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Turnover intention among primary health workers in China: a systematic review and meta-analysis

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Abstract

Objectives To analyze the prevalence and determinants of turnover intention (the intent to change or leave current employment) in order to provide evidence for improving retention measures.

Design Systemic review and meta-analysis.

Data sources Four English language databases (PubMed, EMBASE, Cochrane Library and PsycINFO) and three Chinese databases (CNKI, CSPD and CBM) were searched up to October 2019.

Eligibility criteria Eligible studies were observational or descriptive studies conducted in mainland China, with human participants. The prevalence of turnover intention among health workers and related factors (potential risk factors) had to be explicitly reported in each included study.

Data extraction and synthesis Data were extracted by one author and reviewed independently by two other authors. For each factor analyzed by a meta-analysis, it was required that the factor is the same consistently among different studies, and at least three studies included it. The quality of studies was assessed using the Newcastle–Ottawa scale and heterogeneity was evaluated using I^2 statistic.

Results: We identified 16 cross-sectional studies investigating a total of 37672 primary health workers (PHWs). The prevalence of turnover intention was 30.4% (95% CI 24.0-36.7%). Subgroup analysis revealed that the highest prevalence was observed in the community facilities and the eastern provinces of China. Meta-analyses indicated that 21 factors were significantly associated with turnover intention, included demographic factors (gender, age, education, marital status), job characteristic factors (title, work seniority, income, social status, organizational affiliation, work stress) and job satisfaction factors (learning and training opportunity, interpersonal relationship, keep busy and fulfilling, work condition and environment).

Conclusion: This study highlights the problem of the turnover intention among PHWs in China. There is a significant association between demographic factors, job characteristic factors, job satisfaction factors and turnover intention. So the comprehensive measures from these aspects should be taken towards retaining PHWs.

Strengths and limitations of this study

1) This systematic review provides supplemental evidence from China to global studies on the turnover intention of primary health workers.

2) Meta-analysis and narrative analysis are performed to identify the risk factors of turnover intention among primary health workers.

3) Significant heterogeneity among the individual studies exists when performing the subgroup analysis and part of the meta-analysis.

Introduction

Primary health care (PHC) addresses the majority of a person's health needs throughout their lifetime. The declaration of Astana declared that strengthening primary health care is the most inclusive, effective and efficient approach to enhance people's physical and mental health, as well as social well-being.[1] Primary health workers (PHWs) are direct providers of PHC, and their quantity directly decides the quantity, quality and outcomes of PHC.[2] These services should be provided with compassion, respect and dignity by health professionals who are well-trained, skilled, motivated and committed.[1] However, primary health institutions are facing significant labor shortages worldwide,[3] not only in the low and middle-income countries[2,4,5] but also in the developed countries.[6,7] In China, the PHC services are provided by community health centers and stations in the urban areas and by township health centers and village clinics in rural areas.[8] Nowadays, these health agencies are all facing the problem of staff turnover, aggravated the shortage of health workforce[9], which become one of the significant obstacles to strengthen China's primary healthcare services.[10]

Turnover intention (TI) is defined as the probability that an employee will leave his or her job within a specific period,[11] which was regarded as one of the best predictors of turnover behaviors.[12–15] Previous studies have explored the factors which influencing the turnover intentions of PHWs. A variety of them have been identified, such as demographic factors,[7,16–21] job satisfaction,[17,19,21–24] work stress,[12,17,24] burnout,[22,25] quality of work-life,[20] interpersonal communication,[26] violence from patients[27] et al. While these factors have been linked with TI definitely, some researchers focused on the factors which were off-the-job. Han et al.[28]found that key factors of community integration influencing overseas-trained doctors' decision to stay in or leave a rural community in Australia; Stewart et al.[16] reported that community satisfaction is a crucial predictor of intent to leave among rural and remote registered nurses in Canada; Chao et al. and Lu et al.[11,12] demonstrated there is a significant correlation between work-family conflict and TI of PHWs in Taiwan and Guangdong.

In China, many empirical studies have been conducted. However, most of them were published in Chinese, only a few studies about TI and risk factors of PHWs have been published in international journals, and no related systematic reviews have been found neither Chinese nor English. Therefore, this study aims to examine the prevalence of TI and identify the related factors among PHWs in China by conducting a systemic review and meta-analysis.

Method

Literature search

This systematic review and meta-analysis were performed following the PRISMA guidelines.[29,30] A systematic search of the literature was conducted up to October 2019 using five English language

databases (PubMed, EMBASE, Cochrane Library, PsycINFO) and three Chinese databases (CNKI, CSPD and CBM). No limits were applied for language and publication dates of coverage. The search strategy was based on a combination of "(Turnover Intention, or Departure Intention, or Demission Intention, or Leave Intention, or intent to leave), AND (Primary, Community, Rural, Countryside, District, Basic, Fundamental or Grassroots), AND (Health worker, Health officer, Health Manpower, Health Personnel, Medical Personnel, Medical worker, Medical staff, Doctor, Physician, or Nurse) and (China, or Chinese)". References of the retrieved studies were also checked and screened. The full search strategy can be found in the supplementary tables S1.

Study eligibility

Eligible studies were published studies that reported TI prevalence and related determinants among Chinese PHWs. The eligibility criteria included: (1) Types of studies: original cross-sectional studies. Those presenting non-original data, such as reviews, editorials, opinion papers, or letters to the editor, were excluded. (2) Types of participants: Chinese PHWs. (3) Types of intervention: no intervention measures applied. (4) Types of outcome measures: the prevalence of TI nd related factors reported in the study.

Eligibility assessment was conducted to screen titles, abstracts and full texts of the identified studies by two reviewers independently. Disagreements on which studies should be included or excluded were resolved by full group consensus.

Data extraction

A piloted form referred to the Cochrane Effective Practice and Organization of Care Review Group (EPOC) data collection checklist,[31] was used to extract relevant data from the included full-text studies. The following data were extracted: author, publication year, the location where the study was carried out, participants, sample size, number of cases, assessment tools, prevalence of TI and related factors. Data extraction was conducted by one author and reviewed independently by two other authors, with disagreements resolved by discussion until consensus was reached.

Quality assessment

The quality of studies was assessed using a modified Newcastle-Ottawa scale,[32] as recommended by the Cochrane Collaboration.[33] Studies received scores based on the design-specific sources of bias, methods for selecting participants, exposure measures, outcome variables and methods to control confounders.[34] The total score was 7 points, and all the included studies were grouped according to their scores, which included good (6–7), moderate (3–5) and poor (1–2).

Data synthesis and statistical analysis

The main outcome in this review was the difference in prevalence or relative risk of TI among different groups. The prevalence of TI was estimated as the total number of TI cases divided by the total number of PHWs participating in the study. We compared the difference of TI between PHWs from different regions and institutions by subgroup analyses. The other outcome of this study was

to identify the association between factors and TI among PHWs in the form of the log odds ratio. For each factor analyzed by a meta-analysis, it was required related variables in the questionnaire are the same consistently among different studies, which meant it was feasible to be merged into two groups; meanwhile, at least three studies related to each factor had to be included in the meta-analysis. When performing a meta-analysis, the significance of the pooled odds ratio (OR) was determined by the Z-test. Heterogeneity was estimated by the Q statistic and evaluated using I^2 statistic.[35] A fixed-effect model was used to compute the summary risk estimate if there was no heterogeneity among the studies, whereas a random-effects model was used when heterogeneity existed ($I^2 \geq 50\%$).[36] Publication bias was evaluated using Egger's test. All statistical analyses were performed using Stata V13.0 and RevMan V5.3. A two-tailed p value of <0.05 was considered to be statistically significant. We referred to the meta-analysis of observational studies in epidemiology (MOOSE) guideline.[37] If it was infeasible to make a quantitative synthesis and conduct a meta-analysis, a narrative approach and descriptive statistics were used by grouping studies that reported the same factors, and to compare their associations with TI of PHWs.

Patient and public involvement

Patients and the public were not involved in this study.

Results

A total of 455 records were identified through our initial database search (PubMed: 13, Embase: 14, Coherence: 6, PsycINFO: 0, CNKI: 124, WAN FANG Data: 270, CBM: 28). After removing the duplicate records, 208 records were screened based on title and abstract. Eighty-seven articles were included in the full-text review. Among these, 63 articles were eliminated due to lacking original data. Three articles were eliminated for the inappropriate study design. Five articles were excluded because missing data on risk factors of TI. Finally, 16 studies were included in this study. No additional studies were obtained after checking references of all the 16 retrieved articles. The study selection process was shown in Figure 1.

Figure 1 Flow diagram of the study selection

Study characteristics

Table 1 presented the main characteristics of all 16 studies. These studies were all cross-sectional studies and performed in 24 provinces of China between 2011 and 2019. The selected studies included 37 672 participants, with a median sample size of 1073 (range 127–16157). Five studies were conducted in eastern China,[38–42] four in central provinces, [18,43–45] four in the west region.[17,46–48] four studies conducted in in urban area, [38,39,43,49] eight in rural area, [17,18,41,45–48,50] and four included both areas. [40,42,44,51] All studies reported the prevalence and related factors of TI among PHWs.

Table 1 Characteristics of 16 included studies

The determinants of TI would be analyzed by meta-analysis and content analysis. 47 factors were extracted in 16 included studies (Supplementary tables S2). It included three groups: 7 demographic factors, 22 job characteristic factors, and 18 job satisfaction factors. The average quality score of the 16 included studies was 5.25 of 7 points, indicating a moderate-average quality, assessed using the modified Newcastle-Ottawa scale (Supplementary tables S3). All studies were distributed in the medium and high quality.

Prevalence of turnover intention among PHWs

Table 2 showed the prevalence of turnover intention among PHWs in China. The pooled prevalence was 0.304 (95%CI: 0.240-0.367, P < 0.001). the highest prevalence was 0.543 (95%CI: 0.457-0.630) reported by Gu et al. [38], whereas Zhang reported the lowest prevalence of 0.08 (95%CI: 0.054-0.106). [48] The subgroup analysis by the region showed that, the highest prevalence was observed in the eastern China with a prevalence of 0.376 (95%CI: 0.231-0.521, P < 0.001) followed by central regions at 0.319 (95%CI: 0.239-0.399, P < 0.001) and then west at 0.232 (95%CI: 0.119-0.345, P < 0.001). According to working setting, the highest prevalence occurred in PHWs working in the community, 0.412 (95% CI: 0.274-0.551, P < 0.001), followed by the rural PHWs working in township and village. By sample size, the prevalence of TI was higher in studies having a sample of size<1037, 0.355 (95% CI: 0.232-0.478, P < 0.001) compared to those having a sample size≥1037, 0.255 (95%CI: 0.174-0.337, P < 0.001). High heterogeneity was observed across the included studies.

Table 2 Prevalence of turnover intention among PHWs in China

Related factors of turnover intention among PHWs

All studies reported demographic factors or job characteristic factors and determined their associations with TI of PHWs. Moreover, six studies explored the effects of job satisfaction factors, [18,41,44–47] 19 factors were feasible for included in the meta-analyses. The egger's linear regression tests on a natural logarithm scale of OR found no evidence of publication bias for the studies included in meta-analyses (Supplementary tables S4).

Demographic factors and turnover intention

The meta-analysis of demographic factors was based on 15 cross-sectional studies (Figure 2). Gender (male vs. female: OR:1.23, 95%CI: 1.08-1.40, P = 0.002),[17,18,39–47,49,51] age (younger vs. older: OR: 1.47, 95%CI: 1.24-1.74, P < 0.00001),[39,40,43,47–49,51] marriage status (unmarried vs. married, OR: 1.16, 95%CI: 1.04-1.29, P = 0.007)[17,40,42–44,46,47] were significantly associated with TI of PHWs, but education (low-education vs. high-education: OR:0.78, 95%CI: 0.60-1.02 P = 0.07).[17,18,40,42–45,47–49] were not statistically significant.

Figure 2 Forest plots of demographic factors

Job characteristic factors and turnover intention

Job characteristic factor was studied in nine studies (Figure 3). Job title (low-title vs. high-title: OR: 1.11, 95%CI: 1.03-1.21, P =0.007),[17,39,40,42–45,47,49] work seniority (short vs. long: OR: 1.17, 95%CI: 1.03-1.34, P =0.01),[39,45,48,49] organizational affiliation (strength vs. others: OR: 0.85, 95%CI: 0.73–1.00, P < 0.00001),[40,43,51] work stress (high vs. low: OR: 3.14, 95%CI: 2.73-3.61, P < 0.00001)[42,44,46,47,51] were significantly associated with TI of PHWs. However, occupation (doctor vs. nurse: OR:1.05, 95%CI: 0.78-1.41, P = 0.76)[39,40,42,43,49] were not statistically significant.

Figure 3 Forest plots of job characteristic factors

Job satisfaction factors and turnover intention

Six studies expolred the association between job satisfaction factors and turnover intention (Figure 4). Overall job satisfaction (satisfied vs. dissatisfied: OR: 0.15, 95%CI: 0.04-0.51, P=0.002),[38,41,44] promotion and individual development space (satisfied vs. dissatisfied: OR: 0.19, 95%CI: 0.12-0.29, P < 0.00001),[18,46,47] interpersonal relationship (satisfied vs dissatisfied: OR: 0.20, 95%CI: 0.15-0.28, P<0.00001),[18,46,47] keep busy and fulfilling (satisfied vs dissatisfied: OR: 0.39, 95%CI: 0.33-0.47, P<0.00001),[18,41,46,47] individual value embodiment (satisfied vs dissatisfied: OR:0.16, 95%CI: 0.08-0.32, P<0.00001),[18,41,46] income satisfaction (satisfied vs dissatisfied: OR: 0.33, 95%CI: 0.11-0.95, P =0.04),[18,41,45–47] work condition and environment (satisfied vs dissatisfied: OR: 0.19, 95%CI: 0.15-0.23, P<0.00001),[18,41,46,47] level of attention by leaders (satisfied vs dissatisfied: OR: 0.20, 95%CI: 0.15-0.26, P<0.00001), [18,46,47] the competence of my manager in making decisions (satisfied vs dissatisfied: OR: 0.18, 95%CI: 0.10-0.32, P<0.00001),[18,46,47] and motivation and salary system (satisfied vs dissatisfied: OR: 0.21, 95%CI: 0.11-0.38, P < 0.00001)[44,46,47] were significantly associated with TI of PHWs.

Figure 4 Forest plots of job satisfaction factors

All the other 28 exposures were analyzed for their associations with TI of PHWs under a narrative approach. In the demographic factors group, PHWs who work in remote region,[40] with lower income[17,46,51] and social status[41,46,47] were found to have high risks of TI significantly. No significant associations were found between TI and the nation.[45,46] Besides, the associations between TI and major in clinical medicine are inconclusive.[45,46]

Among job characteristic factors, seven were significantly associated with high risks of TI, including lower individual income levels in the local,[18,41] more severe emotional exhaustion,[41,45] more severe flattening of affect,[45] more participation in public health service,[50] longer working hours,[46] no career planning,[46] lack of insurance.[45] No significant

associations were found between TI and qualified to practice,[18] re-employ after retirement,[47] turnover experience,[46] career identity,[46] influence on family life,[49] patient trust.[46] Besides, the associations between TI and living condition is inconclusive.[46,47]

Regarding job satisfaction factors, PHWs who unsatisfied with work stability,[18,46] the chance to try my own methods of doing the job,[18] the chance to do something that makes use of my abilities,[18,46] work support,[41,47] policies practice, [18,44,46]and income fairness[44,46] were found to have high risks of TI significantly. However, no statistical significant association was found between TI and the satisfaction of the scientific research atmosphere or learning and the training opportunity. [45–47]

Discussion

This systematic review presents an overall prevalence of TI (30.4%) among Chinese PHWs whichindicated that three of ten PHWs intent to turnover. However, this finding is almost two times higher than some of the high-income countries. A study conducted in England showed that only 11.8% of primary care doctors had high turnover intention.[52] A survey including 23,159 nurses from 10 European countries showed that showed that 9% of all these nurses intended to leave their profession, varied from 5 to 17% among countries[53] Another survey preformed among 2263 physicians in American reported that 18.4% of them intended to leave the practice. [54] A study cinducted in Canada reported 17.2% of registered nurses intended to leave the current nursing position. [16] Meanwhile, the prevalence of TI was lower than some low and middle-income countries, such as Ghana, [19] Iraqi, [55] South Africa,[21] and the Philippines. [56]

The subgroup analysis indicated that the variation of prevalence of TI among regions. The possible explanations for this variation might be the difference in the level of social and economic development and the workplace. In east China, there is a higher amount of urban hospitals than other regions, providing more jobs, higher pay and better work environment. It attract lots of PHWs move away from primary care practice.[57] As the rural PHWs, they usually settled down in rural areas, lacking access to urban hospitals compare to peers in the urban community.

This study extracted a broad scope of 47 related factors and determined their associations with TI of PHWs, identifying a total of 31 demographic, job characteristic and job satisfaction risk factors. Five demographic risk factors were determined to have significant associations with TI of PHWs, which showed that PHWs had high risks of TI were those who were male, younger, had a higher education, unmarried, work in the remote region. Some of these findings are in lines with studies done in South Africa, Philippines, Canada, Saudi Arabia, Ghana and Netherlands.[16,19–21,24,56] However, Bonenberger et al. [19] and Labrague et al.[56] showed that the association between gender and TI of PHWs was not statistically significant.

According to job characteristic factors, we concluded that PHWs who had shorter work seniority, higher work stress, longer working hours presented significantly high risks of TI. All of these

findings are consistent with prior studies. Nevertheless, some findings are inconsistent with prior studies. Income was found to be significant statistically in the review, which is consistent with Almalki et al.,[20] but Labrague et al.[56] reported an insignificant association between income and TI. Occupation, level of the medical institution was not statistically significant with TI in the review, in accord with Warmelink et al.[24] and Labrague et al.[56] However, some studies reported showed the opposite results. [16,19]In addition, there are seven factors identified in the review were never or rarely reported in other countries, including title, social status, participation in public health service, insurance, career planning, emotional exhaustion or flattening of affect and authorized personnel, which were found to have significant associations with high risk of TI among PHWs in China.

There is a significant inverse association between job satisfaction and TI. In this review, we found that the low overall job satisfaction reported significantly higher risks of TI among PHWs, which is in line with Bonenberger et al.,[19] Warmelink et al.[24] and Delobelle et al.[21] Furthermore, most of the job satisfaction factors are also significant associated with TI of PHWs. However, these specific job satisfaction factors were rarely reported in previous studies.

Notably, compared with previous studies focused on the family factor[16,20], our study did not find relevant evidence on family factors in China such as: community satisfaction, numbers of the dependent family member, family commitments.

To our knowledge, this is the first systematic review (including meta-analysis) to determine potential risk factors of TI among Chinese PHWs. Our findings present an overview of the current evidence from Mainland China. One strength of this review is it estimated the prevalence of TI among Chinese PHWs based on a large sample size with a total of 16 cross-sectional studies and 37 672 participants. Another strength is that it determines the associations of a broad scope of potential risk factors. Limitations exist in this systematic review. Significant heterogeneity among the individual studies was found when performing the subgroup analysis and part of meta-analysis due to the lack of relevant studies. There is still needed to collect more relevant studies to make more in-depth analyses in the future.

Conclusion

The analysis highlights recognition on the problem of the turnover intention among PHWs in China. There is a significant association between demographic factors, job characteristic factors, job satisfaction factors and turnover intention. So the comprehensive measures from these aspects should be taken towards retaining PHWs. Moreover, PHWs in community or the east require special attention.

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Contributors

Rongxin He and Ying Mao conceived this research project. Jinlin Liu and Rongxin He developed the search strategy and Rongxin He searched the databases. Jinlin Liu, Bin Zhu, Zhangning and Rongxin He selected the studies. Rongxin He designed and executed the analyses, interpreted the findings, wrote the first draft, revised subsequent drafts, and prepared the manuscript. Ying Mao and Zhang Wei-Hong revised drafts of the manuscript.

Competing interests

The authors declare that they have no competing interests.

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Table 1 Characteristics of 16 included studies

Authors	Location	Participants	Number (Qualified rate %)	Assessment tools	Prevalence, N (%)	Ref. No.
Xu,2012	Anhui	City community	1109(92.96%)	Dichotomous question	224 persons (20.2%)	5
Gu,2012	Shanghai，	City community	127(86.99%)	Dichotomous question	69 persons (56.69%)	7
Yao,2011	Guangdong	City community	335(95.7%)	Dichotomous question	178 persons (52.0%)	13
Lu,2018	Shandong	Rural area (village)	1037(98.57%)	The Self-made 10items 5-point Likert Turnover intention Scale	498 persons (48.02%) (Score of > 32 out of 50 means turnover intention)	15
Ou,2018	Guangdong	City community and Rural area	1252(87.43%)	Frah Turnover intention Scale	227 persons (18. 13%) (Score of > 3 out of 5)	17
Xu,2015	Guizhou	Rural area (township)	704(96.6%)	Dichotomous question	247 persons (35.10%)	19
Liu,2019	Not Stated	City community and Rural area	16157(100.00%)	Dichotomous question	1858 persons (11.50%)	33
Zhang,2013	Shaanxi	Rural area (township)	425(99.53%)	Dichotomous question	34 persons (8.00%)	39
Liu,2017	Shanghai	City community and Rural area	3295(86.70%)	Dichotomous question	520 persons (15.80%)	49
Shen,2018	8 central provinces [1]	Rural area (village)	1669 (100.00%)	Dichotomous question	568 persons（34.03%）	54
Zhou,2016	Wuhan	City community and Rural area	755 (83.90%)	Michael & Spector Turnover intention Scale	278 persons（36.86%） (Score of > 3 out of 5)	55
Zhang,2015	Shandong, Anhui, Shanxi	Rural area (township)	167(100.00%)	Dichotomous question	49 persons (29. 34%)	63
Wan,2013	Yunnan	Rural area (township & county)	493(94.80%)	Dichotomous question	101 persons (29. 34%)	70
Fang,2014	Hubei	Rural area (village)	1889(97.88%)	Dichotomous question	695 persons (36.8%)	76
Sun,2013	5 provinces[2]	City community	3212(99.32%)	Dichotomous question	1243 persons (38.7%)	79
Liu JL,2019	11 western provinces[3]	Rural area (township & county)	5046(90.4%0%)	Dichotomous question	1468 persons (29.1%)	86

[1]8 provinces：Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan

[2]5 provinces：Zhejiang, Guangdong, Guizhou, Hebei, and Hubei

[3]11 provinces：Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, and Yunnan

Table 2 Prevalence of turnover intention among PHWs in China

Variables	Characteristic	Included studies	Prevalence (95%CI)	Q test (I^2)
Overall		16	0.304[0.240, 0.367]	99.5%
By region	East	5	0.376[0.231, 0.521]	99.3%
	Central	4	0.319[0.239, 0.399]	97.6%
	West	4	0.232[0.119, 0.345]	98.8%
By participants	Work in village	3	0.395[0.321, 0.470]	96.3%
	Work in township	5	0.234[0.144, 0.342]	98.4%
	Work in community	4	0.412[0.274, 0.551]	98.7%
By sample size	<1037	8	0.355[0.232, 0.478]	99.7%
	≥1037	8	0.255[0.174, 0.337]	98.8%

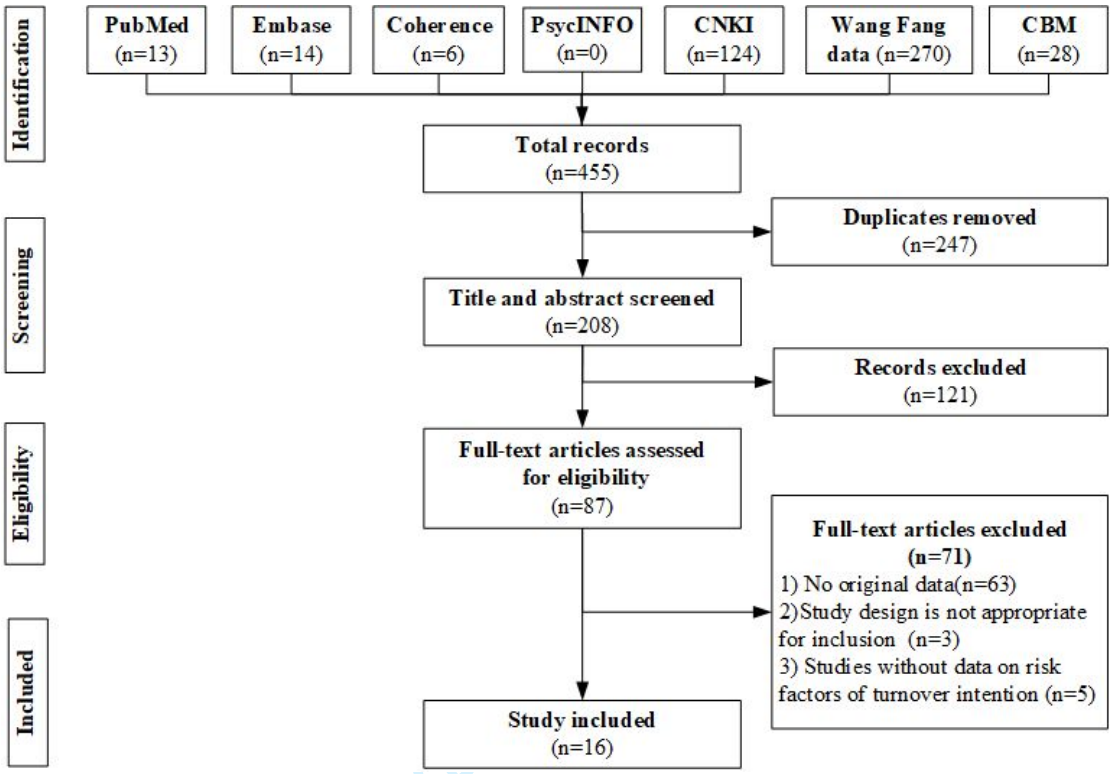


Figure 1 Flow diagram of the study selection

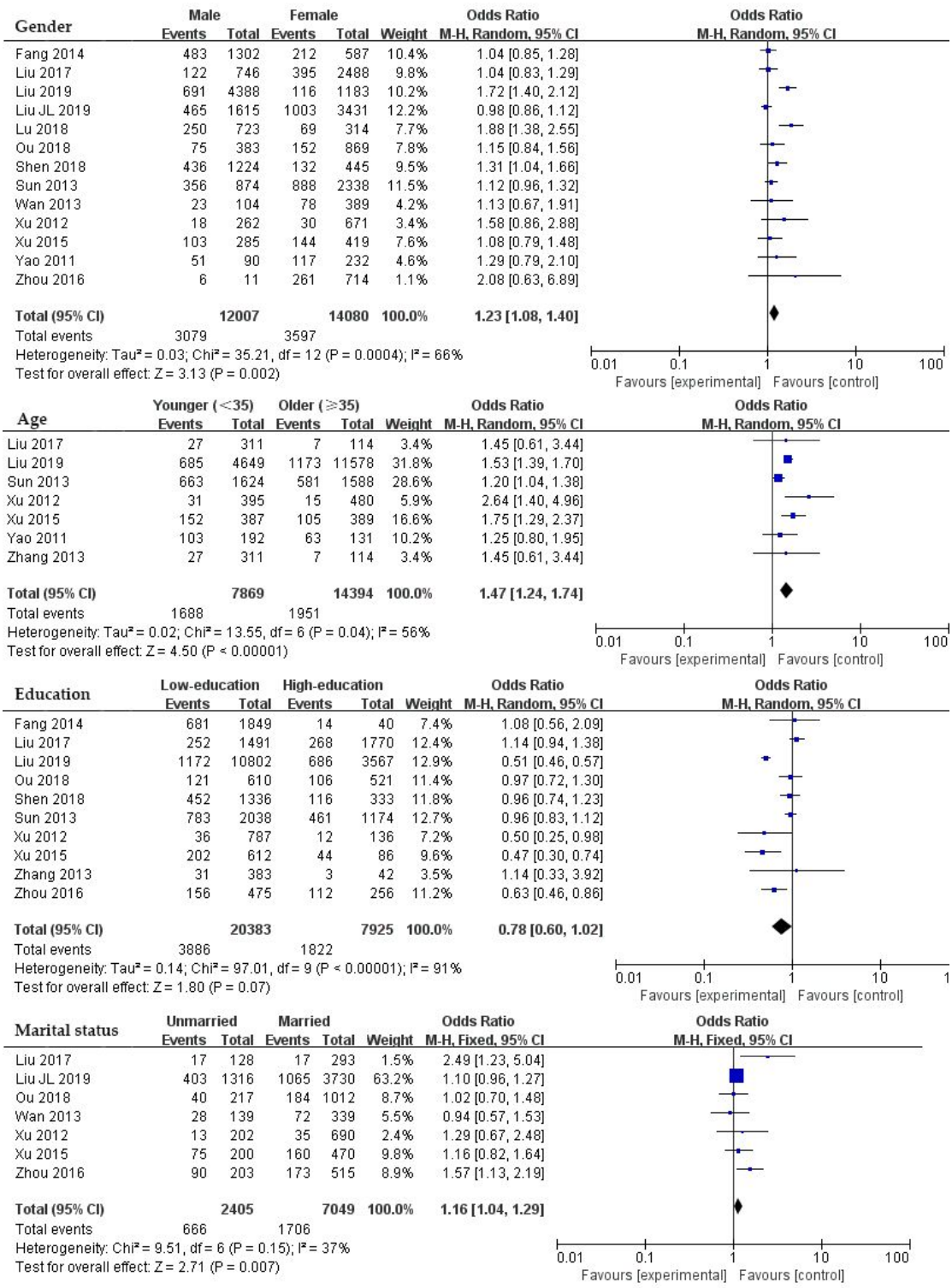


Figure 2 Forest plots of demographic factors

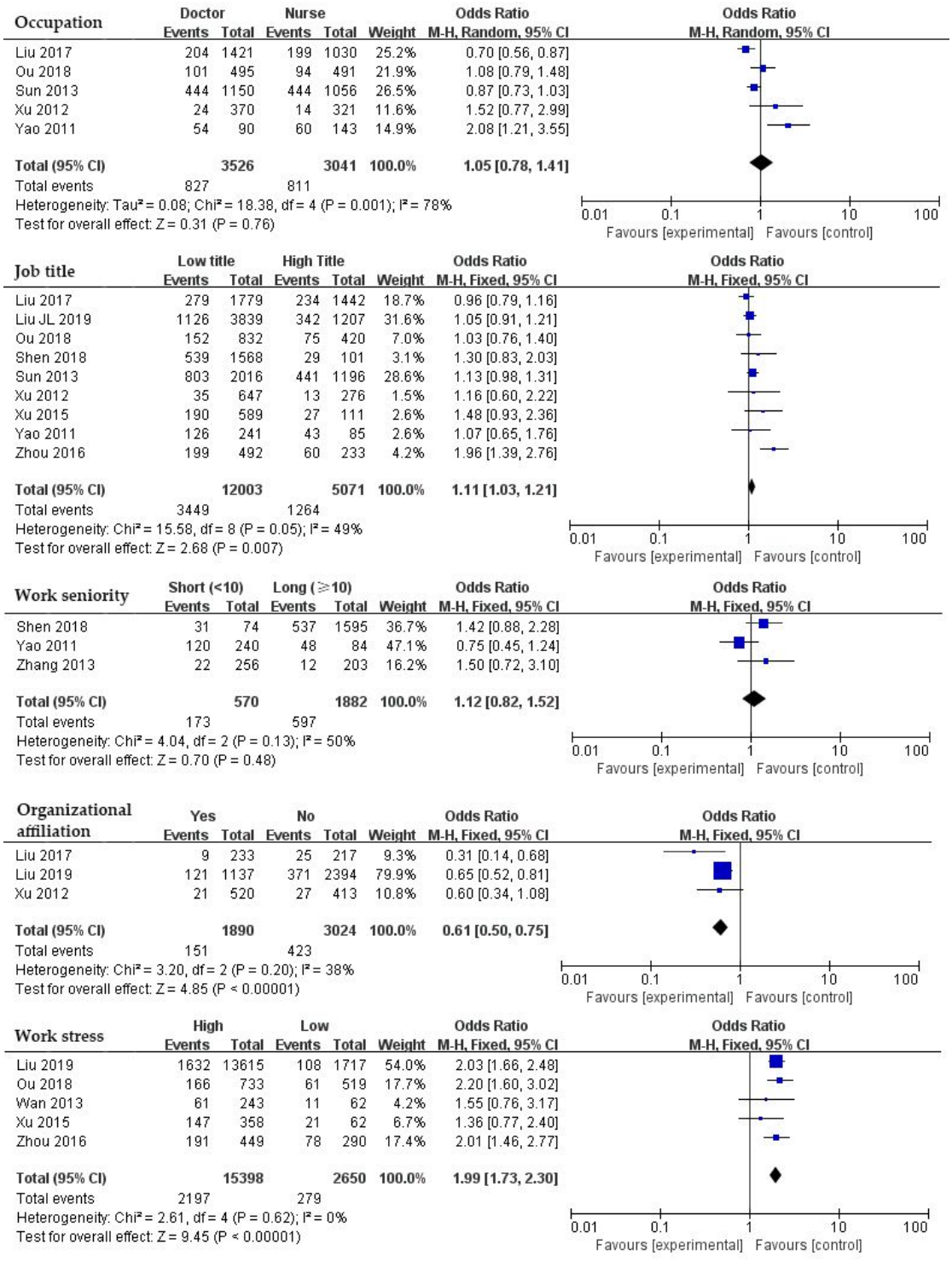


Figure 3 Forest plots of job characteristic factors

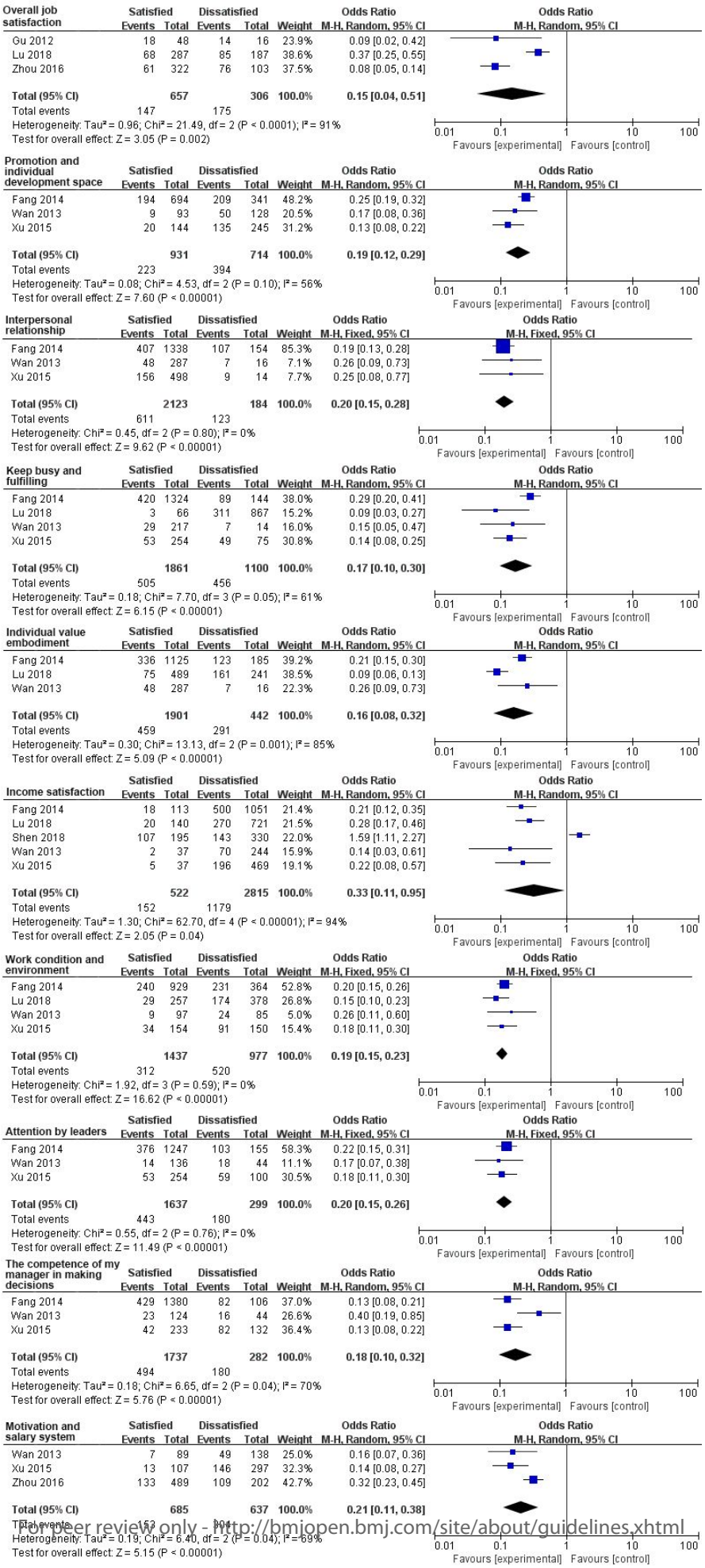


Figure 4 Forest plots of job satisfaction factors

Table S1 Search strategy

Database 1: PubMed

Sequence	Query
#1	Search (Chinese[MeSH Terms]) OR Chinese[Title/Abstract]
#2	Search (China[MeSH Terms]) OR China[Title/Abstract]
#3	***#1 OR #2*** Search (((Chinese[MeSH Terms]) OR Chinese[Title/Abstract]))OR ((China[MeSH Terms]) OR China[Title/Abstract]))
#4	Search (Health worker[MeSH Terms]) OR Health worker[Title/Abstract]
#5	Search (Health officer[MeSH Terms]) OR Health officer[Title/Abstract]
#6	Search (Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract]
#7	Search (Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract]
#8	Search (Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract]
#9	Search (Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract]
#10	Search (Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract]
#11	Search (Doctor[MeSH Terms]) OR Doctor[Title/Abstract]
#12	Search (Physician[MeSH Terms]) OR Physician[Title/Abstract]
#13	Search (Nurse[MeSH Terms]) OR Nurse [Title/Abstract]
#14	***#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #11 OR #12 OR #13*** Search ((((((((((Health worker[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health officer[MeSH Terms]) OR Health officer[Title/Abstract])) OR ((Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract])) OR ((Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract])) OR ((Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract])) OR ((Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract])) OR ((Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract])) OR ((Doctor[MeSH Terms]) OR Doctor[Title/Abstract])) OR ((Physician[MeSH Terms]) OR Physician[Title/Abstract])) OR ((Nurse[MeSH Terms]) OR Nurse [Title/Abstract])
#15	Search (Rural[MeSH Terms]) OR Rural[Title/Abstract]
#16	Search (Countryside[MeSH Terms]) OR Countryside[Title/Abstract]
#17	Search (Community[MeSH Terms]) OR Community[Title/Abstract]
#18	Search (District[MeSH Terms]) OR District[Title/Abstract]
#19	Search (Basic[MeSH Terms]) OR Basic[Title/Abstract]
#20	Search (Fundamental[MeSH Terms]) OR Fundamental[Title/Abstract]
#21	Search (Primary[MeSH Terms]) OR Primary[Title/Abstract]
#22	Search (Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]
#23	***#7 OR #8 OR #9 OR #11 OR #12 OR #13 OR #14*** Search ((((Primary[MeSH Terms]) OR Primary[Title/Abstract]) OR Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]) OR (((Community[MeSH Terms]) OR Community[Title/Abstract]) OR ((((((((((Rural[MeSH Terms]) OR Rural[Title/Abstract]) OR Countryside[MeSH Terms]) OR Countryside[Title/Abstract]) OR District[MeSH Terms]) OR District[Title/Abstract]) OR Basic[MeSH Terms]) OR Basic[Title/Abstract]) OR Fundamental[MeSH Terms]) OR Fundamental[Title/Abstract]))

#24	Search(Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract]
#25	Search (Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract]
#26	Search (Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract]
#27	Search(Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract]
#28	Search intent to leave[Title/Abstract]
#29	***#18 OR #19 OR #20*** Search ((((((Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract])) OR ((Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract])) OR ((Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract])) OR ((Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract])) OR intent to leave[Title/Abstract]
#30	***#3 AND #10AND #17AND #21*** Search ((((((((Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract])) OR ((Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract])) OR ((Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract])) OR ((Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract])) OR intent to leave[Title/Abstract])) AND (((((((Primary[MeSH Terms]) OR Primary[Title/Abstract]) OR Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]) OR (((Community[MeSH Terms]) OR Community[Title/Abstract]) OR ((((((((((Rural[MeSH Terms]) OR Rural[Title/Abstract]) OR Countryside[MeSH Terms]) OR Countryside[Title/Abstract]) OR District[MeSH Terms]) OR District[Title/Abstract]) OR Basic[MeSH Terms]) OR Basic[Title/Abstract]) OR fundamental[MeSH Terms]) OR fundamental[Title/Abstract])))) AND ((((((((((((((Health worker[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health officer[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract])) OR ((Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract])) OR ((Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract])) OR ((Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract])) OR ((Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract])) OR ((Doctor[MeSH Terms]) OR Doctor[Title/Abstract])) OR ((Physician[MeSH Terms]) OR Physician[Title/Abstract])) OR ((Nurse[MeSH Terms]) OR Nurse [Title/Abstract]))) AND (((((Chinese[MeSH Terms]) OR Chinese[Title/Abstract]))OR ((China[MeSH Terms]) OR China[Title/Abstract]))))))

Database 2: EMBASE

Sequence	Query
#1	'China'/exp
#2	'China':ti,ab
#3	#1 OR #2
#4	'Turnover Intention' OR 'Departure Intention' OR 'Demission Intention' OR 'Leave Intention'/exp
#5	'Turnover Intention' OR ' Departure Intention' OR 'Demission Intention' OR 'Leave Intention' OR 'intent to leave':ti,ab
#6	#4 OR #5
#7	'Primary' OR 'Grass roots' OR 'Community' OR 'Countryside' OR 'District' OR 'Basic' OR 'Rural' OR 'Fundamental':ti,ab
#8	'Health worker' OR 'Health officer' OR 'Health Manpower' OR 'Health Personnel' OR 'Medical Personnel' OR 'Medical worker' OR 'Medical staff ' OR 'Doctor' OR 'Physician' OR 'Nurse':ti,ab

#9	#3 AND #6 AND #7 AND #8

Database 3: Cochrane Library

Sequence	Query
#1	china:ti,ab,kw (Word variations have been searched)
#2	chinese:ti,ab,kw(Word variations have been searched)
#3	#1 or #2
#4	(turnover intention):ti,ab,kw OR (departure Intention):ti,ab,kw OR (demission Intention):ti,ab,kw OR (leave Intention):ti,ab,kw OR (intent to leave):ti,ab,kw(Word variations have been searched)
#5	(primary):ti,ab,kw OR (community):ti,ab,kw OR (rural):ti,ab,kw OR (basic):ti,ab,kw OR (countryside):ti,ab,kw(Word variations have been searched)
#6	(health worker):ti,ab,kw OR (health manpower):ti,ab,kw OR (health personnel):ti,ab,kw OR (health officer):ti,ab,kw(Word variations have been searched)
#7	(medical worker):ti,ab,kw OR (medical staff):ti,ab,kw OR (doctor):ti,ab,kw OR (physician):ti,ab,kw OR (nurse):ti,ab,kw(Word variations have been searched)
#8	#5 or #6
#9	#3 and #4 and #5 and #8

Database 4: PsycINFO

Sequence	Query
#1	Title: china OR Abstract: china OR Title: chinese OR Abstract: chinese
#2	Title: turnover intention OR Abstract: turnover intention OR Title: Departure Intention OR Abstract: Departure Intention OR Title: Demission Intention OR Abstract: Demission Intention OR Title: Leave Intention OR Abstract: Leave Intention OR Abstract: intent to leave
#3	Title: Health worker OR Abstract: Health worker OR Title: Health officer OR Abstract: Health officer OR Title: Health Manpower OR Abstract: Health Manpower OR Title: Health Personnel OR Abstract: Health Personnel OR Title: Medical Personnel OR Abstract: Medical Personnel OR Title: Medical worker OR Abstract: Medical worker OR Title: Medical staff OR Abstract: Medical staff OR Title: Doctor OR Abstract: Doctor OR Title: Physician OR Abstract: Physician OR Title: Nurse OR Abstract: Nurse
#4	Title: Rural OR Abstract: Rural OR Title: Countryside OR Abstract: Countryside OR Title: Community OR Abstract: Community OR Title: District OR Abstract: District OR Title: Basic OR Abstract: Basic OR Title: Fundamental OR Abstract: Fundamental OR Title: Primary OR Abstract: Primary OR Title: Grass roots OR Abstract: Grass roots
#5	#1 AND #2 AND #3 AND #4

Database 5: CAJD (CNKI)

SU=('医生'+'医务人员'+'护士'+'卫生人员')AND SU=('离职意愿'+'离职倾向'+'离职意向'+'留职意愿'+'工作意愿'+'留职意向')AND SU=('基层'+'社区'+'农村'+'乡镇卫生院'+'卫生服务中心')

Database 6: CSPD (WANFANG Data)

(题名或关键词:(社区)+题名或关键词:(农村)+题名或关键词:(基层) +题名或关键词:(乡镇卫生院) +题名或关键词:(卫生服务中心))*(题名或关键词:(离职意愿)+题名或关键词:(离职倾向)+题名或关键词:(离职意向)) +题名或关键词:(留职意愿)) +题名或关键词:(工作意愿)) +题名或关键词:(留职意向)) *(题名或关键词:(医生)+题名或关键词:(护士)+题名或关键词:(医务人员) +题名或关键词:(卫生人员))

Database 7: CBM

(((((“社区”[标题:智能]) OR “基层”[标题:智能]) OR “农村”[标题:智能]) OR “乡镇卫生院”[标题:智能]) OR “卫生服务中心”[标题:智能]) AND (((((“离职意愿”[标题:智能]) OR “离职倾向”[标题:智能]) OR “离职意向”[标题:智能]) OR “留职意愿”[标题:智能]) OR “工作意愿”[标题:智能]) OR “留职意向”[标题:智能] AND ((((“医生”[标题:智能]) OR “护士”[标题:智能]) OR “卫生人员”[标题:智能]) OR “医务人员”[标题:智能])

Table S2 47 factors related to TI

Group	Category	Exposure
A	Demographic	A1-gender, A2-age, A3-education, A4-region, A5-marital status, A6-nation, A7-major,
B	Job characteristic	B1-occupation, B2-job title, B3-work seniority, B4-qualified to practice, B5-income,B6-medical institution, B7-organizational affiliation, B8- re-employ after retirement, B9-turnover experience, B10-individual income levels in the local, B11-work stress, B12-emotional exhaustion, B13-flattening of affect, B14-public health service, B15-working hours, B16-career planning, B17-career identity, B18-Social status B19-influence family life, B20-living condition, B21-lack of insurance, B22-patient trust.
C	Job satisfaction	C1-learning and training opportunities, C2-promotion and individual development space, C3-interpersonal relationship, C4-work conditions and environment, C5-individual value embodiment, C6-scientific research atmosphere, C7-level of attention by leaders, C8-income satisfaction ， C9-keep busy and fulfilling, C10-the competence of my manager in making decisions, C11-work stability, C12-policies practice, C13-the chance to try my own methods of doing the job, C14-the chance to do something that makes use of my abilities, C15-job satisfaction, C16-work support, C17-income fairness, C18-motivation and salary system ,.

Table S3 Quality scores assessing risk of bias using a modified Newcastle-Ottawa scale

Study type: Cross-sectional; Score: 1=achieved, 0=not achieved								
Authors	**Representativeness of the sample**	**Sample size**	**Non-respondents**	**Ascertainment of the exposure**	**Comparability of subjects in different outcome groups (control for confounding)**	**Assessment of the outcome**	**Statistical test is appropriate**	**Total score**
Xu,2012	1	1	0	1	1	1	1	6
Gu,2012	0	1	0	1	1	1	1	5
Yao,2011	0	1	0	1	0	1	1	4
Lu,2018	1	1	0	1	0	1	1	5
Ou,2018	1	1	0	1	1	1	1	6
Xu,2015	0	1	0	1	1	1	1	5
Liu,2019	1	1	0	1	1	1	1	6
Zhang,2013	0	1	0	1	1	1	1	5
Liu,2017	1	1	0	1	0	1	1	5
Shen,2018	1	1	0	1	1	1	1	6
Zhou,2016	0	1	0	1	0	1	1	4
Zhang,2015	0	1	0	1	1	1	1	5
Wan,2013	0	1	0	1	0	1	1	4
Fang,2014	1	1	0	1	1	1	1	6
Sun,2013	1	1	0	1	1	1	1	6
Liu JL,2019	1	1	0	1	1	1	1	6

Table S4 Meta-analyses on 19 factors

Exposure	No. of studies in Meta-analyses	Comparison model	Q test		Statistical model	Pooled OR	Z test	Egger
			I^2	*P*-value		OR (95%CI)	*P*-value	P>|t|
Demographic factors								
Gender	13	Male vs. female	66%	0.0004	Random-effect	1.23 [1.08, 1.40]	0.002	0.240
Age	7	Younger (<35) vs. older (≥35)	56%	0.04	Random-effect	1.47 [1.24, 1.74]	< 0.00001	0.368
Education	10	Low-education (junior college or below) vs. high-education(bachelor degree or above)	91%	< 0.00001	Random-effect	0.78 [0.60,1.02]	0.07	0.325
Marital status	7	Unmarried vs. married	37%	0.15	Fixed-effect	1.16 [1.04, 1.29]	0.007	0.095
Job characteristic factors								
Occupation	5	Doctor vs. nurse	78%	0.001	Random-effect	1.05 [0.78, 1.41]	0.76	0.221
Job title	9	Low-title (no title or junior title) vs. high-title (middle title or senior title)	49%	0.05	Fixed-effect	1.11 [1.03, 1.21]	0.007	0.223
Work seniority	3	Short (<10) vs. long (≥10)	50%	0.13	Fixed-effect	1.12 [1.82, 1.52]	0.48	0.117
Organizational affiliation	4	Authorized personnel vs. others	38%	0.20	Fixed-effect	0.85 [0.73, 1.00]	< 0.00001	0.400
Work stress	5	High vs. low	0%	0.62	Fixed-effect	3.14 [2.73, 3.61]	< 0.00001	0.169
Job satisfaction factors								
Overall job satisfaction	3	Satisfied vs. dissatisfied	91%	< 0.0001	Random-effect	0.15 [0.04, 0.51]	0.002	0.561
Promotion and individual development space	3	Satisfied vs. dissatisfied	56%	0.10	Random-effect	0.19 [0.12, 0.29]	< 0.00001	0.160
Interpersonal relationship	3	Satisfied vs. dissatisfied	0%	0.80	Fixed-effect	0.20 [0.15, 0.28]	< 0.00001	0.522
Keep busy and fulfilling	4	Satisfied vs. dissatisfied	61%	0.05	Random-effect	0.39 [0.33, 0.47]	< 0.00001	0.162
Individual value embodiment	3	Satisfied vs. dissatisfied	85%	0.001	Random-effect	0.16 [0.08, 0.32]	< 0.00001	0.291

Income satisfaction	5	Satisfied vs. dissatisfied	94%	< 0.00001	Random-effect	0.33 [0.11, 0.95]	0.04	0.216
Work condition and environment	5	Satisfied vs. dissatisfied	0%	0.59	Fixed-effect	0.19 [0.15, 0.23]	< 0.00001	0.153
Attention by leaders	3	Satisfied vs. dissatisfied	0%	0.76	Fixed-effect	0.20 [0.15, 0.26]	< 0.00001	0.120
The competence of my manager in making decisions	3	Satisfied vs. dissatisfied	70%	0.04	Random-effect	0.18 [0.10, 0.32]	< 0.00001	0.210
Motivation and salary system	3	Satisfied vs. dissatisfied	69%	0.04	Random-effect	0.21 [0.11, 0.38]	< 0.00001	0.161

Appendix

1. Distribution of factors in 16 included studies (1 = Yes, 0 = No)

Exposure	16 included studies (Ref. No.)																Total
	5	7	13	15	17	19	33	39	49	54	55	63	70	76	79	86	
A1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	**13**
A2	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	**13**
A3	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	**13**
A4	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	**3**
A5	1	0	0	0	1	1	0	1	0	0	1	0	1	0	0	1	**7**
A6	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	**2**
A7	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	**2**
B1	1	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	**5**
B2	1	0	1	0	1	1	1	0	1	1	1	0	1	0	1	1	**11**
B3	1	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	**8**
B4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**
B5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	**2**
B6	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	**3**
B7	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	**3**
B8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
B9	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
B10	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
B11	0	0	0	0	1	1	1	0	0	0	1	0	1	0	0	0	**5**
B12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
B13	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
B14	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	**2**
B15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
B16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
B17	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
B18	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	**3**
B19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
B20	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	**2**
B21	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
B22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**
C1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	**3**
C2	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	**3**
C3	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	**4**
C4	0	0	0	1	0	1	0	0	0	0	1	0	1	1	0	0	**5**
C5	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	**3**
C6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
C7	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	**3**
C8	0	0	0	1	0	1	0	0	0	1	0	0	1	1	0	0	**5**

C9	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	**4**
C10	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	**3**
C11	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	**2**
C12	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	**3**
C13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**
C14	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	**2**
C15	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	**3**
C16	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	**2**
C17	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	**2**
C18	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	**3**
Total	**8**	**2**	**8**	**11**	**9**	**19**	**6**	**4**	**6**	**11**	**12**	**1**	**32**	**17**	**9**	**7**	

2. Data extraction according to each factor

**** TI: Turnover Intention; Non-TI: Non- Turnover Intention***

A1-Gender

Author	Group	TI	Non-TI	Results
Sun, 2013	male	356	518	No significant difference (χ^2 test).
	female	888	1450	
Liu JL, 2019	male	465	1150	No significant difference (χ^2test).
	female	1003	2428	
Fang, 2014	male	483	819	No significant difference (χ^2 test).
	female	212	375	
Xu, 2012	male	18	244	Significant difference (χ^2=10.040, P<0.01).
	female	30	641	
Yao, 2011	male	51	39	No significant difference (χ^2 test).
	female	115	117	
Lu, 2018	male	250	473	Significant difference (χ^2=18.574, P<0.001).
	female	69	245	
Ou, 2018	male	75	308	No significant difference (χ^2 test).
	female	152	717	
Xu, 2015	male	103	182	No significant difference (χ^2 test).
	female	144	275	
Liu, 2019	male	691	3697	Significant difference (χ^2=109.55, P<0.001).
	female	116	1067	
Liu, 2017	male	122	624	No significant difference (χ^2 test).
	female	395	2093	
Shen, 2018	male	436	788	Significant difference (χ^2=5.160, P=0.023).
	female	132	313	
Wan,2013	male	23	81	No significant difference (χ^2 test).
	female	78	311	
Zhou, 2016	male	6	5	No significant difference (χ^2 test).
	female	261	453	

A2-Age

Author	Group	TI	Non-TI	Results
Sun, 2013	≤ 24	166	229	Significant difference (χ^2=11.73, P=0.019);
	25-34	497	732	25-34, OR=0.740, 95%CI=0.549-0.996;
	35-44	368	589	≥55, OR=0.518, 95%CI=0.296-0.905
	45-54	159	290	
	≥ 55	54	128	
Liu JL, 2019	< 30	606	1318	Significant difference (χ^2 test , P<0.001);
	31-40	534	1175	< 30, OR=1.21, 95%CI=1.01-1.45;

	≥ 41	328	1022	31-40, OR=1.29, 95%CI=1.08-1.54
Xu, 2012	≤ 25	5	125	Significant difference (χ^2=25.786, P=0.001)
	25-34	26	270	
	35-44	6	240	
	45-54	9	168	
	≥ 55	2	72	
Xu, 2015	< 25	21	40	No significant difference (χ^2 test)
	25-34	131	195	
	35-44	69	143	
	≥ 45	21	63	
Zhang, 2013	< 25	15	78	Significant difference (χ^2=10.553, P=0.032)
	25-29	9	130	
	30-34	3	76	
	35-39	5	61	
	≥ 40	2	46	
Gu, 2012	< 29	19	12	Significant difference (χ^2=10.177, P=0.017)
	30-39	30	9	
	40-49	8	12	
	> 50	15	17	
Yao, 2011	< 25	37	32	No significant difference (χ^2 test)
	25-34	66	57	
	35-44	37	43	
	45-55	19	16	
	>55	7	9	
Lu, 2018	≤30	11	24	Significant difference (χ^2=9.298, P=0.026).
	31-40	142	261	
	41-50	104	250	
	51-60	42	117	
	>60	20	66	
Ou, 2018	Mean	34.69 ± 7.29	36.06 ± 8.0	Significant difference (χ^2=2.530, P=0.012).
Liu, 2019	< 25	84	498	Significant difference (χ^2 test , P<0.001)
	25-34	601	3466	
	35-44	606	4884	
	45-54	497	4857	
	55-59	55	587	
	≥ 60	15	77	
Shen, 2018	18-29	20	22	Significant difference (χ^2=13.724, P=0.017)
	30-39	140	241	
	40-49	223	406	
	50-59	110	218	
	60-69	67	190	

	≥ 70	8	24	
Zhou,2016	≤ 28	143	179	Significant difference (χ^2=37.40, P<0.01).
	29-35	75	101	
	≥ 36	48	186	
Wan, 2013	< 25	20	107	Significant difference (χ^2=9.433, P=0.009).
	25-44	76	234	
	≥ 45	5	51	
Liu, 2017	< 25	15	78	Significant difference (χ^2=10.553, P=0.032).
	25-29	9	130	
	30-34	3	76	
	35-39	5	61	
	≥40	2	46	

A3-Education

Author	**Group**	**TI**	**Non-TI**	**Results**
Sun, 2013	Secondary technical school and below	239	409	No significant difference (χ^2 test)
	Junior college	544	846	
	Bachelor	445	698	
	Master and above	16	15	
Zhou, 2016	Secondary technical school and below	22	60	Significant difference (χ^2=10.07, P=0.01).
	Junior college	134	259	
	Bachelor and above	112	144	
Liu JL, 2019	Low	16	68	Significant difference (χ^2 test , P=0.008);
	Medium	1021	2582	Medium, OR=1.46, 95%CI=0.83-2.58;
	High	431	928	High, OR=1.72, 95%CI=0.96-3.09
Fang, 2014	Secondary technical school and below	577	987	No significant difference (χ^2 test)
	Junior college	104	181	
	Bachelor	8	13	
	Master and above	6	13	
Xu, 2012	Secondary technical school and below	352	14	Significant difference (χ^2 test , P=0.052)
	Junior college	399	22	
	Bachelor	124	12	
Yao, 2011	Secondary technical school and below	30	42	Significant difference (χ^2=3.767, P=0.035)
	Junior college and above	135	112	

Ou, 2018	Secondary technical school and Junior college	121 104	610 400	No significant difference (χ^2 test)
	Bachelor	2	15	
	Master and above			
Zhang, 2013	Secondary technical school and below	7	119	No significant difference (χ^2 test)
	Junior college	24	233	
	Bachelor and above	3	39	
Liu,2017	Secondary technical school and below	45	283	Significant difference (χ^2=5.047, P=0.080).
	Junior college	207	956	
	Bachelor and above	268	1502	
Xu, 2015	Secondary technical school and below	60	152	Significant difference (χ^2=18.689, P=0.005).
	Junior college	142	258	
	Bachelor and above	44	42	
Wan, 2013	Secondary technical school and below	24	113	No significant difference (χ^2 test)
	Junior college and above	77	276	
Shen,2018	Middle school and below	48	96	No significant difference (χ^2 test)
	High school	38	93	
	Secondary technical school	366	695	
	Junior college	108	193	
	Bachelor and above	8	24	
Liu, 2019	Middle school and below	18	231	Significant difference (χ^2=190.53, P<0.001); Secondary technical school, OR=9.19, 95%CI=1.27-66.26.
	Secondary technical school	397	4721	
	Junior college	757	5850	
	Bachelor	655	3488	
	Master	27	77	
	Doctor	4	2	

A4- Region

Author	Group	TI	Non-TI	Results
Sun, 2013	Hubei	307	168	No significant difference (χ^2 test)
	Guizhou	254	381	
	Hebei	223	332	

	Guangdong	231	241	
	Zhejiang	229	303	
Liu, 2017	Remote village	166	847	Significant difference (χ^2=10.414, P=0.005)
	Normal village	215	988	
	Urban region	139	930	

A5- Marital status

Author	Group	TI	Non-TI	Results
Liu JL, 2019	unmarried	403	913	No significant difference (χ^2test)
	married	1065	2665	
Xu, 2012	unmarried	13	189	Significant difference (χ^2=17.447, P=0.002)
	married	35	655	
	others	0	41	
Ou, 2018	unmarried	40	177	No significant difference (χ^2test)
	married	184	828	
	divorce	3	20	
Xu, 2015	unmarried	75	125	No significant difference (χ^2test)
	married	160	310	
	others	9	20	
Wan, 2013	unmarried	28	111	No significant difference (χ^2test)
	married	72	267	
	divorce	1	12	
Zhou, 2016	unmarried	90	113	Significant difference (χ^2=7.45, P=0.05)
	married	173	342	
	others	6	13	
Liu, 2017	unmarried	17	111	Significant difference (χ^2=7.091, P=0.008)
	married	17	276	
	divorce	0	4	

A6- Nation

Author	Group	TI	Non-TI	Results
Wan, 2013	Ethnic Han	60	254	No significant difference (χ^2 test)
	Others	41	138	
Shen, 2018	Ethnic Han	517	998	No significant difference (χ^2 test)
	Minority	51	103	

A7- Major

Author	Group	TI	Non-TI	Results
Shen, 2018	Clinical medicine	442	803	No significant difference (χ^2 test)
		57	143	

	Clinical Chinese medicine	12	36	
	Public health	28	38	
	Nursing	2	3	
	Pharmacy	9	31	
	Other medical specialties	18	47	
	Other non-medical specialties			
Wan, 2013	Clinical medicine	44	118	Significant difference (χ^2=8.597, P=0.014).
	Nursing	41	168	
	Others	16	106	

B1- Occupation

Author	Group	TI	Non-TI	Results
Sun, 2013	Doctor	444	706	Significant difference (χ^2=12.305, P=0.006);
	Nurse	444	612	Medical technician, OR=0.796, 95%CI=0.645-
	Medical technician	231	455	0.982.
	Public health worker	125	195	
Xu, 2012	Doctor	24	346	No significant difference (χ^2 test)
	Nurse	14	307	
	Public health	6	76	
	Administrative staff	1	48	
	Medical technician worker	3	98	
Yao, 2011	Doctor	67	109	Significant difference (χ^2=18.558, P=0.026).
	Public health worker	12	2	
	Pharmacist	12	16	
	Nurse	60	83	
	Medical technician	7	4	
	Administrative staff	12	8	
Ou, 2018	Doctor	101	394	Significant difference (χ^2=15.028, P=0.002).
	Nurse	94	397	Medical technician, , OR=0.397, 95%CI=0.220-
	Public health worker	17	64	0.717
	Medical technician	15	170	
Liu, 2017	Doctor	204	1217	Significant difference (χ^2=20.673, P<0.001)
	Nurse	199	831	
	Medical technician	104	556	
	Administrative staff	13	158	

B2- Job title

Author	Group	TI	Non-TI	Results
Sun, 2013	No title	110	219	Significant difference (χ^2=12.305, P=0.016).
	Junior title	693	994	
	Middle title	388	651	
	Senior title	53	104	
Wan, 2013	No title	42	200	No significant difference (χ^2 test)
	Junior and Middle title	57	175	
	Senior title	2	17	
Liu JL, 2019	Medical assistant	491	1213	No significant difference (χ^2 test)
	Resident physician	635	1500	
	Attending physician	262	646	
	Associate chief physician	58	166	
	Chief physician	22	53	
Xu, 2012	No title	6	108	No significant difference (χ^2 test)
	Junior title	29	504	
	Middle title	11	223	
	Senior title	2	40	
Yao, 2011	No title	25	15	No significant difference (χ^2 test)
	Junior title	101	100	
	Middle title	36	34	
	Senior title	7	8	
Ou, 2018	Junior title	152	680	No significant difference (χ^2 test)
	Middle title	67	306	
	Senior title	8	39	
Xu, 2015	No title	102	226	No significant difference (χ^2 test)
	Junior title	88	173	
	Middle title	22	64	
	Senior title	5	20	
Liu, 2019	Intern	229	1752	No significant difference (χ^2 test)
	Junior title doctor	746	6010	
	Middle title doctor	466	3589	
	Senior title doctor	417	3018	
Shen,2018	No title	320	646	No significant difference (χ^2 test)
	Junior title	219	383	
	Middle title	27	69	
	Senior title	2	3	
Zhou,2016	No title	19	14	Significant difference (χ^2=22.04, P<0.01).
	Junior title	180	279	
	Middle title	58	154	

	Senior title	2	19	
Liu, 2017	No title	9	80	No significant difference (χ^2 test)
	Junior title	270	1420	
	Middle title	229	1138	
	Senior title	5	70	

B3- Work seniority

Author	Group	TI	Non-TI	Results
Sun, 2013	≤ 1 year	113	168	Significant difference (χ^2=14.639, P=0.012)
	2–5 years	259	381	
	6–10 years	238	332	
	11–15 years	167	241	
	16–20 years	197	303	
	≥ 20 years	270	543	
Wan, 2013	< 5 years	40	180	No significant difference (χ^2 test)
	5-19 years	53	148	
	≥ 20 years	8	64	
Fang,2014	< 5 year	30	75	No significant difference (χ^2 test)
	5–15 years	193	287	
	15–25 years	196	336	
	≥ 25 years	276	496	
Xu, 2012	< 3 years	20	288	Significant difference (χ^2=16.816, P=0.002)
	3-5 years	14	315	
	≥ 6 years	13	259	
Yao, 2011	<3 year	56	60	No significant difference (χ^2 test)
	3–5 years	39	39	
	6–9 years	25	21	
	≥ 10 years	48	36	
Ou, 2018	Mean	9.51 ± 7. 13	9.71 ± 7. 77	No significant difference (χ^2 test)
Zhang, 2013	≤ 5 year	18	157	Significant difference (χ^2=4.149, P=0.042).
	5–9 years	4	77	
	10–14 years	8	76	
	15-19 years	2	60	
	≥ 20 years	2	55	
Shen,2018	0–9 years	31	43	Significant difference (χ^2=13.599, P=0.018).
	10–19 years	160	310	
	20–29 years	212	358	
	30–39 years	98	194	
	40–49 years	63	179	
	≥ 50 years	4	17	

B4- Qualified to practice

Author	Group	TI	Non-TI	Results
Fang, 2014	Yes	528	925	No significant difference (χ^2 test)
	No	167	269	

B5- Income

Author	Group	TI	Non-TI	Results
Liu JL, 2019	< 163.4	134	302	Significant difference (χ^2 test, P<0.001);
	163.5-326.7	618	1324	326.8-490.1, OR=1.26, 95%CI=1.02-1.55
	326.8-490.1	539	1310	
	≥ 490.2	177	624	
Fang,2014	The upper layer	0	4	Significant difference (χ^2=42.385, P<0.001)
	Between upper and middle	15	42	
	Middle level	134	354	
	Between middle and lower	320	540	
	The lower layer	222	250	
Lu,2018	The lower layer	216	415	Significant difference (χ^2=10.952, P=0.012).
	Middle level	94	272	
	The upper layer	9	31	
Liu, 2019	< 1000RMB	41	79	Significant difference (χ^2=129.56, P<0.001);
	1001-3000 RMB	776	4874	5001-8000 RMB, OR=6.67, 95%CI=1.66-26.75
	3001-5000 RMB	932	8347	
	5001-8000 RMB	104	1046	
	8001-10000 RMB	0	17	
	≥ 10001 RMB	5	6	
Wan, 2013	≤3000	94	334	Significant difference (χ^2=4.340, P=0.037).
	>3000	7	58	

B6- Medical institution

Author	Group	TI	Non-TI	Results
Liu JL, 2019	Township hospital	480	1027	Significant difference (χ^2 test, P<0.001);
	Center for Disease Control and Prevention	131	485	CDC, OR=0.74, 95%CI=0.58-0.94; TCMH, OR=1.15, 95%CI=0.94-1.41.
	Maternity and child health hospital	210	584	
		249	490	

	Traditional Chinese medical hospital	398	992	
	County general hospital			
Yao, 2011	Community center	139	108	Significant difference (χ^2=7.436, P=0.007).
	Community station	31	49	
Wan, 2013	County	94	334	Significant difference (χ^2=4.340, P=0.037).
	Town	7	58	

B7- Organizational affiliation

Author	Group	TI	Non-TI	Results
Xu, 2012	Establishment strength	21	499	No significant difference (χ^2 test)
	Temporary employment	24	342	
	Others	3	44	
Liu, 2019	Establishment strength	121	1016	Significant difference (χ^2=48.24, P<0.001).
	Long-term employment	214	1798	
	Temporary employment	371	2023	
	Others	56	381	
Liu,2017	Establishment strength	9	224	Significant difference (χ^2=11.995, P<0.001).
	Temporary employment	25	192	

B8- Re-employ after retirement

Author	Group	TI	Non-TI	Results
Xu, 2015	Yes	26	48	No significant difference (χ^2 test)
	No	200	371	

B9- Turnover experience

Author	Group	TI	Non-TI	Results
Wan, 2013	No	55	224	No significant difference (χ^2 test)
	Yes	46	168	

B10- Individual income levels in the local

Author	Group	TI	Non-TI	Results
Fang,2014	The upper layer	0	4	Significant difference (χ^2=42.385, P<0.001)
	Between upper and middle	15	42	
	Middle level	134	354	
	Between middle and lower	320	540	
	The lower layer	222	250	
Lu,2018	The lower layer	216	415	Significant difference (χ^2=10.952, P=0.012).
	Middle level	94	272	
	The upper layer	9	31	

B11- Work stress

Author	Group	TI	Non-TI	Results
Ou, 2018	High	166	567	Significant difference (χ^2=24.291, P<0.001);
	Low	61	458	Yes, OR=2.179, 95%CI=1.572-3.019.
Wan, 2013	High	61	182	Significant difference (χ^2=2.271, P=0.040).
	Not too bad	29	159	
	Low	11	51	
Xu, 2015	High	147	211	Significant difference (χ^2=16.715, P=0.002).
	Not too bad	77	204	
	Low	21	41	
Liu, 2019	Very high	849	3458	Significant difference (χ^2=424.24, P<0.001);
	High	783	8525	High, OR=0.41, 95%CI=0.25-0.65
	Not too bad	118	777	
	Low	89	1418	
	Very low	19	191	
Zhou, 2016	Very high	75	42	Significant difference (χ^2=50.40, P<0.01).
	High	116	216	
	Low	78	212	

B12- Emotional Exhaustion

Author	Group	TI	Non-TI	Results
Shen, 2018	Severe	288	299	Significant difference (χ^2 =105.750, P<0.001)
	Moderate	162	349	Severe, OR=2.436, 95%CI=1.695-3.500
	None	118	453	
Lu, 2018	Bad	215	147	Significant difference (χ^2 =400.485, P<0.001).
	Not too bad	63	211	
	Good	41	360	

B13- Flattening of affect

Author	Group	TI	Non-TI	Results
Shen, 2018	Severe	128	138	Significant difference (χ^2 =105.750, P<0.001)
	Moderate	332	648	Severe, OR=1.626, 95%CI=1.064-2.485;
	None	108	315	Moderate, OR=1.486, 95%CI=1.069-2.066.

B14- Public health service

Author	Group	TI	Non-TI	Results
Zhang, 2015	More participation	38	66	Significant difference (χ^2=6.89, P<0.01).
	Less participation	11	52	

B15- Working hours

Author	Group	TI	Non-TI	Results
Wan, 2013	≤ 40	26	131	Significant difference (χ^2=12.033, P=0.002).
	41-59	40	187	
	≥ 60	35	73	

B16- Career planning

Author	Group	TI	Non-TI	Results
Wan, 2013	No	14	55	Significant difference (χ^2=2.553, P=0.012).
	In-between	68	231	
	Yes	14	110	

B17- Career identity (be pound of this job)

Author	Group	TI	Non-TI	Results
Wan, 2013	No	11	45	No significant difference (χ^2 test)
	In-between	47	166	
	Yes	46	181	

B18- Social status

Author	Group	TI	Non-TI	Results
Lu, 2018	High	171	521	Significant difference (χ^2=50.815, P<0.001).
	Low	148	187	
Xu,2015	Dissatisfied	21	9	Significant difference (χ^2=217.296, P=0.002).
	Not too bad	79	108	
	Satisfied	146	328	
Wan, 2013	Dissatisfied	7	18	No significant difference (χ^2 test)
	Not too bad	54	187	

	Satisfied	40	187	

B19- Influence family life

Author	Group	TI	Non-TI	Results
Sun, 2013	Yse	108	150	No significant difference (χ^2 test)
	No	1136	1818	

B20- Living condition

Author	Group	TI	Non-TI	Results
Xu, 2015	Dissatisfied	126	176	Significant difference (χ^2=26.907, P<0.001).
	Not too bad	97	213	
	Satisfied	23	67	
Wan, 2013	Dissatisfied	7	56	No significant difference (χ^2 test)
	Not too bad	56	223	
	Satisfied	38	113	

B21- Lack of insurance

Author	Group	TI	Non-TI	Results
Shen, 2018	Yes	473	965	Significant difference (χ^2=5.228, P=0.022);
	No	95	236	Yes, OR=1.769, 95%CI=1.291-2.423.

B22- Patient trust

Author	Group	TI	Non-TI	Results
Wan, 2013	No	5	8	No significant difference (χ^2 test)
	In-between	45	162	
	Yes	51	222	

C1- Learning and training opportunity

Author	Group	TI	Non-TI	Results
Xu, 2015	Satisfied	7	35	Significant difference (χ^2=22.697, P<0.001).
	Not too bad	100	243	
	Dissatisfied	140	178	
Shen, 2018	Yse	236	394	Significant difference (χ^2=5.297, P=0.021).
	No	332	707	
Wan, 2013	Dissatisfied	50	89	Significant difference (χ^2=5.549, P<0.001).
	Not too bad	45	226	
	Satisfied	6	76	

C2- Promotion and individual development space

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	209	132	Significant difference (χ^2 =113.797, P<0.001);
	Not too bad	292	562	Not too bad, OR=0.655, 95%CI=0.475-0.905
	Satisfied	194	500	
Wan, 2013	Dissatisfied	50	78	Significant difference (χ^2 =5.743, P<0.001).
	Not too bad	42	230	
	Satisfied	9	84	
Xu, 2015	Dissatisfied	135	110	Significant difference (χ^2 =84.791, P<0.001).
	Not too bad	92	220	
	Satisfied	20	124	

C3- Interpersonal relationship

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	107	47	Significant difference (χ^2 =107.351, P<0.001).
	Not too bad	181	216	
	Satisfied	407	931	
Wan, 2013	Dissatisfied	7	9	Significant difference (χ^2 =2.684, P=0.007).
	Not too bad	46	144	
	Satisfied	48	239	
Xu, 2015	Dissatisfied	9	5	Significant difference (χ^2 =21.398, P<0.001).
	Not too bad	82	109	
	Satisfied	156	342	

C4- Work conditions and environment

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	231	133	Significant difference (χ^2 =159.456, P<0.001);
	Not too bad	224	372	Not too bad, OR=1.604, 95%CI=1.172-2.194;
	Satisfied	240	689	Dissatisfied, OR=2.406, 95%CI=1.686-3.435.
Lu,2018	Dissatisfied	174	204	Significant difference (χ^2 =168.223, P<0.001).
	Not too bad	116	286	
	Satisfied	29	228	
Xu, 2015	Dissatisfied	91	59	Significant difference (χ^2 =84.959, P<0.001)
	Not too bad	122	243	
	Satisfied	34	120	
Wan, 2013	Dissatisfied	24	61	Significant difference (χ^2=25.4, P<0.001).
	Not too bad	68	243	
	Satisfied	9	88	
Zhou,2016	Good	92	290	Significant difference (χ^2=54.16, P<0.01)
	Bad	177	175	

C5- Individual value embodiment

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	123	62	Significant difference (χ^2 =97.266, P<0.001)
	Not too bad	236	343	
	Satisfied	336	789	
Lu,2018	Dissatisfied	161	217	Significant difference (χ^2 =286.382, P<0.001)
	Not too bad	83	319	
	Satisfied	75	182	
Wan, 2013	Dissatisfied	7	9	No significant difference (χ^2 test)
	Not too bad	46	144	
	Satisfied	48	239	

C6- Scientific research atmosphere

Author	Group	TI	Non-TI	Results
Sun, 2013	Yse	22	49	No significant difference (χ^2 test)
	No	1222	1919	

C7- Level of attention by leaders

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	103	52	Significant difference (χ^2 =94.244, P<0.001)
	Not too bad	216	271	
	Satisfied	376	871	
Xu,2015	Dissatisfied	59	41	Significant difference (χ^2 =51.405, P<0.001)
	Not too bad	135	212	
	Satisfied	53	201	
Wan, 2013	Dissatisfied	18	26	Significant difference (χ^2 =4.346, P<0.001)
	Not too bad	69	244	
	Satisfied	14	122	

C8- Income satisfaction

Author	Group	TI	Non-TI	Results
Fang, 2014	Satisfactory	18	95	Significant difference (χ^2 =121.542, P<0.001)
	Not too bad	177	548	Satisfactory, OR=0.284, 95%CI=0.161-0.501;
	Dissatisfactory	500	551	Not too bad, OR=0.536, 95%CI=0.418-0.689.
Lu,2018	Satisfactory	20	120	Significant difference (χ^2 =18.128, P<0.001).
	Not too bad	29	147	
	Dissatisfactory	270	451	
Xu, 2015	Dissatisfied	196	273	Significant difference (χ^2 =38.497, P<0.001).

	Not too bad	45	150	
	Satisfied	5	32	
Wan, 2013	Dissatisfied	70	174	Significant difference (χ^2 =4.608, P<0.001).
	Not too bad	29	183	
	Satisfied	2	35	
Shen, 2018	0-19%	12	7	Significant difference (χ^2 =121.542, P<0.001)
	20-39%	131	180	0-19%, OR=20.738, 95%CI=3.815-121.717;
	40-59%	893	578	20-39%, OR=6.101, 95%CI=1.573-23.665;
	60-79%	339	148	40-59%, OR=5.567, 95%CI=1.490-21.469;
	80-99%	75	59	60-79%, OR=4.457, 95%CI=1.148-17.299.
	100%	32	29	

C9- Keep busy and fulfilling

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	89	55	Significant difference (χ^2 =63.259, P<0.001)
	Not too bad	186	235	
	Satisfied	420	904	
Wan, 2013	Dissatisfied	7	7	Significant difference (χ^2 =3.827, P<0.001)
	Not too bad	65	197	
	Satisfied	29	188	
Lu,2018	Dissatisfied	311	556	Significant difference (χ^2 =127.627, P<0.001)
	Not too bad	5	99	
	Satisfied	3	63	
Xu, 2015	Dissatisfied	49	26	Significant difference (χ^2 =60.244, P<0.001)
	Not too bad	144	227	
	Satisfied	53	201	
Shen, 2013	Severe deficiency	338	497	Significant difference (χ^2=34.028, P<0.001)
	Moderate deficiency	86	269	Severe deficiency, OR=2.436, 95%CI=1.695-3.500.
	Little deficiency and none	144	335	

C10- The competence of my manager in making decisions

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	82	24	Significant difference (χ^2 =107.944, P<0.001);
	Not too bad	184	219	Dissatisfied, OR=2.017, 95%CI=1.068-3.807
	Satisfied	429	951	
Xu,2015	Dissatisfied	82	50	Significant difference (χ^2 =81.415, P<0.001)
	Not too bad	123	212	
	Satisfied	42	191	

Wan, 2013	Dissatisfied	16	28	No significant difference (χ^2 test)
	Not too bad	62	263	
	Satisfied	23	101	

C11- Work stability

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	110	30	Significant difference (χ^2 =148.266, P<0.001)
	Not too bad	225	286	Dissatisfied, OR=1.955, 95%CI=1.107-3.454
	Satisfied	360	878	
Wan, 2013	Dissatisfied	12	12	Significant difference (χ^2 =3.984, P<0.001)
	Not too bad	63	208	
	Satisfied	26	172	

C12- Policies practice

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	148	67	Significant difference (χ^2 =145.606, P<0.001)
	Not too bad	261	357	Dissatisfied, OR=1.735, 95%CI=1.121-2.687
	Satisfied	286	770	
Zhou, 2016	Useful	93	282	Significant difference (χ^2=45.22, P<0.01)
	Useless	152	162	
	Negative effect	21	20	
Wan, 2013	Dissatisfied	18	28	Significant difference (χ^2=4.907, P<0.001).
	Not too bad	74	249	
	Satisfied	9	115	

C13- The chance to try my own methods of doing the job

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	79	52	Significant difference (χ^2 =46.986, P<0.001)
	Not too bad	277	410	Dissatisfied, OR=0.560, 95%CI=0.335-0.936
	Satisfied	339	732	

C14- The chance to do something that makes use of my abilities

Author	Group	TI	Non-TI	Results
Fang, 2014	Dissatisfied	68	27	Significant difference (χ^2 =84.353, P<0.001)
	Not too bad	213	251	
	Satisfied	414	916	
Wan, 2013	Dissatisfied	10	17	Significant difference (χ^2=3.596, P=0.001).
	Not too bad	72	235	
	Satisfied	19	140	

C15- Job satisfaction

Author	Group	TI	Non-TI	Results
Gu, 2012	Dissatisfied	14	2	Significant difference (χ^2 =16.928, P<0.001)
	Not too bad	40	18	
	Satisfied	18	30	
Lu,2018	Dissatisfied	85	102	Significant difference (χ^2 =51.182, P<0.001)
	Not too bad	166	397	
	Satisfied	68	219	
Zhou, 2016	Dissatisfied	76	27	Significant difference (χ^2 =109.40, P<0.01)
	Not too bad	134	181	
	Satisfied	61	261	

C16- Work support

Author	Group	TI	Non-TI	Results
Xu, 2015	Dissatisfied	175	200	Significant difference (χ^2 =67.704, P<0.001)
	Not too bad	61	176	
	Satisfied	8	75	
Lu, 2018	Dissatisfied	308	458	Significant difference (χ^2 =234.402, P<0.001).
	Not too bad	10	140	
	Satisfied	1	120	

C17- Income fairness

Author	Group	TI	Non-TI	Results
Zhou, 2016	Unfair	163	132	Significant difference (χ^2=76.83, P<0.01).
	Unclear	13	17	
	Fair	133	356	
Wan, 2013	Dissatisfied	1	4	Significant difference (χ^2 =3.912, P<0.001).
	Not too bad	76	209	
	Satisfied	24	179	

C18- Motivation and Salary System

Author	Group	TI	Non-TI	Results
Xu, 2015	Dissatisfied	146	151	Significant difference (χ^2 =56.593, P<0.001)
	Not too bad	85	209	
	Satisfied	13	94	
Zhou, 2016	Dissatisfied	109	93	Significant difference (χ^2 =56.55, P<0.001)
	Not clear	29	19	
	Satisfied	133	356	

Wan, 2013	Dissatisfied	49	89	Significant difference (χ^2 =5.363, P<0.001)
	Not too bad	45	221	
	Satisfied	7	82	

PRISMA 2009 Checklist

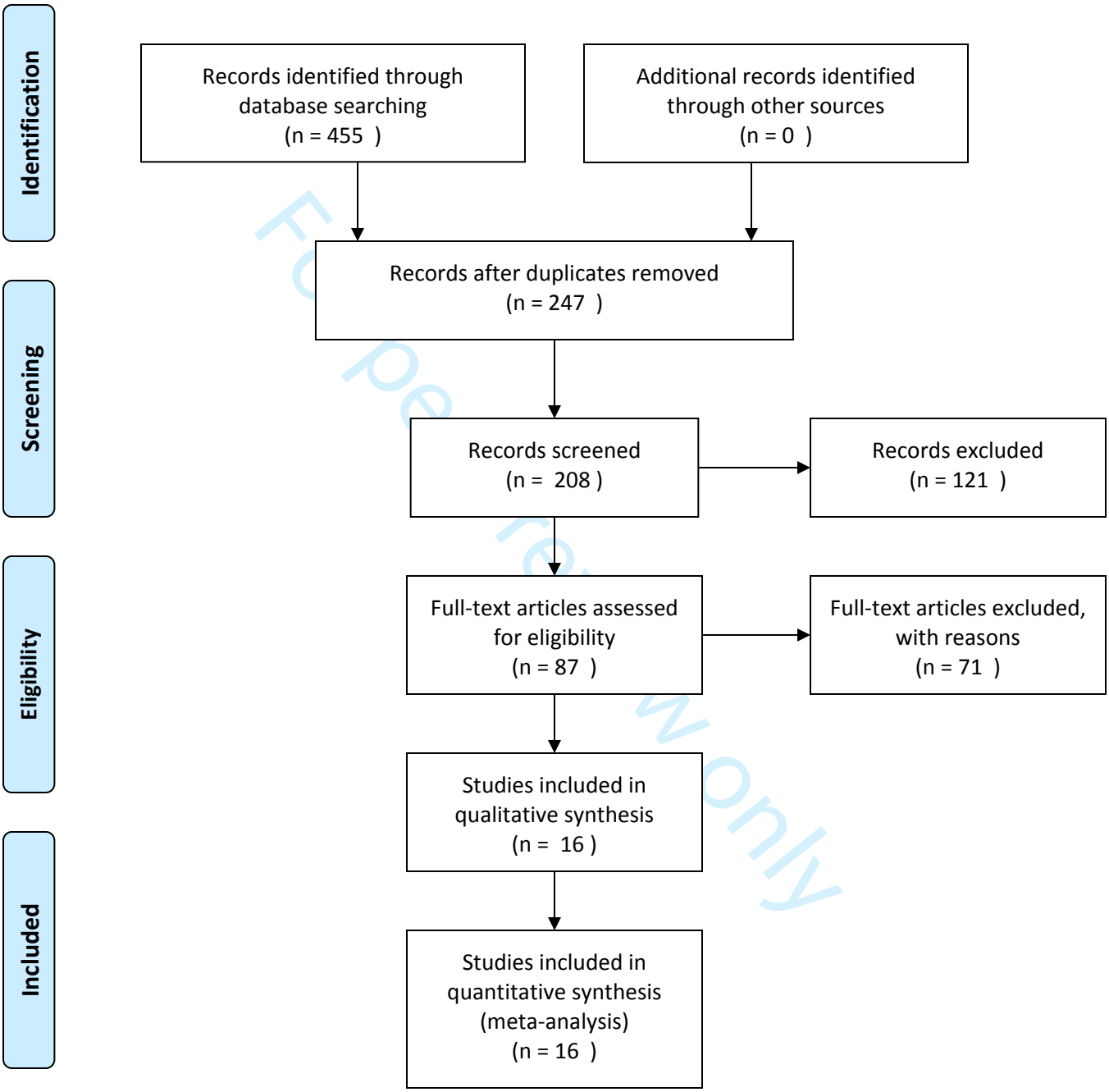
Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Not applicable
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4-5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Not applicable
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	6
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	7
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	7-8
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	7
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Not applicable
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	7
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9-10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	10
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	10
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	10

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

PRISMA 2009 Flow Diagram



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Turnover intention among primary health workers in China: a systematic review and meta-analysis

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Turnover intention among primary health workers in China: a systematic review and meta-analysis

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Abstract

Objectives To analyse the prevalence and determinants of turnover intention among primary health workers (PHWs) in China to provide evidence for improving retention measures.

Design Systemic review and meta-analysis.

Data sources Four English language databases (PubMed, EMBASE, Cochrane Library, PsycINFO) and three Chinese databases (CNKI, CSPD, CBM) were searched up to October 2019.

Eligibility criteria Eligible studies were observational or descriptive studies conducted in mainland China. The prevalence of turnover intention among health workers and related factors had to be explicitly reported in each included study.

Data extraction and synthesis Data were extracted by one author and reviewed independently by two other authors. For each factor analysed by a meta-analysis, the factor was required to be the same across different studies, and at least three studies had to include it. The quality of studies was assessed using the Newcastle–Ottawa scale and heterogeneity was evaluated using the I^2 statistic.

Results: We identified 16 cross-sectional studies investigating a total of 37,672 primary health workers. The prevalence of turnover intention was 30.4%. Subgroup analysis revealed that the highest prevalence was observed in the community primary health care institutions and the eastern provinces of China. Meta-analyses indicated that 21 factors were significantly associated with turnover intention, including demographic factors (gender, age, education, marital status), job characteristic factors (title, work seniority, remuneration, social status, organizational affiliation, work stress) and job satisfaction factors (learning and training opportunity, interpersonal relationship, work condition and environment and so on).

Conclusion: This study highlights the problem of turnover intention among PHWs in China. Efforts should be made to improve conditions in both work-related areas and areas outside of work. Policymakers should continue to improve reward systems, the construction of infrastructure, and promotion systems and pay more attention to PHWs' lives outside of work and meet their living needs.

Strengths and limitations of this study

1) This systematic review provides supplemental evidence from China to global studies on the turnover intention of primary health workers.

2) Meta-analysis and narrative analysis are performed to identify the risk factors for turnover intention among primary health workers.

3) Due to the limitation and shortage of the current studies, significant heterogeneity among the individual studies evident after the subgroup analysis and part of the meta-analysis are performed.

Introduction

Primary health care (PHC) addresses the majority of a person's health needs throughout their lifetime. The declaration of Astana declared that strengthening PHC is the most inclusive, effective and efficient approach to enhance people's physical and mental health andsocial well-being.[1] Primary health workers (PHWs) are direct providers of PHC, and their quantity directly determines the quantity, quality and outcomes of PHC.[2] These services should be provided with compassion, respect and dignity by health professionals who are well-trained, skilled, motivated and committed.[1] However, primary health institutions are facing significant labour shortages worldwide,[3] not only in low- and middle-income countries[2,4,5] but also indeveloped countries.[6,7] In China, PHC services including basic medical and public health services, are provided by community health centres and stations in urban areas and by township health centres and village clinics in rural areas.[8] These four types of PHC institutions constitute the essential part of China's three-tertiary health care delivery network. PHWs working inside include doctors, nurses, public health workers and administrative staff, most of them have to play multiple roles. Currently, PHC institutions are all facing the problem of staff turnover, aggravating the shortage of the health workforce[9], which has become one of the significant obstacles to strengthening China's primary healthcare services.[10]

Turnover, a behavior of actually leaving, was an important value in human resources management and maintenance of the current workforce[11]. Turnover intention (TI) is defined as the probability that an employee will leave his or her job within a specific period;[12] TI is considered to one of the best predictors of turnover behaviour.[13–16] Previous studies have explored the factors that influence the turnover intentions of PHWs. A variety of factors have been identified, such as demographic factors,[7,17–22] job satisfaction,[18,20,22–25] work stress,[13,18,25] burnout,[23,26] quality of work-life,[21] interpersonal communication,[27] and violence from patients.[28] While these factors have been definitely linked with TI, some researchers have focused on factors outside of work. Han et al.[29] found that key factors of community integration influence overseas-trained doctors' decision to stay in or leave a rural community in Australia; Stewart et al.[17] reported that community satisfaction is a crucial predictor of intent to leave among rural and remote registered nurses in Canada; and Chao et al. and Lu et al.[12,13] demonstrated that there is a significant correlation between work-family conflict and the TI of PHWs in Taiwan and Guangdong.

In China, many empirical studies have been conducted. However, there is no consistent conclusion on the prevalence and determinates of TI among PHWs in China. Furthermore, most of them were published in Chinese, only a few studies on TI and risk factors for PHWs have been published in international journals, and no related systematic reviews have been found in either Chinese or

English. Therefore, this study aims to examine the prevalence of TI and identify the related factors among PHWs in China by conducting a systemic review and meta-analysis.

Method

Literature search

This systematic review and meta-analysis were performed following the PRISMA guidelines.[30,31] A systematic search of the literature was conducted up to October 2019 using four English language databases (PubMed, EMBASE, Cochrane Library, PsycINFO) and three Chinese databases (CNKI, CSPD and CBM). No limits were applied for language and publication dates of coverage. The search strategy was based on a combination of "(Turnover Intention, or Departure Intention, or Demission Intention, or Leave Intention, or intent to leave), AND (Primary, Community, Rural, Countryside, District, Basic, Fundamental or Grassroots), AND (Health worker, Health officer, Health Manpower, Health Personnel, Medical Personnel, Medical worker, Medical staff, Doctor, Physician, or Nurse) and (China, or Chinese)". References of the retrieved studies were also checked and screened. The full search strategy can be found in the Supplementary Tables S1.

Study eligibility

Eligible studies were published studies that reported the prevalence and related determinants of TI among Chinese PHWs. The eligibility criteria included the following: (1) types of studies: original cross-sectional studies (those presenting non-original data, such as reviews, editorials, opinion papers, or letters to the editor, were excluded); (2) types of participants: Chinese PHWs; (3) types of risk factor: demographic factors, job characteristic factors and job satisfaction factors. (4) types of outcome measures: the prevalence of TI and related factors reported in the study.

Eligibility assessment was conducted to screen the titles, abstracts and full texts of the identified studies by two reviewers independently. Disagreements on which studies should be included or excluded were resolved by full group consensus.

Data extraction

A piloted form referred to the Cochrane Effective Practice and Organization of Care Review Group (EPOC) data collection checklist,[32] was used to extract relevant data from the included full-text studies. The following data were extracted: author, publication year, location where the study was carried out, participants, sample size, number of cases, assessment tools, prevalence of TI and related factors. Data extraction was conducted by one author and reviewed independently by two other authors, with disagreements resolved by discussion until consensus was reached. The inter-rater reliability for title screening between two authors was 96.15%, and for abstract screening was 94.74%. The full inter-rater reliability result can be found in the Supplementary Tables S2.

Quality assessment

The quality of studies was assessed using a modified Newcastle-Ottawa Scale[33], as recommended by the Cochrane Collaboration[34]. Studies received scores based on the design-specific sources of

bias, methods for selecting participants, exposure measures, outcome variables and methods to control confounders[35]. The total score was 7 points, and all the included studies were grouped according to their scores, which were categorized as good (6–7), moderate (3–5) and poor (1–2). Specifically, a study with a sample size of less than 1000 was regarded as having poor representativeness of the sample (score = 0, otherwise = 1); a cross-sectional study with a response rate lower than 80% or without reporting a response rate was considered a poor-quality study (score = 0, otherwise = 1). Meanwhile, if statistical methods used in the study was exact, we considered statistical test to be appropriate (score = 1, otherwise = 0), even if there was no further multivariate analysis. Three authors independently scored all included studied, with disagreements resolved by discussion until consensus was reached.

Data synthesis and statistical analysis

The primary outcome in this review was the difference in the prevalence or relative risk of TI among different groups. The prevalence of TI was estimated as the total number of TI cases divided by the total number of PHWs participating in the study. It was assessed via single-arm analysis. We compared the difference in TI between PHWs from different regions and institutions by subgroup analyses. The secondary outcome of this study was the association between factors and TI among PHWs in the form of the odds ratio. Each factor analysed by a meta-analysis, required related variables in the questionnaire to be the same in different studies, which meant that it was feasible to merge the factor into two groups; meanwhile, at least three studies related to each factor had to be included in the meta-analysis. When the meta-analysis was performed, the significance of the pooled odds ratio (OR) was determined by the Z-test. Heterogeneity was estimated by the Q statistic and evaluated using the I^2 statistic.[36] A fixed-effect model was used to compute the summary risk estimate if there was no heterogeneity among the studies, whereas a random-effects model was used when heterogeneity existed ($I^2 \geq 50\%$).[37] Publication bias was evaluated using Egger's test. All statistical analyses were performed using Stata V13.0 and RevMan V5.3. A two-tailed p value of <0.05 was considered to be statistically significant. We referred to the Meta-analysis of Observational Studies in Epidemiology (MOOSE) guideline.[38] If it was infeasible to make a quantitative synthesis and conduct a meta-analysis, a narrative approach and descriptive statistics were used by grouping studies that reported the same factors, and to compare their associations with the TI of PHWs.

Patient and public involvement

Patients and the public were not involved in this study.

Results

A total of 455 records were identified through our initial database search (PubMed: 13, Embase: 14, Coherence: 6, PsycINFO: 0, CNKI: 124, WAN FANG Data: 270, CBM: 28). After duplicate records

were removed, 208 records were screened based on title and abstract. Eighty-seven articles were included in the full-text review. Among these, 63 articles were eliminated due to a lack of original data. Three articles were eliminated due to the inappropriate study designs. Five articles were excluded because of missing data on risk factors for TI. Ultimately, 16 studies were included in this study. No additional studies were obtained after the references of all 16 retrieved articles were checked. The study selection process is shown in Figure 1.

Figure 1 Flow diagram of the study selection

Study characteristics

Table 1 presents the main characteristics of all 16 studies. These studies were all cross-sectional and performed in 24 provinces of China between 2011 and 2019. The selected studies included 37,672 participants, with a median sample size of 1073 (range 127–16,157). Five studies were conducted in eastern China,[39–43] four in central provinces,[19,44–46] and four in the western region.[18,47–49] Four studies were conducted in urban areas,[39,40,44,50] eight in rural areas,[18,19,42,46–49,51] and four in both areas.[41,43,45,52] Thirteen studies used a dichotomous question to measure TI (Do you want to leave your job? Yes/No), and three studies used scales. All studies reported the prevalence and related factors of TI among PHWs.

Table 1 Characteristics of 16 included studies

Authors	Location	Research sites	Sample size (Qualified rate %)	TI assessment tool	Prevalence of TI, N (%)	Ref. No.
Xu,2012	Anhui	City community	1109(92.96%)	Dichotomous question	224 persons (20.2%)	5
Gu,2012	Shanghai，	City community	127(86.99%)	Dichotomous question	69 persons (56.69%)	7
Yao,2011	Guangdong	City community	335(95.7%)	Dichotomous question	178 persons (52.0%)	13
Lu,2018	Shandong	Rural area (village)	1037(98.57%)	The Self-made 10items 5-point Likert Turnover intention Scale	498 persons (48.02%) (Score of > 32 out of 50 means turnover intention)	15
Ou,2018	Guangdong	City community and Rural area	1252(87.43%)	Frah Turnover intention Scale	227 persons (18. 13%) (Score of > 3 out of 5)	17
Xu,2015	Guizhou	Rural area (township)	704(96.6%)	Dichotomous question	247 persons (35.10%)	19
Liu,2019	Not Stated	City community and Rural area	16157(100.00%)	Dichotomous question	1858 persons (11.50%)	33
Zhang,2013	Shaanxi	Rural area (township)	425(99.53%)	Dichotomous question	34 persons (8.00%)	39
Liu,2017	Shanghai	City community and Rural area	3295(86.70%)	Dichotomous question	520 persons (15.80%)	49
Shen,2018	8 central provinces*	Rural area (village)	1669 (100.00%)	Dichotomous question	568 persons（34.03%）	54
Zhou,2016	Wuhan	City community and Rural area	755 (83.90%)	Michael & Spector Turnover intention Scale	278 persons（36.86%） (Score of > 3 out of 5)	55
Zhang,2015	Shandong, Anhui, Shanxi	Rural area (township)	167(100.00%)	Dichotomous question	49 persons (29. 34%)	63
Wan,2013	Yunnan	Rural area (township & county)	493(94.80%)	Dichotomous question	101 persons (29. 34%)	70
Fang,2014	Hubei	Rural area (village)	1889(97.88%)	Dichotomous question	695 persons (36.8%)	76
Sun,2013	5 provinces*	City community	3212(99.32%)	Dichotomous question	1243 persons (38.7%)	79
Liu JL,2019	11 western provinces*	Rural area (township & county)	5046(90.4%0%)	Dichotomous question	1468 persons (29.1%)	86

*8 provinces：Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan, 5 provinces：Zhejiang, Guangdong, Guizhou, Hebei, and Hubei; 11 provinces：Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, and Yunnan.

Forty-seven factors were extracted from 16 included studies (Supplementary Tables S3). It included three groups: 7 demographic factors, 22 job characteristic factors, and 18 job satisfaction factors. The average quality score of the 16 included studies was 5.25 of 7 points, indicating a moderate research quality, according to the modified Newcastle-Ottawa scale (Supplementary Tables S4). All studies were of the medium and high quality.

Prevalence of turnover intention among PHWs

Table 2 shows the prevalence of turnover intention among PHWs in China. The pooled prevalence was 30.4%. The highest prevalence was 54.3% reported by Gu et al.[39], whereas Zhang reported the lowest prevalence of 8.0%.[49] The subgroup analysis by region showed that, the highest prevalence was observed in the eastern China (37.6%), followed by central regions (31.9%). andwestern regions (23.2%). According to work setting, the highest prevalence occurred among PHWs working in the community), followed by rural PHWs working in townships and villages. With respect to sample size, the prevalence of TI was higher in studies having a sample size<1037 (35.5%) than in those with a sample size≥1037 (25.5%). High heterogeneity was observed across the included studies due to the inconsistent research sites, regions and objects.

Table 2 Prevalence of turnover intention among PHWs in China

Variables	Characteristic	Included studies	Prevalence (95%CI)	Q test (I^2)
Overall		16	0.304[0.240, 0.367]	99.5%
By region	East	5	0.376[0.231, 0.521]	99.3%
	Central	4	0.319[0.239, 0.399]	97.6%
	West	4	0.232[0.119, 0.345]	98.8%
By research site	Work in village	3	0.395[0.321, 0.470]	96.3%
	Work in township	5	0.234[0.144, 0.342]	98.4%
	Work in community	4	0.412[0.274, 0.551]	98.7%
By sample size	<1037	8	0.355[0.232, 0.478]	99.7%
	≥1037	8	0.255[0.174, 0.337]	98.8%

Factors related to turnover intention among PHWs

All studies reported demographic factors or job characteristic factors and determined their associations with the TI of PHWs. Moreover, six studies explored the effects of job satisfaction factors,[19,42,45–48] and ninetheen factors were feasible for inclusion in the meta-analyses. Egger's linear regression tests on a natural logarithm scale of OR found no evidence of publication bias for the studies included in meta-analyses (Supplementary Tables S5).

Demographic factors and turnover intention

The meta-analysis of demographic factors was based on 15 cross-sectional studies (Figure 2). Gender (male vs. female: OR:1.23),[18,19,48,50,52,40–47] age (younger vs. older: OR: 1.47),[40,41,44,48–50,52] and marriage status (unmarried vs. married, OR: 1.16)[18,41,43–

45,47,48] were significantly associated with TI in PHWs, which showed that the PHWs with higher risks of TI were male, were younger, had a higher education, were unmarried, and worked in the remote region. But education (low-education vs. high-education: OR:0.78).[18,19,41,43–46,48–50] was not statistically significant.

Figure 2 Forest plots of demographic factors

Job characteristic factors and turnover intention

Job characteristic factors were examined in nine studies (Figure 3). Job title (low-title vs. high-title: OR: 1.11),[18,40,41,43–46,48,50] work seniority (short vs. long: OR: 1.17),[40,46,49,50] organizational affiliation (strength vs. others: OR: 0.85),[41,44,52] and work stress (high vs. low: OR: 3.14)[43,45,47,48,52] were significantly associated with the TI of PHWs, which presented that the PHWs with higher risks of TI were those with shorter work seniority, higher work stress, and longer working hours. However, occupation (doctor vs. nurse: OR:1.05)[40,41,43,44,50] was not statistically significant.

Figure 3 Forest plots of job characteristic factors

Job satisfaction factors and turnover intention

Six studies explored the association between job satisfaction factors and turnover intention (Figure 4). Overall job satisfaction (satisfied vs. dissatisfied: OR: 0.15),[39,42,45] promotion and individual development space (satisfied vs. dissatisfied: OR: 0.19),[19,47,48] interpersonal relationships (satisfied vs dissatisfied: OR: 0.20),[19,47,48] keep busy and fulfilling (satisfied vs dissatisfied: OR: 0.39),[19,42,47,48] sense of accomplishment (satisfied vs dissatisfied: OR:0.16),[19,42,47] income satisfaction (satisfied vs dissatisfied: OR: 0.33),[19,42,46–48] work condition and environment (satisfied vs dissatisfied: OR: 0.19),[19,42,47,48] level of attention by leaders (satisfied vs dissatisfied: OR: 0.20),[19,47,48] the competence of my manager in making decisions (satisfied vs dissatisfied: OR: 0.18),[19,47,48] and motivation and salary system (satisfied vs dissatisfied: OR: 0.21)[45,47,48] were significantly associated with the TI of PHWs. The results showed that PHWs who dissatisfied their job had significantly higher risks of TI.

Figure 4 Forest plots of job satisfaction factors

The remaining twenty-eight exposures were analysed for their associations with the TI of PHWs under a narrative approach. In the demographic factors group, PHWs who work in remote regions[41] and who have lower remuneration [18,47,52] and social status[42,47,48] were found to have significantly higher risks of TI. No significant associations were found between TI and the nation.[46,47] In addition, the associations between TI and major in clinical medicine are inconclusive.[46,47]

Among job characteristic factors, seven were significantly associated with high risks of TI, including lower individual remuneration levels at the local level,[19,42] more severe emotional exhaustion,[42,46] more severe flattening of affect,[46] more participation in public health service,[51] longer working hours,[47] no career planning,[47] and lack of insurance.[46] No significant associations were found between TI and qualified to practice,[19] re-employ after retirement,[48] turnover experience,[47] career identity,[47] influence on family life,[50] patient trust.[47] In addition, the associations between TI and living condition is inconclusive.[47,48]

Regarding job satisfaction factors, PHWs who are unsatisfied with work stability,[19,47] the chance to try their own methods of performing their job,[19] the chance to do something that makes use of their abilities,[19,47] work support,[42,48] policies practice,[19,45,47]and income fairness[45,47] were found to have significantly high risks of TI. However, no statistically significant associations were found between TI and the satisfaction with the scientific research atmosphere or learning and training opportunity.[46–48]

Discussion

Principal findings

This systematic review presents an overall prevalence of TI (30.4%) among Chinese PHWs which indicated that three of ten PHWs have TI. However, this finding is almost two times higher than that of some high-income countries. A study conducted in England showed that only 11.8% of primary care doctors had high turnover intention.[53] A survey including 23,159 nurses from 10 European countries showed that 9% of all these nurses intended to leave their profession, varying from 5% to 17% among countries[54] Another survey performed among 2,263 physicians in America reported that 18.4% of them intended to leave their practice.[55] A study conducted in Canada reported that 17.2% of registered nurses intended to leave their current nursing position.[17] Meanwhile, the prevalence of TI was lower than in some low- and middle-income countries, such as Ghana,[20] Iraq, [56] South Africa,[22] and the Philippines.[57]

The subgroup analysis indicated the variation in the prevalence of TI among regions. The possible explanations for this variation might be the difference in the level of social and economic development and the workplace. In East China, there are more urban hospitals than in other regions, providing more jobs, higher pay and a better work environment. It attracts many PHWs to move away from primary care practice.[58] As rural PHWs, they usually settled down in rural areas, lacking access to urban hospitals compared to peers in the urban community.

This study extracted a broad scope of fourty-seven related factors and determined their associations with the TI of PHWs, identifying a total of thirty-one demographic, job characteristic and job satisfaction risk factors.

Five demographic risk factors were determined to have significant associations with the TI of PHWs, which showed that the PHWs who were male, were younger, had a higher education, were

unmarried, and worked in the remote region with high risks of TI. Some of these findings are in line with studies performed in South Africa, the Philippines, Canada, Saudi Arabia, Ghana and the Netherlands.[17,20–22,25,57] However, Bonenberger et al.[20] and Labrague et al.[57] showed that the association between gender and the TI of PHWs was not statistically significant. It can be concluded that different types of PHWs have unique characteristics of TI. Accordingly, we can sum up the high-risk population among PHWs. For example, the turnover intentions of an unmarried young practitioner who received full medical training could be expected to be higher than a married older practitioner with limited training. The policymakers and medical institutions managers should formulate or adjust retention measures based on these characteristics.

According to job characteristic factors, we concluded that PHWs who less shorter work seniority, higher work stress, and longer working hours had significantly higher risks of TI. All of these findings are consistent with prior studies. Nevertheless, some findings are inconsistent with prior studies. Remuneration was found to be statistically significant in the review, which is consistent with Almalki et al.,[21] but Labrague et al.[57] reported an insignificant association between remuneration and TI. Occupation, and level of the medical institution were not significantly associated with TI in the review, in accordance with Warmelink et al.[25] and Labrague et al.[57] However, some studies reported the opposite results.[17,20] In addition, seven factors identified in the review were never or rarely reported in other countries, including title, social status, participation in public health service, insurance, career planning, emotional exhaustion or flattening of affect and authorized personnel, which were found to have significant associations with a high risk of TI among PHWs in China. Among these factors, "emotional exhaustion" and "flattening of affect" are measures of mental health status. In recent years, the mental health status of the health workforce has deteriorated due to increasing work stress and violence.[59,60] Some studies also found that mental health has significant associations with job satisfaction and job burnout.[18,26,61] In the context of COVID-19, all PHWs have been mobilized to fight the epidemic, which will undoubtedly have a negative impact on their mental health status.[62,63] The risk of TIs caused by mental health problems cannot be ignored.

There is a significant inverse association between job satisfaction and TI. In this review, we found that low overall job satisfaction reported significantly higher risks of TI among PHWs, which is in line with Bonenberger et al.,[20] Warmelink et al.[25] and Delobelle et al.[22] Furthermore, most of the job satisfaction factors are also significantly associated with the TI of PHWs. However, these specific job satisfaction factors have rarely been reported in previous studies.

Notably, compared with previous studies focused on the family factors,[17,21] our study did not find relevant evidence on family factors in China such as: community satisfaction, numbers of dependent family members, or family commitments.

Limitations and strengths

To our knowledge, this is the first systematic review (including meta-analysis) to determine potential risk factors for TI among Chinese PHWs. Our findings present an overview of the current evidence from mainland China. One strength of this review is that it estimated the prevalence of TI among Chinese PHWs based on a large sample size with a total of 16 cross-sectional studies and 37,672 participants. Another strength is that it determines the associations of a broad scope of potential risk factors. Limitations exist in this systematic review. Significant heterogeneity among the individual studies was found when the subgroup analysis and the part of meta-analysis were performed. The main reason is the heterogeneity between different studies in research region and research site. Due to the limitation and shortage of the current studies, it is hard to conduct a further study.

Literature Gaps

Therefore, it can be concluded that there are many facets of the TIs among PHWs that need to be explored. First, the differences in TI by occupation within the different regions or institutions need to be explored. Second, there is insufficient research on the interaction effects of demographics and other factors. More research is needed to better represent and understand how two or more determinants work together to impact the TIs of PHWs. Third, the impact of family factors on TIs requires more attention. Last but not least, the relationship between public health services and the TIs of PHWs in the context of the COVID-19 is a worthy research issue.

Conclusion

The analysis highlights the problem of turnover intentions among PHWs in China. There is a significant association between demographic factors, job characteristic factors, job satisfaction factors and turnover intentions. Policymakers should take into account all aspects of human needs that influence PHWs' intentions to stay. As illustrated by the Global Strategy on Human Resources for Health, it is particularly important to find pragmatic solutions to overcome deeply entrenched rigidities in public sector rules and practices that hinder the adoption of adequate reward systems, working conditions and career structures for health workers, with appropriate levels of flexibility and autonomy. [64] Therefore, efforts can be made to improve factors both at work and outside of work. In terms of work factors, policymakers should continue to improve reward systems, the construction of infrastructure, and promotion systems. Outside of work, authorities should pay more attention to PHWs' lives and meet their living needs to increase their willingness to work and live in communities, towns and villages. We also suggest that particular attention be given to PHWs working in the community or the eastern region of China to reduce their turnover intentions by implementing evidence-based health workforce policies.

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Contributors

Rongxin He and Ying Mao conceived this research project. Jinlin Liu and Rongxin He developed the search strategy and Rongxin He searched the databases. Jinlin Liu, Bin Zhu, Zhangning and Rongxin He selected the studies. Rongxin He designed and executed the analyses, interpreted the findings, wrote the first draft, revised subsequent drafts, and prepared the manuscript. Ying Mao and Zhang Wei-Hong revised drafts of the manuscript.

Competing interests

The authors declare that they have no competing interests.

Data availability

All data relevant to the study are included in the article or uploaded as supplementary information. No additional data are available from the authors.

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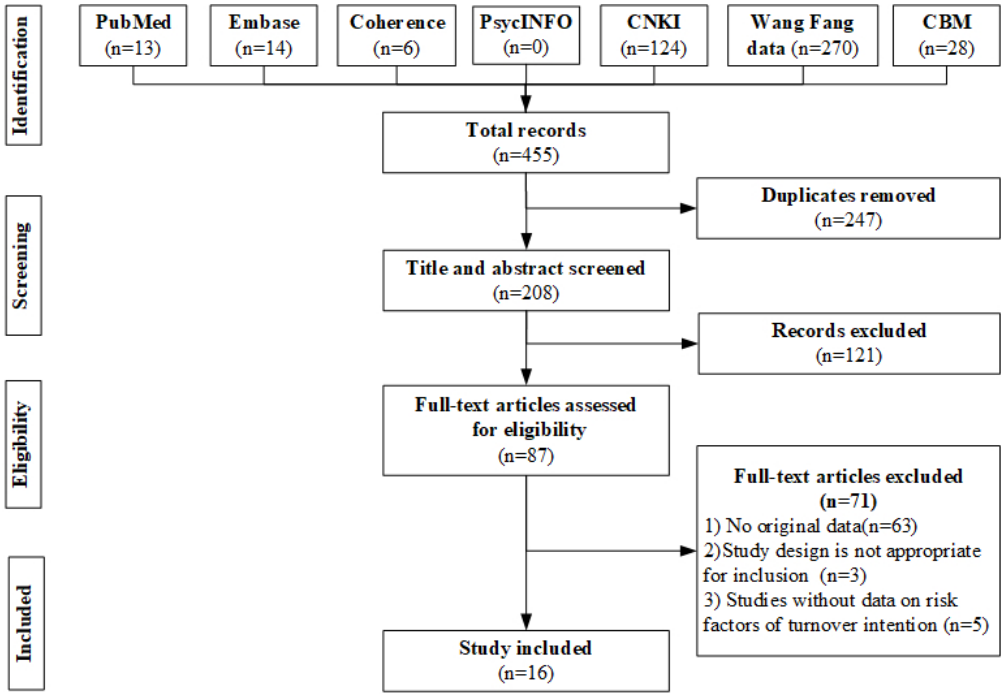

Figure 1 Flow diagram of the study selection

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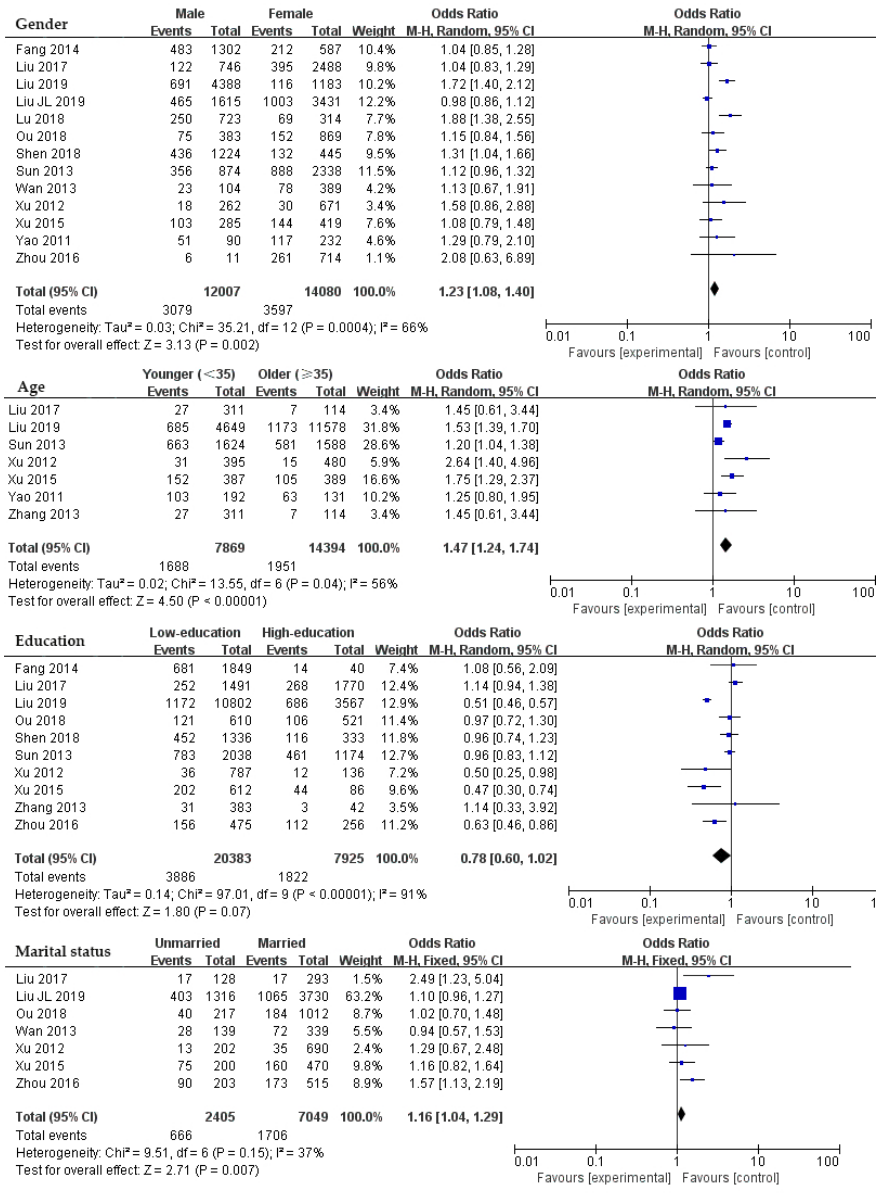


Figure 2 Forest plots of demographic factors

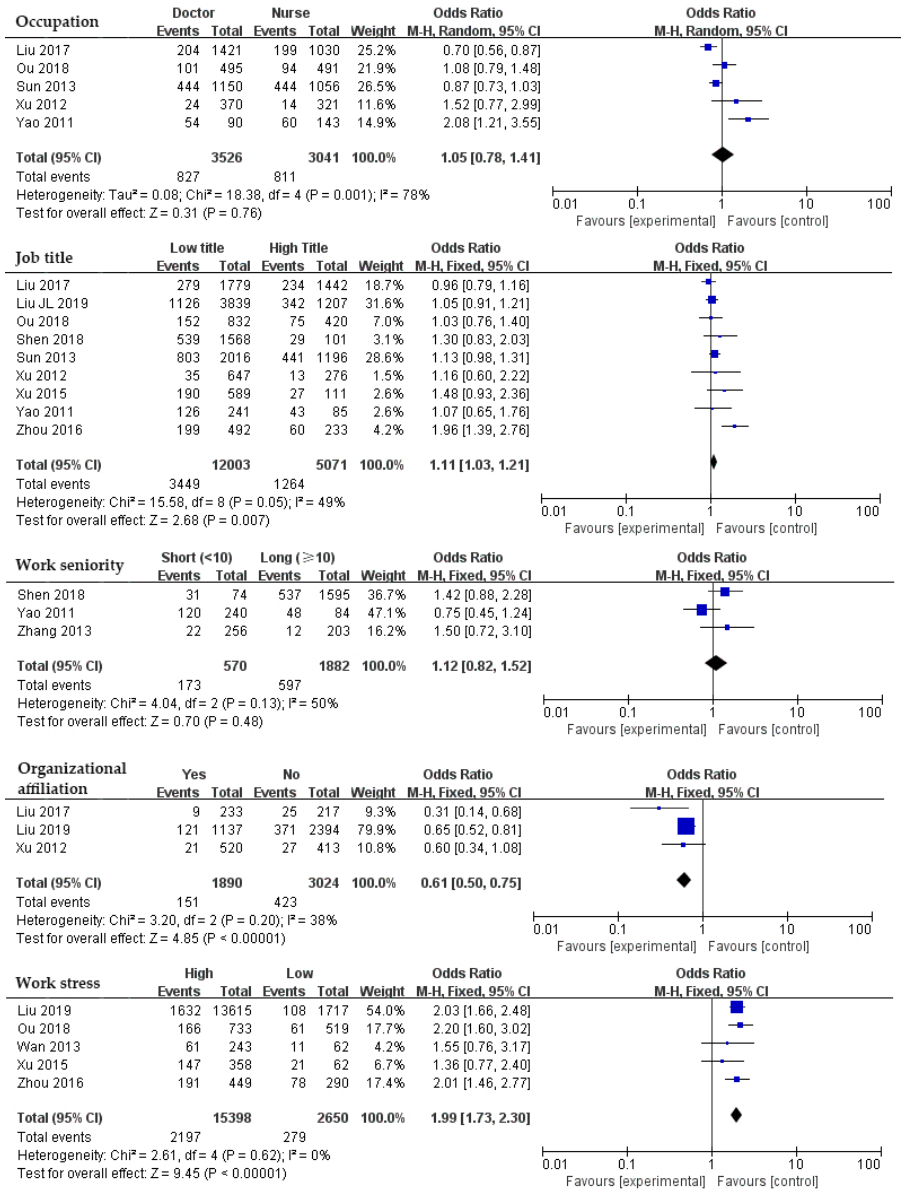


Figure 3 Forest plots of job characteristic factors

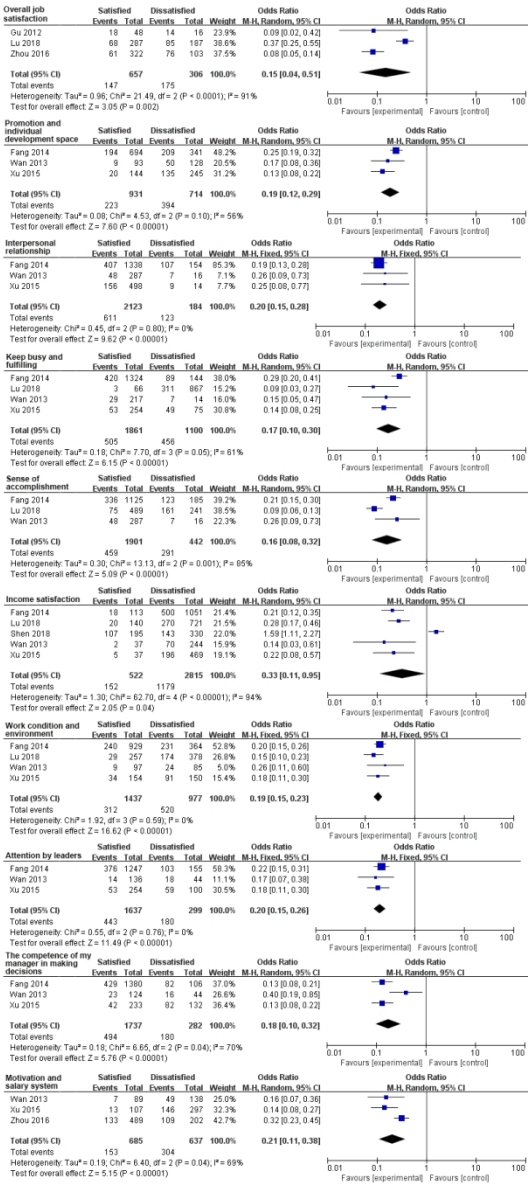


Figure 4 Forest plots of job satisfaction factors

Table S1 Search strategy

Database 1: PubMed

Sequence	Query
#1	Search (Chinese[MeSH Terms]) OR Chinese[Title/Abstract]
#2	Search (China[MeSH Terms]) OR China[Title/Abstract]
#3	***#1 OR #2*** Search (((Chinese[MeSH Terms]) OR Chinese[Title/Abstract]))OR ((China[MeSH Terms]) OR China[Title/Abstract]))
#4	Search (Health worker[MeSH Terms]) OR Health worker[Title/Abstract]
#5	Search (Health officer[MeSH Terms]) OR Health officer[Title/Abstract]
#6	Search (Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract]
#7	Search (Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract]
#8	Search (Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract]
#9	Search (Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract]
#10	Search (Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract]
#11	Search (Doctor[MeSH Terms]) OR Doctor[Title/Abstract]
#12	Search (Physician[MeSH Terms]) OR Physician[Title/Abstract]
#13	Search (Nurse[MeSH Terms]) OR Nurse [Title/Abstract]
#14	***#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #11 OR #12 OR #13*** Search ((((((((((Health worker[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health officer[MeSH Terms]) OR Health officer[Title/Abstract])) OR ((Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract])) OR ((Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract])) OR ((Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract])) OR ((Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract])) OR ((Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract])) OR ((Doctor[MeSH Terms]) OR Doctor[Title/Abstract])) OR ((Physician[MeSH Terms]) OR Physician[Title/Abstract])) OR ((Nurse[MeSH Terms]) OR Nurse [Title/Abstract])
#15	Search (Rural[MeSH Terms]) OR Rural[Title/Abstract]
#16	Search (Countryside[MeSH Terms]) OR Countryside[Title/Abstract]
#17	Search (Community[MeSH Terms]) OR Community[Title/Abstract]
#18	Search (District[MeSH Terms]) OR District[Title/Abstract]
#19	Search (Basic[MeSH Terms]) OR Basic[Title/Abstract]
#20	Search (Fundamental[MeSH Terms]) OR Fundamental[Title/Abstract]
#21	Search (Primary[MeSH Terms]) OR Primary[Title/Abstract]
#22	Search (Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]
#23	***#7 OR #8 OR #9 OR #11 OR #12 OR #13 OR #14*** Search ((((Primary[MeSH Terms]) OR Primary[Title/Abstract]) OR Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]) OR (((Community[MeSH Terms]) OR Community[Title/Abstract]) OR ((((((((((Rural[MeSH Terms]) OR Rural[Title/Abstract]) OR Countryside[MeSH Terms]) OR Countryside[Title/Abstract]) OR District[MeSH Terms]) OR District[Title/Abstract]) OR Basic[MeSH Terms]) OR Basic[Title/Abstract]) OR Fundamental[MeSH Terms]) OR Fundamental[Title/Abstract]))

#24	Search(Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract]
#25	Search (Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract]
#26	Search (Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract]
#27	Search(Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract]
#28	Search intent to leave[Title/Abstract]
#29	***#18 OR #19 OR #20*** Search ((((((Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract])) OR ((Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract])) OR ((Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract])) OR ((Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract])) OR intent to leave[Title/Abstract]
#30	***#3 AND #10AND #17AND #21*** Search ((((((((Turnover Intention[MeSH Terms]) OR Turnover Intention[Title/Abstract])) OR ((Departure Intention[MeSH Terms]) OR Departure Intention[Title/Abstract])) OR ((Demission Intention[MeSH Terms]) OR Demission Intention[Title/Abstract])) OR ((Leave Intention[MeSH Terms]) OR Leave Intention[Title/Abstract])) OR intent to leave[Title/Abstract])) AND (((((((Primary[MeSH Terms]) OR Primary[Title/Abstract]) OR Grass roots[MeSH Terms]) OR Grass roots[Title/Abstract]) OR (((Community[MeSH Terms]) OR Community[Title/Abstract]) OR ((((((((((Rural[MeSH Terms]) OR Rural[Title/Abstract]) OR Countryside[MeSH Terms]) OR Countryside[Title/Abstract]) OR District[MeSH Terms]) OR District[Title/Abstract]) OR Basic[MeSH Terms]) OR Basic[Title/Abstract]) OR fundamental[MeSH Terms]) OR fundamental[Title/Abstract])))) AND ((((((((((((Health worker[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health officer[MeSH Terms]) OR Health worker[Title/Abstract])) OR ((Health Manpower[MeSH Terms]) OR Health Manpower[Title/Abstract])) OR ((Health Personnel[MeSH Terms]) OR Health Personnel[Title/Abstract])) OR ((Medical Personnel[MeSH Terms]) OR Medical Personnel[Title/Abstract])) OR ((Medical worker[MeSH Terms]) OR Medical worker[Title/Abstract])) OR ((Medical staff[MeSH Terms]) OR Medical staff[Title/Abstract])) OR ((Doctor[MeSH Terms]) OR Doctor[Title/Abstract])) OR ((Physician[MeSH Terms]) OR Physician[Title/Abstract])) OR ((Nurse[MeSH Terms]) OR Nurse [Title/Abstract]))) AND (((((Chinese[MeSH Terms]) OR Chinese[Title/Abstract]))OR ((China[MeSH Terms]) OR China[Title/Abstract])))))))

Database 2: EMBASE

Sequence	Query
#1	'China'/exp
#2	'China':ti,ab
#3	#1 OR #2
#4	'Turnover Intention' OR 'Departure Intention' OR 'Demission Intention' OR 'Leave Intention'/exp
#5	'Turnover Intention' OR ' Departure Intention' OR 'Demission Intention' OR 'Leave Intention' OR 'intent to leave':ti,ab
#6	#4 OR #5
#7	'Primary' OR 'Grass roots' OR 'Community' OR 'Countryside' OR 'District' OR 'Basic' OR 'Rural' OR 'Fundamental':ti,ab
#8	'Health worker' OR 'Health officer' OR 'Health Manpower' OR 'Health Personnel' OR 'Medical Personnel' OR 'Medical worker' OR 'Medical staff ' OR 'Doctor' OR 'Physician' OR 'Nurse':ti,ab

#9	#3 AND #6 AND #7 AND #8

Database 3: Cochrane Library

Sequence	Query
#1	china:ti,ab,kw (Word variations have been searched)
#2	chinese:ti,ab,kw(Word variations have been searched)
#3	#1 or #2
#4	(turnover intention):ti,ab,kw OR (departure Intention):ti,ab,kw OR (demission Intention):ti,ab,kw OR (leave Intention):ti,ab,kw OR (intent to leave):ti,ab,kw(Word variations have been searched)
#5	(primary):ti,ab,kw OR (community):ti,ab,kw OR (rural):ti,ab,kw OR (basic):ti,ab,kw OR (countryside):ti,ab,kw(Word variations have been searched)
#6	(health worker):ti,ab,kw OR (health manpower):ti,ab,kw OR (health personnel):ti,ab,kw OR (health officer):ti,ab,kw(Word variations have been searched)
#7	(medical worker):ti,ab,kw OR (medical staff):ti,ab,kw OR (doctor):ti,ab,kw OR (physician):ti,ab,kw OR (nurse):ti,ab,kw(Word variations have been searched)
#8	#5 or #6
#9	#3 and #4 and #5 and #8

Database 4: PsycINFO

Sequence	Query
#1	Title: china OR Abstract: china OR Title: chinese OR Abstract: chinese
#2	Title: turnover intention OR Abstract: turnover intention OR Title: Departure Intention OR Abstract: Departure Intention OR Title: Demission Intention OR Abstract: Demission Intention OR Title: Leave Intention OR Abstract: Leave Intention OR Abstract: intent to leave
#3	Title: Health worker OR Abstract: Health worker OR Title: Health officer OR Abstract: Health officer OR Title: Health Manpower OR Abstract: Health Manpower OR Title: Health Personnel OR Abstract: Health Personnel OR Title: Medical Personnel OR Abstract: Medical Personnel OR Title: Medical worker OR Abstract: Medical worker OR Title: Medical staff OR Abstract: Medical staff OR Title: Doctor OR Abstract: Doctor OR Title: Physician OR Abstract: Physician OR Title: Nurse OR Abstract: Nurse
#4	Title: Rural OR Abstract: Rural OR Title: Countryside OR Abstract: Countryside OR Title: Community OR Abstract: Community OR Title: District OR Abstract: District OR Title: Basic OR Abstract: Basic OR Title: Fundamental OR Abstract: Fundamental OR Title: Primary OR Abstract: Primary OR Title: Grass roots OR Abstract: Grass roots
#5	#1 AND #2 AND #3 AND #4

Database 5: CAJD (CNKI)

SU=('医生'+'医务人员'+'护士'+'卫生人员')AND SU=('离职意愿'+'离职倾向'+'离职意向'+'留职意愿'+'工作意愿'+'留职意向')AND SU=('基层'+'社区'+'农村'+'乡镇卫生院'+'卫生服务中心')

Database 6: CSPD (WANFANG Data)

(题名或关键词:(社区)+题名或关键词:(农村)+题名或关键词:(基层) +题名或关键词:(乡镇卫生院) +题名或关键词:(卫生服务中心))*(题名或关键词:(离职意愿)+题名或关键词:(离职倾向)+题名或关键词:(离职意向)) +题名或关键词:(留职意愿)) +题名或关键词:(工作意愿)) +题名或关键词:(留职意向)) *(题名或关键词:(医生)+题名或关键词:(护士)+题名或关键词:(医务人员) +题名或关键词:(卫生人员))

Database 7: CBM

(((((("社区"[标题:智能]) OR "基层"[标题:智能]) OR "农村"[标题:智能]) OR "乡镇卫生院"[标题:智能]) OR "卫生服务中心"[标题:智能]) AND (((((("离职意愿"[标题:智能]) OR "离职倾向"[标题:智能]) OR "离职意向"[标题:智能]) OR "留职意愿"[标题:智能]) OR "工作意愿"[标题:智能]) OR "留职意向"[标题:智能] AND ((((("医生"[标题:智能]) OR "护士"[标题:智能]) OR "卫生人员"[标题:智能]) OR "医务人员"[标题:智能])

Table S2 The inter-rater reliability for the title abstract screening by the two authors

	TItle		Abstract	
	Author 1	Author 2	Author 1	Author 2
Inclued	120	112	89	83
Exclued	88	96	25	31
Agreement	200		108	
Sum	208		114	
Rate	96.15%		94.74%	

Table S3 47 factors related to TI

Group	Category	Exposure
A	Demographic	A1-gender, A2-age, A3-education, A4-region, A5-marital status, A6-nation, A7-major,
B	Job characteristic	B1-occupation, B2-job title, B3-work seniority, B4-qualified to practice, B5- remuneration, B6-medical institution, B7-organizational affiliation, B8- re-employ after retirement, B9-turnover experience, B10-individual income levels in the local, B11-work stress, B12-emotional exhaustion, B13-flattening of affect, B14-public health service, B15- working hours, B16-career planning, B17-career identity, B18-Social status B19-influence family life, B20-living condition, B21-lack of insurance, B22-patient trust.
C	Job satisfaction	C1-learning and training opportunities, C2-promotion and individual development space, C3-interpersonal relationship, C4-work conditions and environment, C5- sense of accomplishment, C6-scientific research atmosphere, C7-level of attention by leaders, C8-income satisfaction, C9-keep busy and fulfilling, C10-the competence of my manager in making decisions, C11-work stability, C12-policies practice, C13-the chance to try my own methods of doing the job, C14-the chance to do something that makes use of my abilities, C15-job satisfaction, C16-work support, C17-income fairness, C18-motivation and salary system ,.

Table S4 Quality scores assessing risk of bias using a modified Newcastle-Ottawa scale

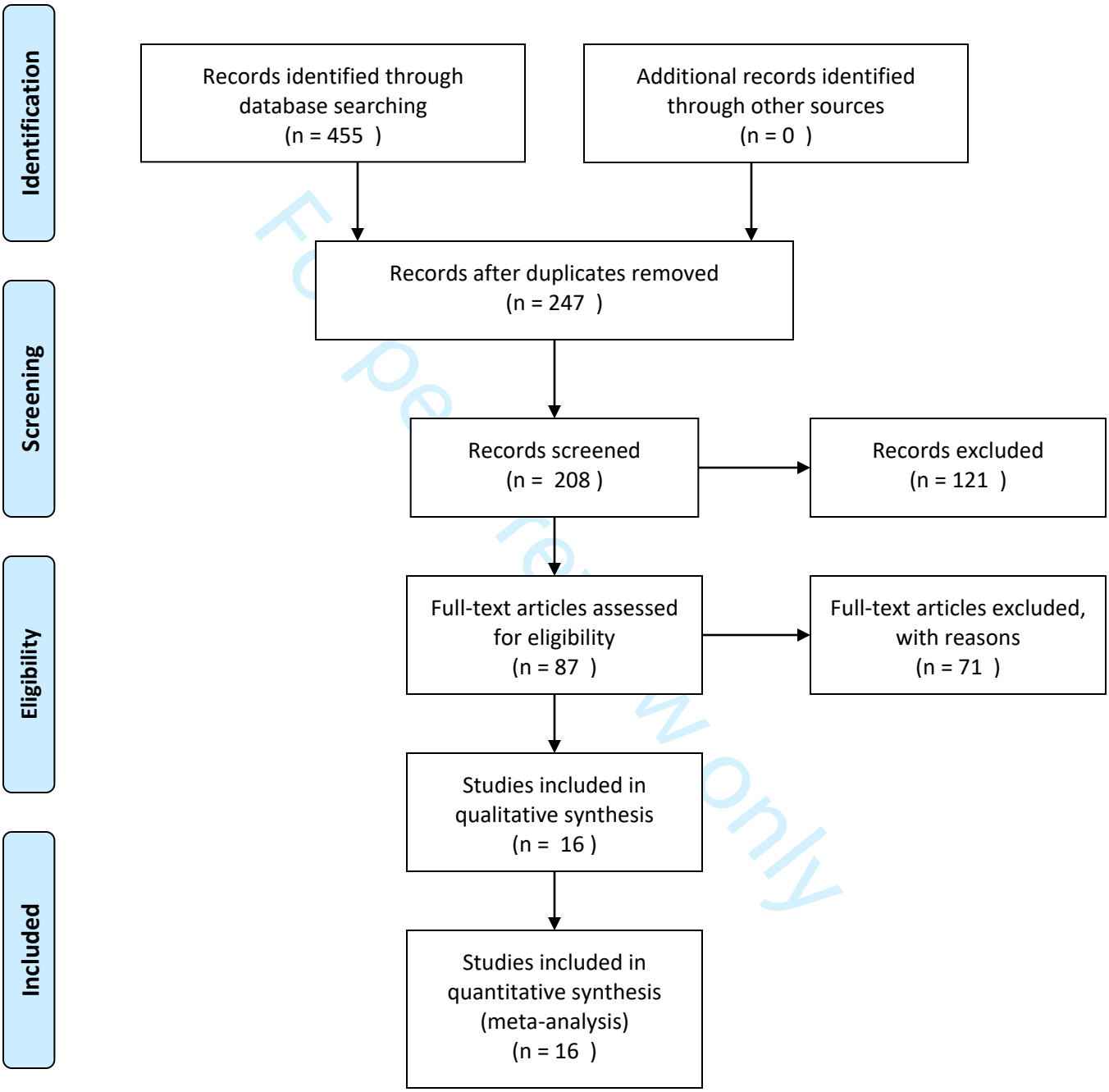
Study type: Cross-sectional; Score: 1=achieved, 0=not achieved								
Authors	**Representativeness of the sample**	**Sample size**	**Non-respondents**	**Ascertainment of the exposure**	**Comparability of subjects in different outcome groups (control for confounding)**	**Assessment of the outcome**	**Statistical test is appropriate**	**Total score**
Xu,2012	1	1	0	1	1	1	1	6
Gu,2012	0	1	0	1	1	1	1	5
Yao,2011	0	1	0	1	0	1	1	4
Lu,2018	1	1	0	1	0	1	1	5
Ou,2018	1	1	0	1	1	1	1	6
Xu,2015	0	1	0	1	1	1	1	5
Liu,2019	1	1	0	1	1	1	1	6
Zhang,2013	0	1	0	1	1	1	1	5
Liu,2017	1	1	0	1	0	1	1	5
Shen,2018	1	1	0	1	1	1	1	6
Zhou,2016	0	1	0	1	0	1	1	4
Zhang,2015	0	1	0	1	1	1	1	5
Wan,2013	0	1	0	1	0	1	1	4
Fang,2014	1	1	0	1	1	1	1	6
Sun,2013	1	1	0	1	1	1	1	6
Liu JL,2019	1	1	0	1	1	1	1	6

Table S5 Meta-analyses on 19 factors

Exposure	No. of studies in Meta-analyses	Comparison model	Q test		Statistical model	Pooled OR	Z test	Egger
			I^2	*P*-value		OR (95%CI)	*P*-value	P>|t|
Demographic factors								
Gender	13	Male vs. female	66%	0.0004	Random-effect	1.23 [1.08, 1.40]	0.002	0.240
Age	7	Younger (<35) vs. older (≥35)	56%	0.04	Random-effect	1.47 [1.24, 1.74]	< 0.00001	0.368
Education	10	Low-education (junior college or below) vs. high-education(bachelor degree or above)	91%	< 0.00001	Random-effect	0.78 [0.60,1.02]	0.07	0.325
Marital status	7	Unmarried vs. married	37%	0.15	Fixed-effect	1.16 [1.04, 1.29]	0.007	0.095
Job characteristic factors								
Occupation	5	Doctor vs. nurse	78%	0.001	Random-effect	1.05 [0.78, 1.41]	0.76	0.221
Job title	9	Low-title (no title or junior title) vs. high-title (middle title or senior title)	49%	0.05	Fixed-effect	1.11 [1.03, 1.21]	0.007	0.223
Work seniority	3	Short (<10) vs. long (≥10)	50%	0.13	Fixed-effect	1.12 [1.82, 1.52]	0.48	0.117
Organizational affiliation	4	Authorized personnel vs. others	38%	0.20	Fixed-effect	0.85 [0.73, 1.00]	< 0.00001	0.400
Work stress	5	High vs. low	0%	0.62	Fixed-effect	3.14 [2.73, 3.61]	< 0.00001	0.169
Job satisfaction factors								
Overall job satisfaction	3	Satisfied vs. dissatisfied	91%	< 0.0001	Random-effect	0.15 [0.04, 0.51]	0.002	0.561
Promotion and individual development space	3	Satisfied vs. dissatisfied	56%	0.10	Random-effect	0.19 [0.12, 0.29]	< 0.00001	0.160
Interpersonal relationship	3	Satisfied vs. dissatisfied	0%	0.80	Fixed-effect	0.20 [0.15, 0.28]	< 0.00001	0.522
Keep busy and fulfilling	4	Satisfied vs. dissatisfied	61%	0.05	Random-effect	0.39 [0.33, 0.47]	< 0.00001	0.162
Sense of accomplishment	3	Satisfied vs. dissatisfied	85%	0.001	Random-effect	0.16 [0.08, 0.32]	< 0.00001	0.291

Income satisfaction	5	Satisfied vs. dissatisfied	94%	< 0.00001	Random-effect	0.33 [0.11, 0.95]	0.04	0.216
Work condition and environment	5	Satisfied vs. dissatisfied	0%	0.59	Fixed-effect	0.19 [0.15, 0.23]	< 0.00001	0.153
Attention by leaders	3	Satisfied vs. dissatisfied	0%	0.76	Fixed-effect	0.20 [0.15, 0.26]	< 0.00001	0.120
The competence of my manager in making decisions	3	Satisfied vs. dissatisfied	70%	0.04	Random-effect	0.18 [0.10, 0.32]	< 0.00001	0.210
Motivation and salary system	3	Satisfied vs. dissatisfied	69%	0.04	Random-effect	0.21 [0.11, 0.38]	< 0.00001	0.161

PRISMA 2009 Flow Diagram



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

MOOSE Checklist for Meta-analyses of Observational Studies

Item No	Recommendation	Reported on Page No
Reporting of background should include		
1	Problem definition	3
2	Hypothesis statement	-
3	Description of study outcome(s)	5
4	Type of exposure or intervention used	4
5	Type of study designs used	4-5
6	Study population	6
Reporting of search strategy should include		
7	Qualifications of searchers (eg, librarians and investigators)	4
8	Search strategy, including time period included in the synthesis and key words	4, Table S1
9	Effort to include all available studies, including contact with authors	6
10	Databases and registries searched	4
11	Search software used, name and version, including special features used (eg, explosion)	5
12	Use of hand searching (eg, reference lists of obtained articles)	6
13	List of citations located and those excluded, including justification	Fig 1
14	Method of addressing articles published in languages other than English	4-5
15	Method of handling abstracts and unpublished studies	-
16	Description of any contact with authors	-
Reporting of methods should include		
17	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	4-5
18	Rationale for the selection and coding of data (eg, sound clinical principles or convenience)	4-5
19	Documentation of how data were classified and coded (eg, multiple raters, blinding and interrater reliability)	4
20	Assessment of confounding (eg, comparability of cases and controls in studies where appropriate)	-
21	Assessment of study quality, including blinding of quality assessors, stratification or regression on possible predictors of study results	4-5
22	Assessment of heterogeneity	5
23	Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated	4-5
24	Provision of appropriate tables and graphics	Tables 1,s1-s5 Fig 1
Reporting of results should include		
25	Graphic summarizing individual study estimates and overall estimate	Figs 2-4
26	Table giving descriptive information for each study included	Table 1
27	Results of sensitivity testing (eg, subgroup analysis)	-
28	Indication of statistical uncertainty of findings	-

Item No	Recommendation	Reported on Page No
Reporting of discussion should include		
29	Quantitative (eg, publication bias)	**Table 2, Figs2-4**
30	Justification for exclusion (eg, exclusion of non-English language citations)	**6**
31	Assessment of quality of included studies	**6,Tables S4**
Reporting of conclusions should include		
32	Consideration of alternative explanations for observed results	**10-12**
33	Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)	**11-12**
34	Guidelines for future research	**11**
35	Disclosure of funding source	**12**

From: Stroup DF, Berlin JA, Morton SC, et al, for the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) Group. Meta-analysis of Observational Studies in Epidemiology. A Proposal for Reporting. *JAMA*. 2000;283(15):2008-2012. doi: 10.1001/jama.283.15.2008.

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Not applicable
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4-5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Not applicable
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5-6
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	6-7
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	8
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Not applicable
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	8
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	10-11
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	11-12
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	11-12
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	12

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097