

Systematic evaluation of influencing factors for Chinese rural doctors' job satisfaction and turnover intention: based on the two-factor theory

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Abstract. – **OBJECTIVE:** In China, rural doctors (RDs) perform crucial health care missions. However, they have received less attention than their colleagues in urban public hospitals. In this specific group, a severe challenge occurs in sync with a high turnover rate and deficient job satisfaction.

MATERIALS AND METHODS: This study aims to systematically summarize and evaluate the influencing factors of job satisfaction and turnover intention among Chinese rural doctors. Seven databases, including PubMed, EMBASE, and China National Knowledge Infrastructure (CNKI), were systematically retrieved, and several experts were consulted to acquire holistic publications in this domain.

RESULTS: A total of 20 full-text papers and 22,721 samples were included. In addition, 53 influencing factors were evaluated, of which 38 factors may play a significant role. Based on Herzberg's two-factor theory, together with China's cultural tradition and national conditions, we classified these influencing factors into sociodemographic characteristic factors (n=13), incentive factors (n=18), and health care factors (n=22). Meanwhile, we discussed and analyzed the influencing factors of turnover intention and job satisfaction in detail and put forward corresponding measures and suggestions for the government.

CONCLUSIONS: We are confident that this research provides a holistic perspective to systematically evaluate the factors influencing the job satisfaction and intention to leave of Chinese rural doctors. Importantly, we hypothesize that the illumination of cases among Chinese rural physicians applies to other countries or regions, which has significant implications for the reform of the medical system by governments or decision-makers worldwide.

Key Words:

Influencing factors, Job satisfaction, Turnover intention, Rural doctors, Chinese, Two-factor theory.

Introduction

According to official reports from the latest Seventh China Census, there were 509.79 million people living in rural areas up to May 11th, 2021, accounting for 36.11 percent of the total population in China¹. Compared to 2014 data², the proportion of rural residents has decreased, but the real problem is that this group continues to constitute the majority of the national population. China's rural areas are home to a large population, but their economic and medical infrastructures are relatively underdeveloped compared to urban areas. Therefore, not only the Chinese government, but also various international health organizations, such as the World Health Organization (WHO), must pay close attention to the overall health status of this population and the development of the health service industry in this region. To realize and promote health equity, the World Health Medical Treatment Fund (WHMTF) should also pay attention to its overall health status and influencing factors, such as health education and various disease prevention projects.

In non-urban areas, rural doctors (RDs) are the primary providers of basic medical services. They also provide basic public health services, such as the establishment of rural health archives, the dissemination of health knowledge, the prevention and control of infectious diseases, health care for

the elderly, and the management of chronic conditions. 57.3 percent of rural patients were initially treated and diagnosed with RDs in the village clinic, according to statistical data^{2,3}. At the end of 2018, there were 845,000 RDs in China, and in 2019, this number became 792,000⁴, while in 2020, there were only 747,000 RDs⁵, 608,828 village clinics, and only 1.55 RDs and health workers per 1000 rural population. In places with vast land and sparse populations, it may not even meet the standard of one village doctor in a clinic. However, according to the statistical results of China's National Health Commission⁶, in 2020, the number of diagnoses and treatments in village clinics reached 1.43 billion, accounting for 18.48% of the total medical service volume in China. Each village clinic's average annual diagnosis and treatment volume was 2,349, and village clinics and rural medical students undertook heavy but key primary medical and health tasks.

Current research focuses insufficiently on Chinese RDs. It is evident from the data that the medical resources of RDs are extremely limited, resulting in a desperate demand from the vast rural population^{4,5}. Notably, at the end of 2010, there were still 1.032 million RDs in China⁶. In just a decade, their number has decreased by nearly 300,000, exacerbating the shortage of medical resources in rural areas. However, because this group is at the bottom of the rural health system, they have received little attention.

In contrast, decision-makers are more interested in resigning medical staff in large hospitals such as urban public hospitals⁷⁻⁹. As one of the best predictors of turnover behavior⁷, high turnover intentions might inevitably lead to brain drain and threaten the sustainability of the whole health system. The existing research evidence on the impact mechanism of job satisfaction and turnover intention of RDs in China is not only insufficient and lacks large-scale empirical investigation; only a few documents have made statistics on them in a small area employing univariate or multivariate logistic regression^{7,10-26}, structural equation models²⁷ or interviews^{14,19,24}, and they are also "scattered" among this evidence. Consequently, it is necessary to use the methods of systematic review and meta-analysis to integrate this evidence, while no scholar has comprehensively evaluated the current situation. Therefore, we have undertaken this important subject and put forward some targeted suggestions and countermeasures to provide an important reference basis for stabilizing Chinese RDs, improving the human resource de-

velopment of the grassroots medical industry, and improving the quality of health services.

The year 1966 saw the introduction of the two-factor theory by American psychologist Herzberg. The full title of this concept is "motivation and hygiene factor theory." According to the theory, there are two primary causes of people's working motivation: hygiene factors, such as opportunities for personal growth, recognition of personal achievements, and career advancement, and extrinsic factors, such as financial rewards. The second is non-work-related motivational factors, such as organizational policy, interpersonal relationships, personal life, salary, and job security^{9,28}. Its central premise is that motivational factors can bring people satisfaction, whereas hygiene factors can reduce dissatisfaction but not bring satisfaction^{29,30}. Despite the fact that the two-factor theory was proposed in 1966, many scholars believe it is still applicable today³⁰⁻³³. They have used it to better comprehend and explain the job satisfaction of medical professionals. According to numerous studies, there is an obvious negative correlation between job satisfaction and intention to leave, and intention to leave is one of the best predictors of actual turnover behavior. Notably, China and other nations have different social systems, national conditions, and national traditions. Therefore, there will be differences between China and other nations in the practical application of which factors should be classified as hygiene factors and which factors should be classified as motivation factors²⁸. For instance, the content that considered hygiene factors abroad, such as wages, may continue to be an important motivator in China.

Collectively, this paper aimed to answer the following key questions.

- (i) What are the influencing factors of job satisfaction and turnover intention of Chinese RDs? Which of these influencing factors are hygiene factors, motivation factors, and just sociodemographic characteristics?
- (ii) Which factors are more important, and which come second? What are the unique features of RDs?
- (iii) What should governments do based on these findings, and what should researchers do in accordance with current progress?

Materials and Methods

This systematic review was conducted following the Preferred Reporting Items for Systematic

Reviews and Meta-Analysis Protocols guideline and PRISMA statement³⁴. This study registered with the International Prospective Register of Systematic Reviews (PROSPERO, registration number: CRD42021289119).

Literature Search

Seven databases were searched by computer, including PubMed, Embase, Web of Science, China National Knowledge Infrastructure (CNKI), WanFang, China Science and Technology Journal Database (VIP), and Chinese BioMedical Literature Database (CBM). At the same time, experts in the field of social medicine were consulted to supplement and obtain relevant literature. The retrieval time limit is from the establishment of the database to January 01st, 2022. Search terms were predefined to allow a comprehensive search strategy that included text fields within records, and the search strategy was based on a combination of 'doctor', 'physician', 'general practitioner', 'village', 'rural', 'primary', 'grassroots', 'satisfaction', 'turnover intention', 'influencing factor', 'China', 'Chinese', etc. We used Boolean operators (within each axis, we combined keywords with the "OR" operator to expand the search, and we then linked the search strategies for the two axes with the "AND" operator to narrow the search). Each database's specific literature retrieval strategies can be found in [Appendix A](#).

Inclusion and Exclusion Criteria

Inclusion criteria: (1) Types of studies: original cross-sectional studies. (2) Types of participants: Chinese rural doctors. (3) The outcome of influencing factors measures: the OR value of influencing factors (which could represent the correlation between sociodemographic factors and rural doctors' job satisfaction or turnover intention) and standardized partial regression coefficient (or 95% CI of OR value) were reported based on univariate or multivariate analysis. (4) The sample size was equal to or greater than 100.

Literature exclusion criteria: (1) Case report, review, systematic evaluation, and meta-analysis. (2) Repeated published and poor-quality literature. (3) The information is incomplete, and the relevant data cannot be obtained or missing.

Data Extraction

First, the title information of relevant literature was retrieved through the retrieval strategy, and Endnote X9 software was used for literature management. After duplication of the included

publications, two reviewers (Yanwei You and Qi Zhang) read the title and abstract for preliminary screening according to the inclusion and exclusion criteria and then read the full text to judge the qualification. A third reviewer (Yuquan Chen) resolved disagreements about the inclusion criteria. For the qualified literature finally selected, two parallel groups (Yanwei You and Yudong Wang) independently extracted the research data and made records, including the first author, survey time, survey area, sampling method, satisfaction, turnover intention, and influencing factors.

Quality Assessment

Two reviewers (Q.Z. and Y.W.) independently evaluated the risk of bias included in the study and cross-checked the results. The third reviewer would decide the final conclusion by discussion (YC) when the two reviewers showed different opinions. The quality of cross-sectional studies was evaluated using 11 items of the observational study quality evaluation standard recommended by American health care quality and research institutions³⁵. There are 11 evaluation items, with a total score of 11 points-low-quality research: 0-3 points; 4-7 points for medium quality; 8-11 points for high quality. The risk of bias (ROB) of the original study was determined according to the quality results.

Data Analysis

The meta package in R software (version 4.0.3, Auckland University, USA) was mainly used for data analysis. For the analysis of the current situation of satisfaction, first, the normality test was conducted. If the data did not conform to normality, they were transformed by logarithm, logit, or double anti-sinusoidal transformation. Taking overall Satisfaction as the analysis index, the calculation method was as follows:

Overall Satisfaction = Number of satisfied people/Total number of samples × 100%.

The calculation method of overall turnover intention was as follows:

Overall Turnover Intention = Number of people with obvious turnover/Total Number of samples × 100%.

Concerning the analysis of influencing factors, data about the risk summary measure (odds ratio) with 95% CI for influencing factors of interest were extracted as provided (univariable and multivariable analysis) in the included studies^{36,37}, and this method was based on the generic inverse variance method³⁸. Considering the accuracy of

multivariate analysis and ensuring the principle of full retrieval, the research results were represented based on the strategy of multivariate analysis with priority, and then the results of the univariate analysis were incorporated in³⁶. For the same literature, if a stratified OR were reported by one of the influencing factors, it would be combined into one dataset using a fixed-effect model strategy and further combined with other references^{39,40}. However, the influence factors were classified and defined differently in different studies. As long as they reflected the same definition described in Table I, we could merge it, consistent with previous research methods³⁶. When the combined effect quantity OR=1 or 95% CI intersected with the invalid vertical line (the abscissa scale value is 1), it indicated no relationship between the influencing factor and the outcome variable (job satisfaction or turnover intention). When the combined effect OR > 1 and the lower limit of 95% CI was greater than 1, this interval fell to the right of the invalid line, indicating that these factors can promote the occurrence of outcome indicators (such as higher job satisfaction or more obvious turnover intention), which was attributed to risk factors. When the combined effect OR and the upper limit of the 95% CI was less than one, and the interval fell on the left side of the invalid line in the forest plot, it indicated that this factor hindered the occurrence of outcome indicators (such as lower job satisfaction or weaker turnover intention), and we considered it a protective factor. The Cochrane Q test and I^2 value were used to test whether there was heterogeneity among studies. If p -value>0.10 and I^2 <40%, it indicated no statistical heterogeneity among the research results, and the fixed effect model was applied to analyze the results. If p -value<0.1 and I^2 >40%, the random effect model was used for meta-analysis. Simultaneously, publication bias was evaluated using Egger's test combined with a funnel plot when the Number of included studies was greater than or equal to 10. Significant clinical heterogeneity was treated by subgroup analysis, sensitivity analysis, or only descriptive analysis.

Results

Study and Sample Characteristics

A total of 536 studies were obtained from various databases and references from relevant publications. A total of 231 duplicate studies were eliminated using Endnote X9 software, 79 irrelevant studies were eliminated by reading the ti-

ties and abstracts, and 133 potentially qualified studies remained. The full text excluded the type of review studies, documents with inconsistent research objects, and incomplete data information. Finally, a total of 20 studies that included 22,721 respondents were included for qualitative and quantitative analysis. Figure 1 shows the detailed process, and the basic characteristics of the included literature are shown in Table I.

Considering that the definitions of certain influencing factors used in the included studies varied substantially, we directly categorized these factors for further examination. The meta-analysis included three categories: sociodemographic characteristics, motivation factors, and hygiene factors (based on the two-factor theory). However, due to vast differences in the political, economic, and cultural traditions of various nations, the types and projects of motivation and hygiene factors vary to a certain degree. For instance, in developed Western nations, the primary motivational factors are high-level needs such as achievement, recognition, and work attraction. China's motivational factors include both high-level needs (development, recognition, and responsibility) and basic-level needs (remuneration). According to Chinese national conditions and the social system, we divided these factors into motivation and hygiene factors after consulting pertinent references and books. **Supplementary Table I** lists the classifications and definitions of influencing factors in the subsequent meta-analysis. **Supplementary Table II** displays the original influencing factors and number of researchers extracted from each original study in order to conduct a comprehensive meta-analysis.

Supplementary Table III displays the quality evaluation of the research methods, which includes ten high-quality studies, ten medium-quality studies, and no poor-quality studies. Figure 2 illustrates the risk bias evaluation (summary plot and traffic light plot) of all studies. After evaluating the quality of the literature, it was determined that none of it needed to be excluded due to poor quality. Therefore, qualitative and quantitative analysis of the 20 studies included in the final study can be performed directly. Simultaneously, we not only performed a meta-analysis of the various hygiene factors and motivation factors determined based on the two-factor theory combined with Chinese national conditions, but we also analyzed the influence of relevant sociodemographic characteristic variables (such as age, gender, and years of service) on RDs' job satisfaction or intention to leave.

Job Satisfaction and Turnover Intention Status

The results showed that 3,942 of 7,554 RDs in 10 studies expressed high satisfaction with their

current work. The normality test was applied in these ten studies (Shapiro-Wilk test, p -value=0.6853). Due to the high heterogeneity of the single rate, a random effect model was used for

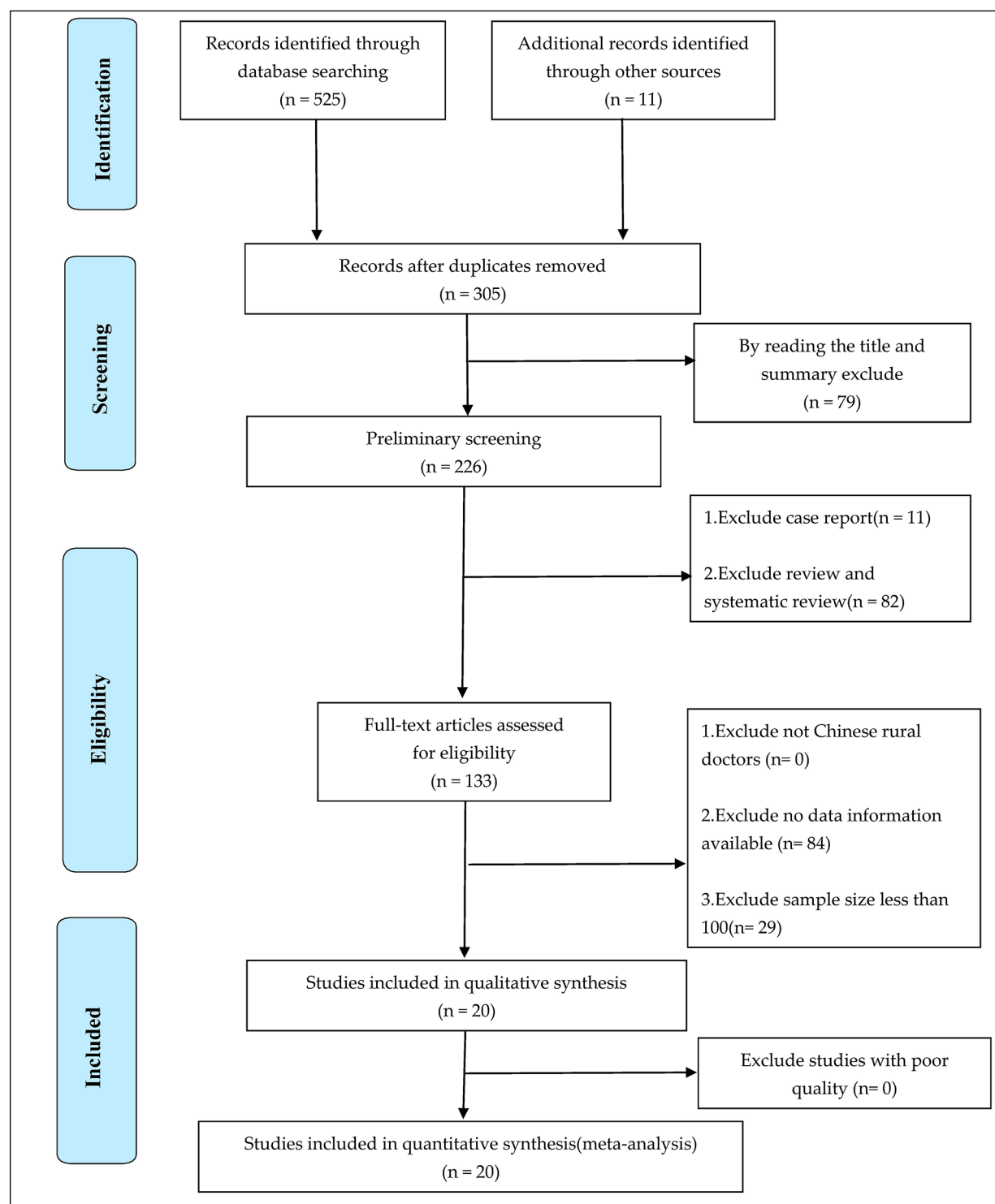


Figure 1. PRISMA flow chart of included studies.

Table I. Characteristics of included studies about influencing factors for Chinese rural doctors' job satisfaction and turnover intention.

Study ID	First Author	Publication Year	Survey Area	Investigation Period	Sampling Method
1	Ma et al ¹⁰	2017	Shandong	2015.10~2015.11	Multi stage stratified random sampling
2	Dai et al ¹¹	2017	Anhui	2016.06~2016.07	Random sampling
3	Jing et al ¹²	2020	Shandong	2018.05	Multi stage stratified random sampling
4	Xing et al ¹³	2010	Liaoning	2009.01~2009.02	Census
5	Lai et al ¹⁴	2012	Hunan	2011.12	Stratified random sampling
6	Gu et al ¹⁵	2019	Shandong	2016.06~2016.08	Stratified random sampling
7	Li et al ¹⁶	2016	Shandong, Guangxi and Shaanxi	2014.04	Multistage sampling
8	Wu et al ¹⁷	2015	Zhejiang	NR	Census
9	Wang et al ¹⁸	2021	Shandong	2020.05	Multi stage stratified random sampling
10	Ruan ¹⁹	2013	Yunnan	NR	Systematic sampling
11	Wang et al ²⁷	2020	Shandong	2017.12	Multistage random cluster sampling
12	Zhang et al ²	2016	Jiangxi	NR	Multi stage stratified random sampling
13	Zhang et al ³	2019	Gansu and Sichuan	2012~2013	Multi stage stratified random sampling
14	Fang et al ²⁰	2014	Hubei	2012.07~2012.08	Multi stage stratified random sampling
15	Liu et al ²¹	2019	11 western provinces in China*	2013.06~2013.09	Three-stage random sampling method
16	Chen et al ²²	2021	Henan	2019	Stratified random sampling
17	Qian ²³	2012	Anhui	NR	Cluster sampling
18	Zhang ²⁴	2015	Xinjiang	2013.01~2013.10	Multistage random cluster sampling
19	Gong et al ²⁵	2020	Tianjin	2019	Stratified random sampling
20	Li et al ²⁶	2020	Shanxi	NR	Multistage random cluster sampling

NR: Not Reported. *Gansu, Guangxi, Kweichow, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, and Yunnan.

meta-analysis. The results showed that the overall job satisfaction was 54.3% (95% CI: 34.2%-74.4%). On the other hand, 4,191 of the 13,928 RDs in 8 studies expressed strong turnover intention, verified by the normality test (Shapiro-Wilk test, p -value=0.4237). After the meta-combination of the random effect model, the overall turnover intention accounted for 32.9% (95% CI: 23.8%-41.9%). The forest plot of these two results is shown in Figure 3.

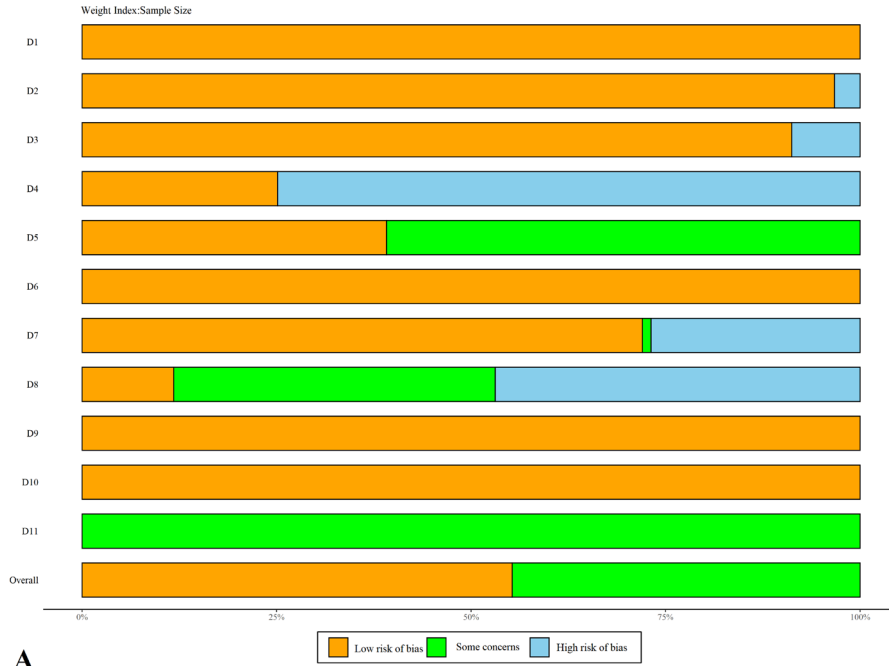
Influencing Factors of Job Satisfaction

Among all the literature used for meta-analysis, only the working load, promotion prospect, patient-doctor relationship, pension security, age, and educational level in Ma et al¹⁰ and Xing et al¹³ involved univariate analysis, and the rest were the results of multivariate analysis. The impact of sociodemographic characteristics variables, hygiene factors, and motivation factors on job satisfaction of RDs in China is shown in Table II.

First, among all documents included, the meta-analysis involving the influencing factors of sociodemographic variables was analyzed. The results showed that the RDs' job satisfaction indexes, including the confidence intervals of gender, years of service, education, marital status, age, operating post, and professional title, intersected with the invalid line, indicating that these factors did not correlate with the outcome indicators. The risk factor was private hosting (OR:1.29, 95% CI: 1.05-1.58), indicating that the satisfaction of RDs in privately sponsored village health centers was higher than that in public rural hospitals or clinics. The protective factor was poor health condition (OR:0.145, 95% CI: 0.029-0.737), indicating that the worse the personal health status of RDs, the lower their job satisfaction, and vice versa.

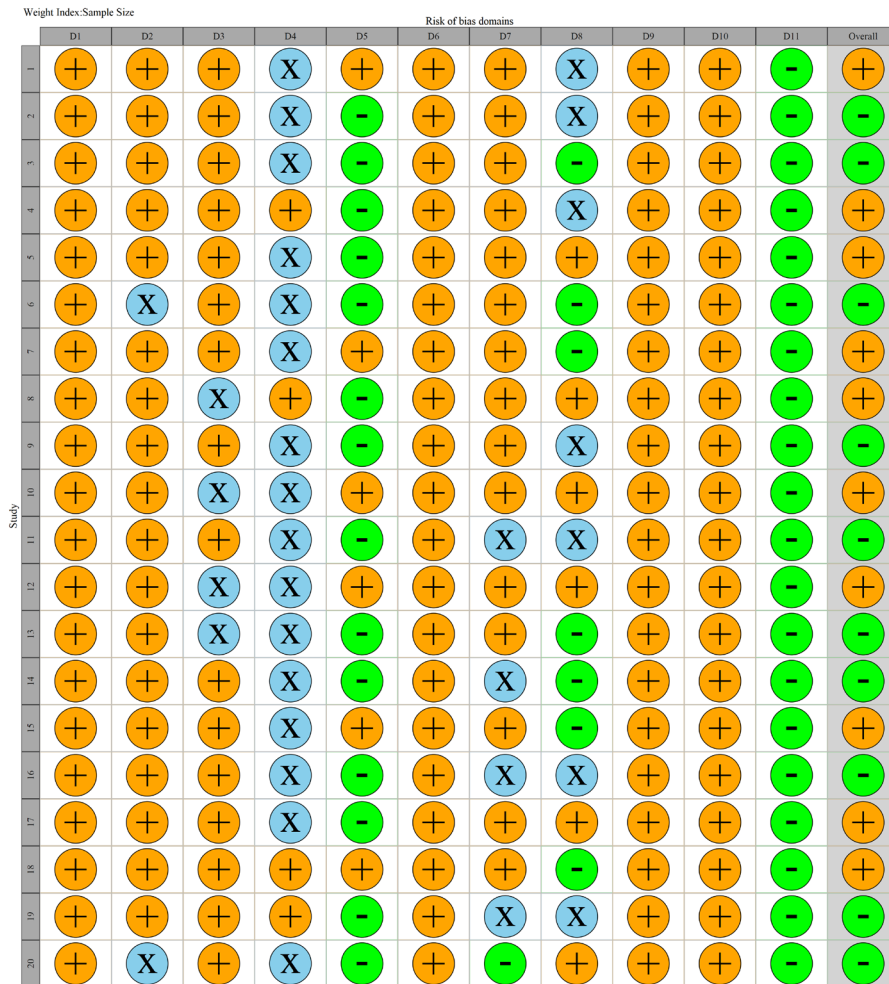
Furthermore, among the results involving hygiene factors, work stress, pension security, social status, and insurance were not related to the job satisfaction of RDs. All risk factors were ranked from high to low

Risk of Bias in Meta-analysis of Influencing Factors of Job Satisfaction and Turnover Intention of Chinese Rural Doctors Based on Two Factor Theory



A

Risk of Bias in Meta-analysis of Influencing Factors of Job Satisfaction and Turnover Intention of Chinese Rural Doctors Based on Two Factor Theory



B

- D1: Define the source of information (survey, record review)
- D2: List inclusion and exclusion criteria for exposed and unexposed subjects (cases and controls) or refer to previous publications
- D3: Indicate time period used for identifying patients
- D4: Indicate whether or not subjects were consecutive if not population-based
- D5: Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants
- D6: Describe any assessments undertaken for quality assurance purposes (eg. test/retest of primary outcome measurements)
- D7: Explain any patient exclusion from analysis
- D8: Describe how confounding was assessed and/or controlled
- D9: If applicable, explain how missing data were handled in the analysis
- D10: Summarize patient response rates and completeness of data collection
- D11: Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained

- Judgement
- + Low |
 - Unclear |
 - X High |

Figure 2. A, Summary plot of risk bias. B, Traffic light plot of risk bias.

Table II. Meta-estimate of odds ratio for influencing factors of Chinese rural doctors' job satisfaction based on the two-factor theory.

Influencing Factors	No. of Studies	Heterogeneity test		Meta-estimate OR (95% confidence interval)
		I ² (%)	P-value	
Sociodemographic characteristic variables				
Being male	5	0	0.49	0.996 (0.935~1.061)
Years of service	4	81	<0.01	1.129 (0.63~2.025)
High educational level	6	78	<0.01	0.927 (0.764~1.125)
Marital status	3	86	<0.01	1.132 (0.594~2.157)
Age	6	93	<0.01	1.117 (0.852~1.466)
Operating post	3	0	0.37	0.98 (0.922~1.042)
Poor health condition	1	-	-	0.145 (0.029~0.737)
Private hosting	1	-	-	1.29 (1.05~1.58)
Professional title	3	72	0.03	1.105 (0.698~1.749)
Hygiene Factors				
Working stress	2	80	0.03	0.677 (0.315~1.456)
Working load	2	88	<0.01	0.651 (0.43~0.984)
Pension security	2	72	0.06	1.22 (0.945~1.576)
Great changes in income	1	-	-	0.5 (0.31~0.81)
Matching compensation with workload	1	-	-	3.78 (1.16~12.35)
Government supports equipment	1	-	-	2.836 (1.174~6.85)
Government-funded village clinic	1	-	-	3.223 (1.322~7.857)
Social position	3	94	<0.01	1.374 (0.896~2.108)
Insurance	1	-	-	0.626 (0.248~1.58)
Healthcare reforms	1*	0	0.93	2.355 (1.538~3.607)
Counties' GDP	1*	0	0.71	0.379 (0.176~0.812)
Good working environment	2	92	<0.01	1.292 (1.199~1.393)
Motivation Factors				
Patient-doctor relationship	2	91	<0.01	1.283 (1.201~1.37)
Leadership support	3	81	<0.01	1.115 (0.864~1.439)
Good organization and management	3	71	0.03	1.408 (1.178~1.681)
Promotion prospect	1	-	-	1.433 (1.225~1.641)
Position reputation	3	97	<0.01	1.188 (1.015~1.391)
Higher income compared with others in the local area	1*	44	0.15	1.745 (1.179~2.583)
Satisfied with learning and training	1*	0	0.87	2.585 (1.78~3.754)
Training opportunities	4	40	0.17	1.141 (1.096~1.189)
Sense of promotion fairness	1	-	-	1.274 (1.225~1.323)
Sense of profession value	4	96	<0.01	1.813 (1.275~2.578)
Income	5	40	0.15	1.257 (1.199~1.318)

*Stratified data within the same study were combined using a fixed effect model.

according to their importance and role: matching compensation with workload (OR=3.78), government-funded village clinic (OR=3.223), government support equipment (OR=2.836), healthcare reforms (OR=2.355), and good working envi-

ronment (OR=1.292). All protective factors were ranked from high to low according to their importance and role: countries' GDP (OR=0.379), great changes in income (OR=0.5), and working load (OR=0.651).

Rural doctors' job satisfaction and turnover intention?

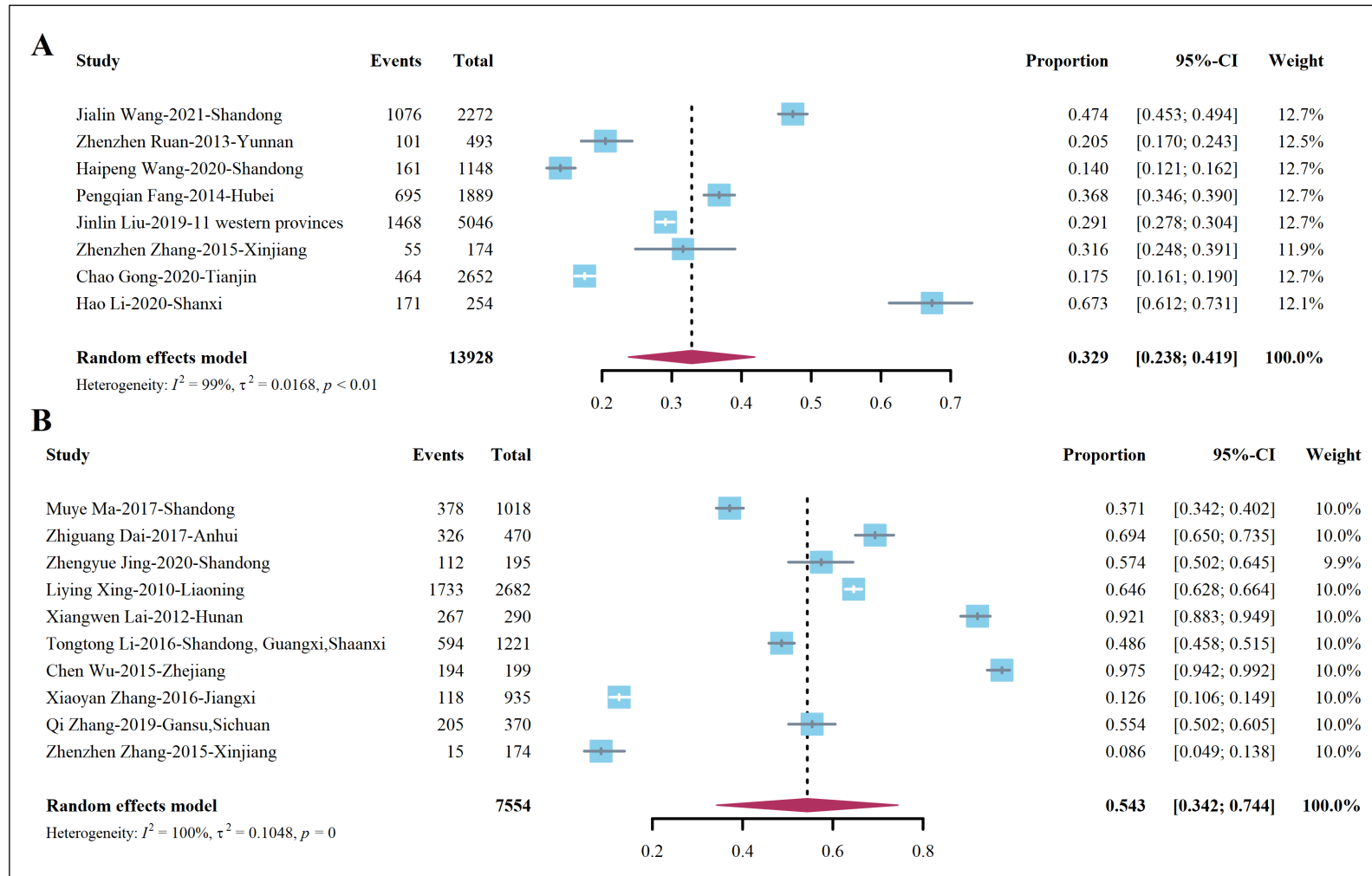


Figure 3. (A) Forest plot of overall turnover intention of rural doctors in China; (B) Forest plot of overall job satisfaction of rural doctors in China.

Table III. Meta-estimate of odds ratio for influencing factors of Chinese rural doctors' turnover intention based on the two-factor theory.

Influencing Factors	No. of Studies	Heterogeneity test		Meta-estimate OR (95% confidence interval)
		<i>I</i> ² (%)	<i>p</i> -value	
Sociodemographic characteristic variables				
Being male	2	84	0.01	1.007 (0.256~3.96)
Marital status	1	-	-	1.18 (0.42~3.35)
Age	4	79	<0.01	1.159 (0.972~1.382)
High educational level	6	48	0.09	1.43 (1.139~1.796)
Operating post	2	34	0.22	0.861 (0.584~1.27)
Have part-time job	1	-	-	1.443 (1.105~1.884)
Professional title	3	65	0.06	1.02 (0.686~1.516)
Medical institution	2	0	0.38	1.073 (0.97~1.187)
Employment mode	1	-	-	3.714 (3.057~4.37)
Years of service	2	0	0.31	1.414 (1.128~1.772)
Certificate	1*	50	0.14	0.816 (0.648~1.029)
Hygiene Factors				
Working load	2	93	<0.01	2.064 (0.493~8.634)
Matching compensation with workload	1*	82	0.02	0.871 (0.682~1.114)
Working hours	2	0	0.42	1.244 (1.081~1.432)
Dissatisfied with the promotion	1	-	-	0.927 (0.609~1.41)
Poor working environment	1	-	-	2.55 (1.32~4.93)
Poor job stability	1*	49	0.16	1.366 (1.045~1.786)
Actual and expected monthly income gap	1	-	-	1.948 (1.187~3.196)
Number of night shifts	1*	0	0.33	1.256 (1.091~1.447)
Dissatisfied with organization and management	2	30	0.23	1.527 (1.213~1.922)
The way boss handles his/her workers	1*	0	0.64	1.157 (0.859~1.557)
Integrated management	1	-	-	1.148 (0.956~1.379)
Motivation Factors				
Sense of profession value	1*	0	0.98	1.057 (0.796~1.403)
Job reward	2	0	0.95	0.823 (0.725~0.934)
Income	7	94	<0.01	0.689 (0.537~0.883)
Job satisfaction	3	0	0.9	0.912 (0.858~0.97)
Satisfied with the promotion	2	24	0.25	0.783 (0.705~0.87)
Income satisfaction	2	50	0.16	0.546 (0.461~0.646)
Higher income compared with others in the local area	1*	0	0.94	0.81 (0.67~0.979)
Social recognition	1	-	-	0.97 (0.89~1.07)
Good organization and management	1	-	-	0.66 (0.58~0.75)
Competence of manager in making decisions	1*	55	0.14	1.313 (0.986~1.748)
Level of attention by leaders	1*	0	1.00	1.160 (0.878~1.534)

*Stratified data within the same study were combined using a fixed effect model.

In addition, among all the motivation factors, only leadership support had nothing to do with the job satisfaction of Chinese RDs. Other factors were risk factors, which were ranked in order of

importance from high to low: Satisfaction with learning and training (OR=2.585), sense of professional value (OR= 1.813), higher-income compared with others in the local area (OR=1.745),

promotion prospects (OR=1.433), good organization and management (OR=1.408), sense of promotion fairness (OR =1.274), patient-doctor relationship (OR=1.283), income (OR=1.257), position reputation (OR=1.188), and training opportunities (OR=1.141).

In conclusion, all risk factors affecting the job satisfaction of RDs in China are listed in order of importance, from high to low, as follows: compensation commensurate with workload, government-funded village clinics, and government support equipment. Satisfaction with learning and training, healthcare reforms, sense of professional value, higher income relative to others in the local area, promotion prospects, good organization and management, good working environment, private hosting, sense of promotion fairness, patient-physician relationship, income, position reputation, and training opportunities. In addition, all protective factors affecting the job satisfaction of RDs in China were ranked according to their significance: poor health conditions, county GDP, significant income fluctuations, and workload.

Influencing Factors of Turnover Intention

Building on the fact that all factors of the included literature reported their OR values and were processed by multivariate analysis, it was evident that the analysis results of factors affecting turnover intention were convincing. Table III shows the impact of sociodemographic characteristics variables, hygiene factors, and motivation factors on the turnover intention of RDs in China.

Firstly, in the meta-analysis involving the influencing factors of sociodemographic variables on RDs' turnover intention, the 95% confidence intervals of gender, marital status, age, operating post, certificate, professional title, and medical institution crossed the invalid line, showing that they did not correlate with the outcome indicators. The remaining influencing factors were risk factors, which were ranked from high to low importance: employment mode (OR=3.714), part-time job (OR=1.443), high educational Level (OR=1.433), and years of service (OR=1.414).

Simultaneously, the analysis results involving hygiene factors, including working load, matching compensation with the workload, dissatisfaction with the promotion, how the boss handles his/her workers, and integrated management, had nothing to do with turnover intention. While the other influencing factors were all risk factors, as the effect of this factor increased, it

promoted the tendency of Chinese RDs to leave their jobs. These factors were ranked from high to low importance: Poor working environment (OR=2.55), Actual and expected monthly income gap (OR=1.948), Dissatisfied with organization and management (OR=1.527), Poor job stability (OR=1.366), Number of night shifts (OR=1.256), and Working hours (OR=1.244).

Concurrently, in the analysis, results involving motivation factors, Sense of professional value, social recognition, Competence of manager in making the decision, and level of attention by leaders were not related to the turnover tendency of Chinese RDs. All other protective factors were arranged in descending order of importance and effect: Income satisfaction (OR=0.546), Good organization and management (OR=0.66), Income (OR=0.689), Satisfied with the promotion (OR=0.783), Higher income compared with others in the local area (OR=0.81), Job reward (OR=0.823), Job satisfaction (OR=0.912), indicating that when the effect of this factor increased, it would reduce RDs' turnover tendency.

In conclusion, all risk factors affecting the turnover intention of RDs in China were listed from high to low importance: employment mode, poor working environment, actual and expected monthly income gap, satisfied with learning and training, dissatisfied with organization and management, part-time job, high educational level, years of service, poor job stability, number of night shifts, and working hours. All protective factors affecting the turnover intention of RDs in China were listed in descending order of importance: income satisfaction, good organization, and management, income, satisfied with the promotion, higher income compared with others in the local area, job reward, job satisfaction.

Discussion

Job Satisfaction and Turnover Intention of Rural Doctors in China

Among the ten combined studies on the job satisfaction of rural doctors, the overall Satisfaction was 54.3% (95% CI: 34.2%-74.4%), which was relative to the doctors rated as "dissatisfied" or "average," indicating that nearly half of rural doctors were dissatisfied with their current job. This is in sharp contrast to doctors' job satisfaction in secondary and tertiary public hospitals in cities or counties in China³⁰⁻³³, and only 6.60% of them are dissatisfied³⁰. Of course, some studies showed that

the satisfaction of doctors in public hospitals in China was not high⁴¹, but overall, the job satisfaction of RDs was relatively low, not to mention compared with 80% of primary care doctors in the United States⁴².

Similarly, the meta-analysis results of 8 studies on turnover intention showed that the overall turnover intention was 32.9% (95% CI: 23.8%-41.9%), which was relative to the evaluation results of “no turnover intention,” “slight turnover intention,” or “moderate turnover intention”. Compared with doctors in urban or county-level public hospitals in China, this proportion was also not low. Only 6.1%-28.2% wanted to leave or change careers^{9,43,44}.

Impact of Sociodemographic Characteristics

The results of this study included 13 basic sociodemographic characteristic variables. It is not appropriate to classify them into any motivation or hygiene factors category, but we would like to elaborate on the influencing factors more comprehensively, so these variables are specifically classified in this part. Among these characteristics, gender, marital status, age, operating post, and professional title are unrelated to job satisfaction or turnover intention. However, it should be noted that we combine all the research results for each index. For age, because our definition range is “all age groups”, from the overall trend, age may have no effect, but its OR value may be meaningful in a certain age range. For example, some studies have shown that among RDs over 40 years old, the OR confidence interval of age is obviously on the right side of the invalid line¹⁶, which suggests that older age tends to correspond with higher satisfaction. In contrast, another study has shown that there is no obvious correlation between each age group of RDs over 36 years old and satisfaction³. However, when health managers make decisions under limited resources, the above factors need to be used with caution to distinguish key intervention objects^{2,45}.

In the analysis of the impact on the turnover intention of RDs, we note that employment mode is the most important factor that may affect the turnover of RDs due to our results of the comparison between RDs with and without proper staffing, which is consistent with previous reports⁴⁶⁻⁴⁸. In recent years, village clinics have gradually changed from individual to public welfare with the promotion of county medical communities and rural integration. RDs have been included

in the management of health centers, signed labor contracts with health centers, and changed their identity into temporary employees of village clinics. In China, most of the salaries and activity funds of RDs with staffing come from the government, so their income is relatively stable, while contract doctors are more likely to face the possibility of nonrenewal or termination^{14,47}. At the same time, doctors with legal staffing also have a strong sense of belonging to their units, so their turnover intention will be greatly reduced¹⁴. Therefore, consistent with many Chinese scholars⁴⁶⁻⁴⁸, we also suggest that RDs be included in the staffing of local public institutions⁴⁹.

Additionally, compared with RDs with higher education, their turnover intention may be higher, which is not difficult to understand because RDs with higher education have more career choices and promotion opportunities. Several studies also show that^{2,14,17,21,27,50}, the overall educational level of RDs is low, even though most of them are below undergraduate. However, compared with doctors in urban three-level public hospitals in China⁴³, their educational level is significantly improved, which may mean that under the same conditions, if RDs have a higher educational level, they tend to go to higher-level hospitals rather than stay at the bottom of the rural medical system. The low educational level may further weaken the medical level of the already scarce village medical resources^{51,52}. Therefore, we appeal to the government to encourage talent with higher educational backgrounds to go to rural areas through various measures to improve and build the local medical and health environment. In addition, increasing RDs may choose part-time jobs in low-income backgrounds to earn extra income¹⁸, resulting in a worse situation with higher turnover intention.

Unlike the results of turnover intention, education has become an irrelevant variable in the study of job satisfaction. This is partly because the higher education opportunities among RDs are not applied widely. Therefore, few RDs have different job satisfaction due to the imbalance of “input-output”. However, previous studies have found that a higher educational level is associated with higher professional requirements and expectations^{14,16,22}. In contrast, higher education experience may reduce job satisfaction⁴⁵, which is consistent with our expectations. The sociodemographic variables that can positively impact job satisfaction include the personal health of RDs and privately sponsored village health centers. As mentioned before, heavy workload and

work pressure can bring doctors underlying health risks, which may reduce their work efficiency and job satisfaction^{3,26}. However, compared with private clinics¹³, doctors in village clinics have more autonomy and freedom, which improves their job satisfaction to a certain extent.

Impact of Hygiene Factors

Eight determinants and four unrelated factors were classified as indicators of job satisfaction of RDs. These results are in line with the two-factor theory. Among them, matching compensation with the workload, good working environment, working load, healthcare reforms, and income stability are important factors affecting the job satisfaction of RDs. These factors also greatly impact the job satisfaction of doctors in other categories (such as doctors in secondary and tertiary public hospitals) or countries^{9,29,53-55}, and our results are consistent with these findings.

Government support (including government-funded village clinics and government support equipment) is a relatively independent characteristic factor affecting RDs' job satisfaction. Government support is an important means to stabilize the ranks of RDs and implement basic public health services, which comes from good policy reform^{2,26}. However, according to previous findings, the subsidies for RDs were often delayed or withheld^{46,47,56}. Many RDs considered allocating public health services time-consuming and that the subsidies were insufficient to compensate for their efforts. Under this condition, with implementing policies, sufficient government support will inevitably lead to high job satisfaction⁵⁷.

Interestingly, we found that the higher the economic level of the county where the rural doctor is located, the lower the satisfaction of the rural doctor. Li et al¹⁶ found that doctors practicing in counties with high GDP felt less satisfied (OR=0.328, 95% CI: 0.112~0.96), and there was no significant difference in counties with average and low GDP. According to these results, to improve the job satisfaction of RDs, we suggest that the government increase subsidies to RDs, improve the level of essential drugs and public health subsidies for RDs, further strengthen the construction of standardized village clinics, and optimize the allocation of diagnosis and treatment equipment and public appliances in clinics. RDs engaged in health work in remote and poor areas are worthy of policy preference.

In the analysis results of the influencing factors of turnover intention, we note that a poor work-

ing environment may be the most important factor causing turnover intention increments, which is similar to previous research results on the influencing factors of doctors' turnover intention in public hospitals⁵⁸. This includes the external working environment and the internal organizational environment. A recent study has shown that a supportive work environment positively impacts public employees' performance, self-efficacy, and job satisfaction⁵⁹. Thus, for Chinese RDs, poor working conditions may reduce job satisfaction and increase their turnover intention⁶⁰. The second influencing factor is the "actual and expected monthly income gap," which is not difficult to understand. From the majority view of career selection, "doctor" is an ideal and high-income job aspiration. Indeed, the income of RDs is often unsatisfactory, which leads to a psychological gap and increases their turnover intention^{42,48,52,61}. Secondly, dissatisfaction with the organization and management is the main reason for the resignation of RDs. Under the rural integrated management mode, township hospitals act as supervisors of village clinics and evaluate the performance of RDs. If the RDs fail to reach the agreed results, their subsidies will be deducted, reducing job satisfaction and talent outflow⁵⁶. The number of night shifts and excess working hours per week is considered one of the reasons for the sharp increase in work pressure⁵⁷. Under the sharp increase in work pressure, their income does not necessarily increase^{26,59}, which also leads to the high turnover intention of RDs. Therefore, we suggest that the government should improve the working environment of RDs, further strengthen the construction of standardized village clinics, and enhance the participation of RDs in decision-making. Superior departments or institutions should fully consider the opinions and ideas of RDs when making decisions related to RDs to reduce their unnecessary work pressure.

Impact of Motivation Factors

According to the two-factor theory, motivation factors can motivate RDs and improve their work enthusiasm and sense of responsibility, hygiene factors can only eliminate their dissatisfaction to maintain their current state, and the incentive effect is very weak or almost none. Expectedly, motivation factors are more important to some extent⁶⁰. Based on the social exchange theory, human resources management (HRM) in public institutions should be approached to focus more on work motivation theory, specifically on the psycho-sociological profile of the public employee⁵⁹.

Among the results of all motivation factors on job satisfaction, only leadership support has nothing to do with the job satisfaction of Chinese RDs, and the other results are in line with the two-factor theory. We think that this may be related to the selected samples. In the analysis of this factor, only Zhang et al²⁴ believed that this factor was irrelevant, which might partially be because RDs in this area were very satisfied with their leadership support. However, the results of the other two studies show that^{10,12} the more support from superiors, the higher job satisfaction. Therefore, exploring this factor still needs to be further verified in the future. Among other impact factors, it seems that the more training opportunities for RDs, the higher the fairness of training times; the better the effect of training and learning, and the greater the improvement of RDs' work skills and job satisfaction^{2,10,12} and the better they can serve the health of rural residents, indicating that the training of RDs should be strengthened and their learning and training opportunities should be increased. The second point is the work value. Many RDs sincerely regard their job as a glorious career^{10,12,60}, regardless of remuneration. This is because some of their parents are RDs, so they also inherit the work value from generation to generation. An ideal doctor-patient relationship can bring a sense of work value, but unexpectedly, Zhang et al² found that more than ordinary RDs feel a discordant relationship with patients, which is also explained in his report.

In addition, a survey showed that working in intensive care units and exposure to suspected or confirmed COVID-19 patients are correlated with prolonged stress, anxiety, and depression in frontline medical staff⁶². This probably leads to a decline in job satisfaction. Another recent study showed that COVID-19 healthcare personnel is at an elevated risk for developing stress-related psychiatric disorders, whereas COVID-19 primary care providers feel a significant responsibility to continue working while fatigued⁶³. Therefore, during the COVID-19 pandemic, whether RDs in China would also suffer from serious job burn-out and lead to a decline in job satisfaction, but whether the sense of work value would ease this downwards trend and how much it would ease was unknown. Unfortunately, few surveys on job satisfaction with RDs during the COVID-19 pandemic. Therefore, as mentioned above^{10,46-50}, improve the work identity of RDs, further clarify the identity status of RDs, provide proper staffing and guarantees for RDs in capable areas, improve

the social status and work value of RDs, enhance their sense of achievement and stabilize the team of RDs. Other influencing factors, such as higher income than others in the local area, good organization and management, and a sense of promotion fairness, are similar to doctor satisfaction in secondary and tertiary public hospitals in China^{29,53,55}.

Similarly, in analyzing the influencing factors of turnover intention, the income satisfaction of RDs is undoubtedly the most important factor^{13,17,19,21,26,27}. Other factors with great correlation, such as income level, job reward, and higher income compared with others in the local area, are factors that have a strong impact on turnover intention. These belong to the salary category, another important part of the two-factor theory. Salary is classified into survival needs in Maslow's hierarchy of needs theory. It is one of the most basic needs and has a high positive effect on the job satisfaction of RDs⁵³. With the advancement of the new medical reform, especially since the implementation of the "zero difference" sales of drugs and the equalization of basic public health services, the workload of RDs has increased significantly. Unfortunately, the basic drug and public health subsidies have not increased synchronously², resulting in a significant decrease in their income level, which has greatly increased the turnover intention of this group. In addition, in implementing the relevant systems of the new medical reform, the decline of diagnosis and treatment income and the unreasonable payment method of subsidies at the grassroots level are underlying problems^{2,10}. However, increasing the salary is insufficient to solve the problem of RDs' turnover intention for a long time. For example, a region in Nanjing, Jiangsu Province, once introduced general practitioners from secondary and tertiary hospitals to grassroots medical institutions with high salaries, which on the one hand caused salary competition with exceptional hospitals and, on the other hand, intensified the dissatisfaction of the original RDs with salaries⁶⁴⁻⁶⁶. Therefore, making up for the work value return of grassroots posts requires the follow-up and cooperation of grassroots medical institutions with supporting measures and the adjustment and guarantee of government policies and regulations. Second, good organization and management will reduce their turnover intention. Compared with dissatisfaction with organization and management⁵⁶, we have demonstrated it in health factors. Finally, there is a negative correlation between overall job satisfaction and turnover intention, consistent with previous research results^{7,60}.

Strength and Limitations

The greatest strength of our study lies in the extensive analysis of global publications by summarizing the influencing factors of job satisfaction and turnover intention of Chinese RDs for the first time and classifying these influencing factors based on the novel perspective of Herzberg's two-factor theory and different sociodemographic characteristics in combination with China's culture and national conditions and explaining these factors in detail. Subsequently, by using systematic and meta-evaluation methods, our study can provide a quantitative and qualitative presentation of these important topics to the vast audience of our journal. Compared to previous analyses of this topic, this study not only identified some unique characteristics of Chinese RDs (impact of employment mode, higher educational level, work value), but also included several factors that may not be related to their job satisfaction and turnover intention (impact of gender, marital status, social status), it also ranked the weights of different influencing factors and put forward targeted suggestions and measures for health managers.

However, this study also has some limitations. First, due to insufficient attention to RDs, the influencing factors included in this study were still not comprehensive. For this reason, by consulting experts and visiting several representative RDs, many potential factors can likely affect job satisfaction or turnover intention, including the geographical location of the clinic (remote geographical location may reduce the number of patients visiting the clinic and increase the turnover intention of RDs), the enrollment of children (most rural districts bring poor educational resources to their children) and the separation of their family. Can be added to future research. In addition, in response to the increasing volume of articles on the relationship and influencing factors among RD topics, it is necessary to identify further the spatial and temporal distributions of the included studies, identify the major and highly cited scholars, and reveal the thematic frontiers of this special issue. Emerging methods such as bibliometrics may help to synthesize the accumulating knowledge and provide a holistic overview of the global status of these issues⁶⁷⁻⁶⁹. Last but not least, it is worth exploring the job satisfaction and turnover intention of RDs in China under the background of the COVID-19 pandemic or other public health emergencies in the future.

Conclusions

Based on Herzberg's two-factor theory and combined with Chinese national conditions and cultural traditions, this study summarized and evaluated the influencing factors of job satisfaction and turnover intention with both a quantitative and qualitative strategy. The findings are as follows:

(i) In our study, we evaluated a total of 53 influencing factors, of which sociodemographic variables such as gender, marital status, age, operating post, and professional title were irrelevant to job satisfaction or intention to leave. However, variables including formal professional title, higher education, and part-time employment were significantly associated with intention to leave. Personal health status and the (private or public) facilities of rural clinics were related to job satisfaction. (ii) Among the hygiene factors, the most important influencing factors on rural doctors' turnover intention were poor working environment, a gap in actual and expected monthly income, and dissatisfaction with organization and management. Simultaneously, the most important influencing factors of rural doctors' job satisfaction were salary matching the workload, government-funded village clinics, and countries' GDP. Among the motivation factors, the significant influencing factors on rural doctors' turnover intention were income satisfaction, good organization, management, and income. Meanwhile, the significant factors affecting their job satisfaction were satisfaction degree of service and technical training, sense of professional value, relatively higher salaries in their local area. (iii) Current experiences could be utilized to explore policy development and improvement concepts to support government take-up. The expansion of the summarized results will help to demonstrate the efficacy and sustainability of various influencing factors, and then provide information for protecting the rights and interests of rural physicians, stabilizing the team of this group, and ensuring the future health of rural residents. Concurrently, we hypothesize that the enlightenment of cases among Chinese rural physicians applies to other developing countries or regions, which has significant implications for the reformation of the medical system by governments or decision-makers around the world. In addition, due to a lack of relevant research, it is unknown whether the COVID-19 pandemic or other public health emergencies will alter these influencing factors and corresponding

weight values regarding rural doctors in China; thus, future researchers can conduct additional research in this context.

Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Data Availability Statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author or the author Yuquan Chen cyq199801@126.com.

Authors’ Contributions

Conceptualization, Yuquan Chen; Methodology, Yuquan Chen and Yanwei You; Material search, Qi Zhang, Yudong Wang; Data extraction, Qi Zhang, Yudong Wang and Yuquan Chen; Data analysis, Yuquan Chen and Yanwei You; Writing-original draft preparation, Yuquan Chen; Writing-review and editing, Yuquan Chen, Yanwei You, Qi Zhang, Yudong Wang and Tao Dai; Supervision, Tao Dai; Project administration, Tao Dai; Funding acquisition, Tao Dai. All authors have read and agreed to the published version of the manuscript.

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