]. Yet we must recognize that their professional environments face numerous challenges. At the hardware level, rural medical facilities often lack advanced diagnostic equipment and emergency resources[49, 51], passively increasing diagnostic and treatment risks. At the humanistic level, the service targets of village doctors are mostly left-behind elderly and children with relatively low health literacy[31, 49, 52], which can easily lead to cognitive gaps in doctor-patient communication. At the institutional level, village clinics lack dedicated dispute resolution departments and medical liability insurance coverage[31, 50–52], often requiring village doctors to independently face the division of responsibilities and economic compensation after disputes. This "high-risk-low-guarantee" practice environment constitutes a typical imbalance of "excessive work demand and scarce work resources" in the JD-R model[29]. When medical disputes occur as a critical work demand event, village doctors neither have access to the professional dispute response support available in urban medical institutions nor can they avoid facing more severe practice risks than their urban counterparts. The dual pressure of resource scarcity and demand overload significantly amplifies negative psychological effects, making village doctors more prone to occupational anxiety and helplessness, accelerating their career exhaustion and turnover decisions.

The unique structural disadvantages faced by village doctors lead to a higher sensitivity of their turnover intention to medical disputes, validating the theoretical deduction in the research hypothesis regarding the health damage caused by medical disputes to medical personnels. This discovery provided a solid theoretical foundation for subsequent targeted intervention measures—such as establishing a rapid response mechanism for primary medical disputes, developing communication skills training programs for village doctors, and improving the joint dispute mediation system within county medical communities.

In addition, the hierarchical regression results also revealed that occupational dissatisfaction, work environment dissatisfaction, and male gender significantly influenced village doctors' turnover intention. This was basically consistent with existing research conclusions[4, 15, 49, 53, 54], and enriches the research dimension of factors affecting village doctors' turnover intention. We found that medical disputes were not isolated incidents, they exhibited significant synergistic interactions with occupational dissatisfaction and work environment dissatisfaction, collectively forming a vicious cycle of "dispute occurrence, environmental

disadvantage, aggravation dissatisfaction, turnover intention". Specifically, medical disputes may directly lead village doctors to doubt their professional competence, reducing their occupational satisfaction[55, 56]. And if there are already hardware defects or management oversights in their work environment, this dissatisfaction will be further amplified, creating a "1 + 1>2" synergistic negative effect that will drive turnover intention.

Our study not only verified the independent impacts of medical disputes, occupational satisfaction, and work environment satisfaction on turnover intention, but also revealed the synergistic mechanism among these factors. The existence of this mechanism implied that merely improving a single factor, like enhancing occupational satisfaction alone or optimizing the work environment alone, was insufficient to fundamentally resolve the turnover challenge among village doctors. A systematic intervention approach encompassing "dispute prevention, environmental optimization and satisfaction enhancement" is required to break this vicious cycle, thereby reducing village doctors' turnover intention at the source and strengthening the stability of the rural healthcare workforce.

Strengths and limitations

This study demonstrates several advantages. This study was the first study to explore the relationship between medical disputes and turnover intention among village doctors, enriching the limited evidence on this topic. And this study applied the PSM method to control potential confounding factors and constructed a robust methodological framework, significantly improving the accuracy and reliability of the study results. However, we must acknowledge that this study has certain limitations. Firstly, as a cross-sectional design, this study essentially limits the establishment of causal relationships between variables. Secondly, relying on self-reported assessment methods may lead to validity issues. Thirdly, we cannot avoid the presence of other unknown variables that may affect the results. Despite these limitations, our study lays the foundation for future research and provides valuable insights for enhancing the turnover intention of village doctors. This study did not collect specific characteristics of medical disputes (such as dispute type, severity, and handling result), so it is impossible to analyze the differential impact of different types of medical disputes on village doctors' turnover intention. At the same time, potential mediating variables such as job burnout and social support were not included, making it impossible to clarify the specific path through which medical disputes affect turnover intention.

Conclusion

Medical disputes are an independent risk factor for village doctors' turnover intention, and occupational satisfaction, work environment satisfaction, and gender further increase the turnover risk of village doctors. To stabilize the village doctor team and ensure the quality of rural primary healthcare services, it is necessary to balance the prevention and control of medical dispute risks and the optimization of the practice environment, and implement precise policy interventions. This study provides empirical evidence for the formulation of relevant policies.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Xuzhou Medical University and it was conducted in accordance with the Declaration of Helsinki. All participants understood the research purpose, process, potential risks, and benefits, and they agreed to participate in this study by providing written informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

M.L. conceptualized the study, conducted statistical analysis, wrote the first draft, and reviewed the final draft of the manuscript. W.X.Y. and Z.H.G. participated in conceptualizing and designing the study, data analysis. D.Z., W.J.Y. and W.W. collected the data and supervised project administration. X.Y.G. and Q.Z.W. supported the investigation, project administration, and reviewing and editing of the first draft. All authors reviewed and approved the final manuscript.

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Figures

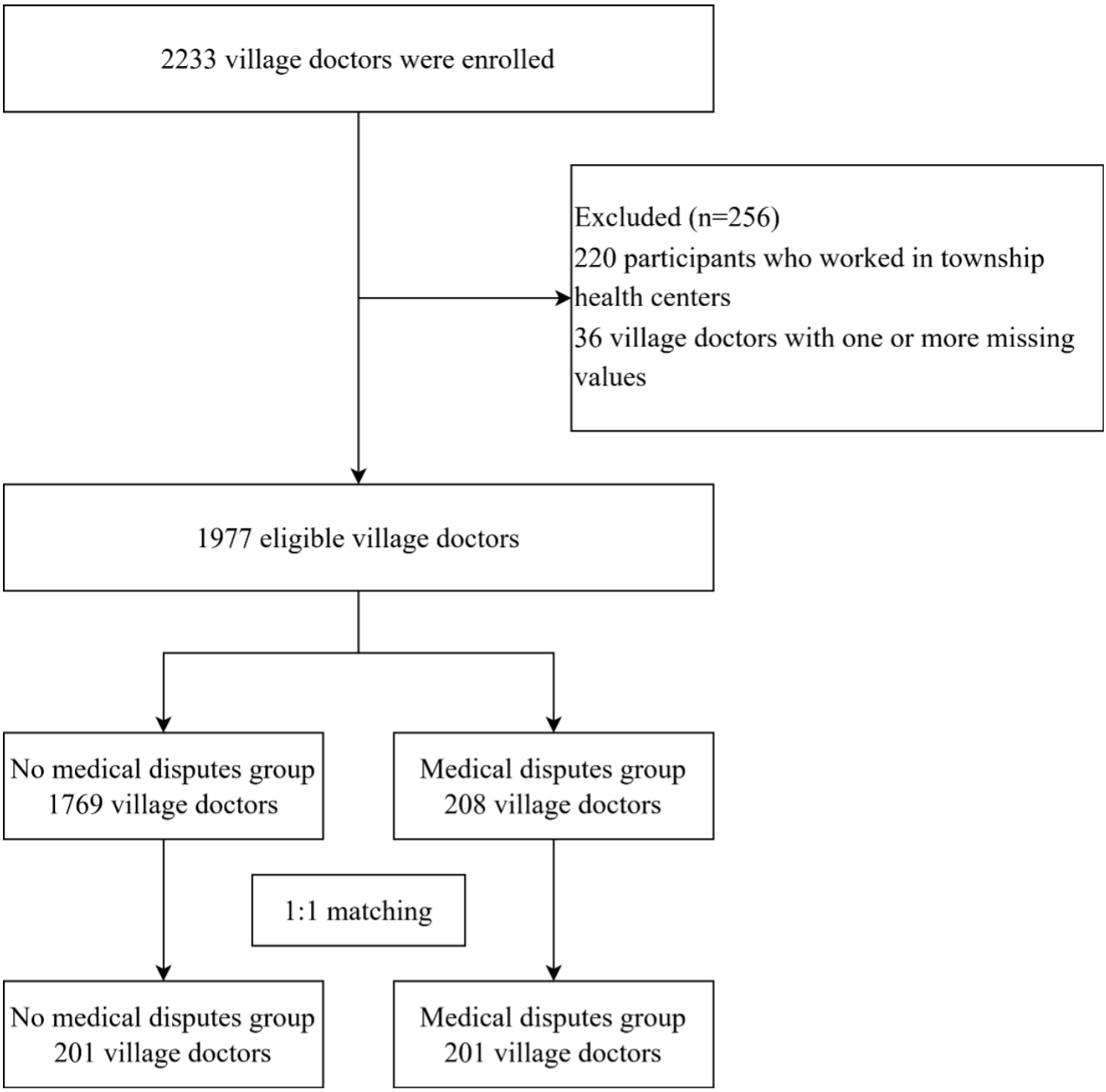


Figure 1

Flowchart

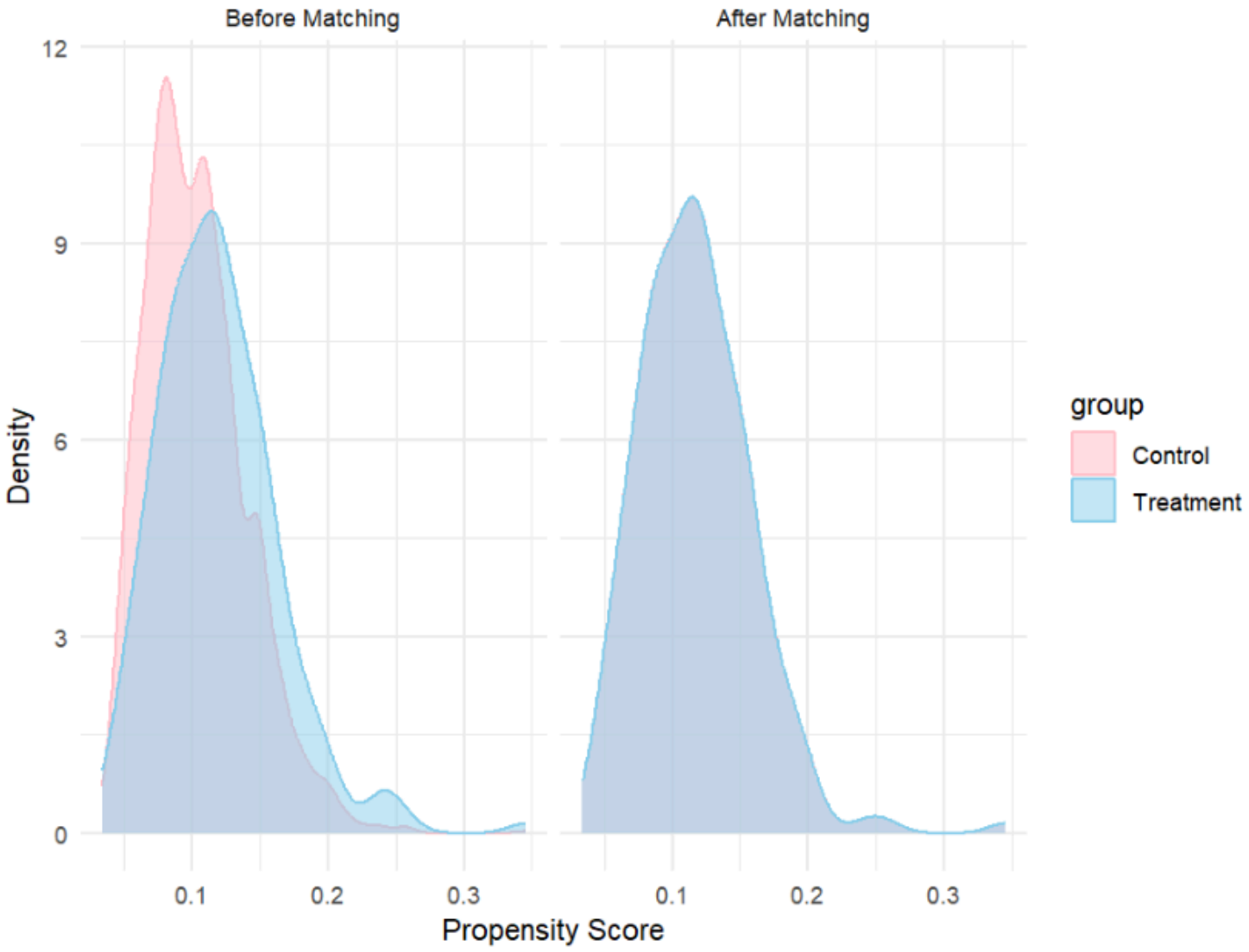


Figure 2

Distribution of propensity scores before and after matching